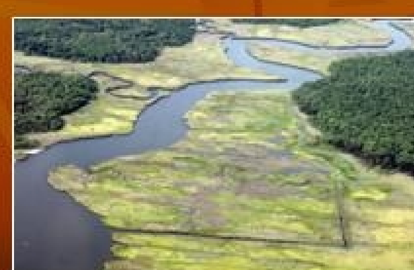
Suffolk County Vector Control & Wetlands Management Long Term Plan & Environmental Impact Statement



Steve Levy, County Executive

FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT

Volume 1 of 5

Final Generic Environmental Impact Statement

Prepared for:

Suffolk County Department of Environment and Energy
Suffolk County Department of Health Services
Suffolk County Department of Public Works
Suffolk County, New York

Prepared by:

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October 2006

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SUFFOLK COUNTY DEPARTMENT OF ENVIRONMENT AND ENERGY
SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS

FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT

SUFFOLK COUNTY VECTOR CONTROL AND WETLANDS MANAGEMENT LONG-TERM PLAN

OCTOBER 2006

Required By and Prepared for:

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SUFFOLK COUNTY VECTOR CONTROL AND WETLANDS MANAGEMENT LONG - TERM PLAN AND ENVIRONMENTAL IMPACT STATEMENT

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Acronym and Abbreviation List

ABDL	Suffolk County Department of Health Services Arthropod-borne Disease Laboratory
BMP	Best management practice
Bs	*Bacillus sphaericus*
Bti	*Bacillus thuringiensis var israelensis*
CAC	Citizens Advisory Committee
CDC	Centers for Disease Control and Prevention
CDEP	Connecticut Department of Environmental Protection
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COPOPAW	Coalition for the Protection of People and Wetlands
DGEIS	Draft Generic Environmental Impact Statement
DO	Dissolved oxygen concentration
EEE	Eastern equine encephalitis
EIS	Environmental Impact Statement
FGEIS	Final Generic Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, Rodenticide Act
FIIS	Fire Island National Seashore (for **Fi**re **Is**land, an abbreviation convention used by NPS)
FINS	Fire Island National Seashore
IPM	Integrated Pest Management
LISS	Long Island Sound Study
MSDS	Material Safety Data Sheet
NEPA	National Environmental Protection Act
NPS	National Park Service
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
OMWM	Open Marsh Water Management
PBO	Piperonyl butoxide
PEP	Peconic Estuary Program
PEP CCMP	Peconic Estuary Program Comprehensive Conservation and Management Plan
PSA	Public Service Announcement
R-T-E	Rare-threatened-endangered species
SCDEE	Suffolk County Department of Energy and the Environment
SCDHS	Suffolk County Department of Health Services
SCDPW	Suffolk County Department of Public Works
SCVC	Suffolk County Department of Vector Control, Division of Vector Control
SEQRA	State Environmental Quality Review Act
SETAC	Society of Environmental Toxicology and Contamination
SSER	South Shore Estuary Reserve
TAC	Technical Advisory Committee
USACOE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WNV	West Nile virus

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Overview

The Vector Control and Wetlands Management Long-Term Plan has established a sustainable framework for protecting public health, reducing pesticide usage, and restoring marshes. This Final Generic Environmental Impact Statement (FGEIS) is associated with the third major revision of the Long-Term Plan. That draft Plan was first issued in September, 2005, and was revised in May 2006 in response to significant environmental review and advisory committee comments. The Plan benefited from an extensive collaboration of stakeholders, including agencies, non-profit institutions, and citizens. As part of this process, 15 committee meetings were held (Citizens Advisory, Technical Advisory, and Steering).

The May 2006 Plan improved the September 2005 version in many ways. For example, several technical clarifications were made (e.g., 75 percent larvicide reduction applies to total acreage larvicided), a brief executive summary was prepared, and a public-friendly abstract on risk assessment was produced. More specificity was provided on actions. Threshold criteria for adulticiding were added, and the document better addressed the distinction between vector control (i.e., "public health nuisance control") vs. emergency response. Objectives for public education and outreach were also bolstered.

The revised Plan and FGEIS were formally released for public comment on May 17, 2006. A total of 114 submissions were made, resulting in 1,544 comments. All comments received a response in this FGEIS. Every attempt was made to make this FGEIS user-friendly, including meticulous indexing, the preparation of an Executive Summary, and discussion of key issues.

Many FGEIS comments have resulted in further Plan improvements. For example, the October 2006 Plan clarifies that *every* adulticide application will be preceded by an objective (numeric) threshold measurement of mosquitoes. Further additions on education and outreach were made, such as targeted education (e.g., schools, homeowner associations). Criteria for further environmental review have been clarified. Also, the draft triennial report format has been included in the Plan (including goals, performance measures, indicators of success, etc.).

Perhaps most significantly, the wetlands strategy has been revamped. The 15-acre threshold which would trigger further review for minor Best Management Practices (BMPs) has been eliminated. All but the most benign BMPs (e.g., hand ditch maintenance; culvert replacement) will receive strict environmental review. As part of the program, no new ditches will be created, and routine machine ditch maintenance has ceased. During the first triennial implementation period, the program will focus on minor water management, such as replacing culverts and restoring tidal circulation. The confusing term "Open Marsh Water Management" has been eliminated, in favor of "Integrated Marsh Management." Wetlands health will be the paramount objective for all projects. The Wetlands Stewardship Committee membership (four non-profits) and jurisdiction (most wetland BMPs) have expanded.

Other comments resulted in extensive responses and clarifications, but not major substantive changes to the Plan itself. These comments include the distinction between public health nuisance and disease control, modeling of West Nile Virus effects in the absence of vector control, and non-target impacts of methoprene.

This latest Plan and FGEIS are the beginning, not the end, of the Long-Term Plan. The collaborative process of adaptive management will proceed, as the Steering Committee and its advisory committees will continue to meet regularly. Ultimately, the Wetlands Stewardship Committee strategy will address the assessment and management needs of all 17,000 acres of tidal wetlands in Suffolk, irrespective of whether those wetlands pose Vector Control concerns. Results of Stewardship Committee efforts will be reflected in the first triennial plan update.

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Executive Summary

ES-1. Introduction

Suffolk County Department of Public Works (SCDPW) submitted an Environmental Assessment Form for the development of a Vector Control and Wetlands Management Long-Term Plan to the Council on Environmental Quality (CEQ) on May 2, 2002. On May 15, 2002, the CEQ issued a recommendation for a Positive Declaration to the Suffolk County Legislature. The Legislature issued the Positive Declaration at its meeting on August 6, 2002. Public Scoping was held for the project, and the Final Scope was published August 1, 2003. The Final Scope was adopted by the Legislature by Resolution 1122 (dated December 16, 2003). The resolution was signed by County Executive Robert Gaffney on December 18, 2003.

A Draft Generic Environmental Impact Statement (DGEIS) for the Suffolk County Vector Control and Wetlands Management Long-Term Plan was submitted to CEQ on May 3, 2006. It was accepted as complete by CEQ at its May 17, 2006 meeting. At that meeting, CEQ set a 60 day comment period (through July 17, 2006) and also announced that two public hearings would be held. Public hearings were thus held, on Thursday, June 29, 2006, from 6 to 9 pm, at the Maxine S. Postal Legislative Auditorium, Riverhead, and on Thursday, July 6, 2006, from 10 am to 1 pm in the Rose A. Caracappa Legislative Auditorium, Hauppauge, before members of CEQ, with CEQ Chair Dr. R. Lawrence Swanson presiding.

At the CEQ meeting held on August 9, 2006, CEQ determined that the comments received in writing and at the hearings were substantive in nature, and forwarded a recommendation to the Legislature that it cause to have a Final Generic Environmental Impact Statement (FGEIS) prepared. The Legislature, at its meeting on October 17, 2006, passed resolution 1103-2006 authorizing the preparation of a FGEIS. The resolution was signed by County Executive Steve Levy on October 20, 2006.

The attached document is the FGEIS for the Suffolk County Vector Control and Wetlands Management Long-Term Plan. Per the regulations associated with the State Environmental Quality Review Act (SEQRA), the FGEIS presents the substantive comments made regarding the DGEIS, provides responses to those comments, and identifies those environmental issues for which further environmental reviews will be needed. Furthermore, per SEQRA, it also identifies the issues for which a Supplemental Environmental Impact Statement will need to be prepared.

ES-2. Revisions to the Long-Term Plan

The Long-Term Plan was developed in an open, transparent, and responsive process, with a great deal of public involvement and guidance. In keeping with this process, on receipt of comments on the DGEIS, project managers and the consultant team determined that changes to the May 3, 2006 Long-Term Plan were warranted.

The most substantial changes were made in three areas. One was to make the criteria for adulticide applications consistent throughout the document. The second was to acknowledge requests for changes to the education program, and to seek to find the resources that might allow for the requested changes to be implemented. The third area where most of the changes were made to the Long-Term Plan were in the water management portion of the Long-Term Plan. All three will be discussed here.

ES-2.1. Vector Control Adulticide Application Criteria

There are three potential trigger levels set to allow consideration of a Vector Control adulticide treatment, discussed in Section 7 (Adult Control) of the Long-Term Plan, and also referred to in Section 3, Surveillance. These are mosquito counts associated with New Jersey traps, with CDC light traps, and landing rates. Language in the May 3, 2006 Long-Term Plan was not precise in every reference to these criteria. The County intends that Vector Control treatments will not be allowed unless the following is true:

- Female mosquitoes from human-biting species exceed 25 per trap night in a New Jersey trap. New Jersey traps are often sampled after operating over several nights. Therefore, the number of mosquitoes that are female and are positively identified as being from species that bite humans will be counted, and the sum will be divided by the number of nights the trap was in operation. This quotient must be 25 or greater if an application is to be considered.

- Female mosquitoes from human-biting species exceed 100 in a CDC light trap. CDC light traps are only set out for one night. Therefore, the number of female mosquitoes from appropriate species in the trap must exceed 100 if an application is to be considered.

- Landing rates for mosquitoes must exceed 1 per minute. Landing rates are measured over a several minute time period (the intent is to use five minute periods as a standard), as it can take some time for mosquitoes to begin to find the potential prey. The number of mosquitoes brushed away or captured on pants legs will be determined. This number will be divided by the time period to determine the landing rate. The quotient must equal or exceed one for an application to be considered.

One or more of these criteria must be met for a Vector Control application to be considered. Failure to meet any one of these criteria will prevent the application from being considered, so long as there is no evidence the test was flawed. Meeting these criteria is not sufficient to cause an application, however; the Long-Term Plan describes a number of other criteria that must be met in order for an application to be made.

ES-2.2. Public Education and Outreach Considerations

Several concrete additions to the education and outreach program were made. They included:

- Use Public Service Announcements (PSAs)

- Conduct elementary school education programs

- Conduct homeowner association education programs

- Target school properties for inspections

- Focus on waste tire removal

- Conduct residential and commercial property audits

The County notes that its proposed education and outreach program through SCDHS health educators includes potential school and homeowner association education efforts. Elementary school education efforts for mosquito issues are difficult, because it is often best to address younger children on issues when it is most relevant to do so. Peak times of concern for mosquitoes tend to be either very early in the school year or late in the school year (or over the summer), and so it tends to make the outreach somewhat suboptimal. In addition, vector control issues are most relevant to the Earth Science curriculum as taught in high school. Nonetheless, the County will not avoid opportunities to educate younger children. Homeowner associations are recognized as good audiences for outreach efforts, especially to encourage source reduction and other mosquito impact avoidance steps.

SCVC inspection programs are almost always in response to complaints. The County acknowledges that prophylactic inspections could be fruitful. However, with over 100 school districts (almost all having many more than one school) in Suffolk County, and untold numbers of commercial properties, such an inspection program is well beyond available resources. The County will continue to strive to respond to all complaint calls within three days of receipt, including any from schools and commercial properties.

The County acknowledges in the Long-Term Plan that waste tires are a material of concern. Waste management is not a County function in Suffolk County. Various County departments are responsible for litter as part of their associated responsibilities in parks or road maintenance, for instance. SCVC will increase its outreach efforts through SCDPW resources, and through SCDHS education and outreach programs, to increase awareness that removal of littered tires not only is an aesthetic issue, and potentially a fire safety issue, but is clearly a health issue because of their potential to serve as mosquito breeding habitat.

The County has found that, very generally speaking, Public Service Announcements (PSAs) are ineffective means of reaching target audiences. They are costly (if professionally produced). If not professionally produced, they can be unattractive for media outlets to use. The County has no control over when the PSAs are aired and therefore can not ensure that the messages are made at times when their use would be most productive. Nonetheless, the County is not adverse to using PSAs. However, in a setting of limited resource availability, producing PSAs does not seem to be the most productive activity the County should consider. The County will seek to optimize its opportunities to produce PSAs through leveraged or donated resources, as is possible.

ES-2.3. Wetlands Management Revisions

More comments were received on wetlands management than on any other single topic. Many comments concerned the potential for the County water management activities to impact the ecological or environmental health of the marshes. The County considered these comments very carefully, and has made some substantial changes to the Long-Term Plan to address and mitigate those concerns.

The primary means that this was accomplished was by increasing scrutiny and review of all potential projects involving the County. In addition, the County has created a diverse and able committee to assist the County in determining a definition of wetlands health, and to use that definition to create a comprehensive marsh management plan for the County. The Integrated Marsh Management program that results will include vector control as one of many concerns when wetlands management projects are considered. However, wetland health will continue to be the paramount consideration in all cases. Finally, the County is limiting the scope of its program over the first three years of the Long-Term Plan to continued activities in the Wertheim National Wildlife Refuge, and small, low impact projects (probably limited to County-owned sites). The following discussion will amplify on these broad changes.

The Best Management Practices Manual identified 15 BMPs to use in the course of conducting water management projects under the Long-Term Plan. These were:

- BMP 1. Natural Processes (no action/reversion)

  Reversion is to be the presumptive interim action for County wetlands, pending identification of a preferred active restoration plan for each wetland.

- BMP 2. Maintain/repair existing culverts, weirs, bridges

- BMP 3. Maintain/reconstruct existing upland/fresh water ditches

- BMP 4. Selective maintenance/reconstruction of existing salt marsh ditches

Maintenance of ditches will only occur under well-defined conditions, subject to local concerns and input. Machine maintenance of ditches will be limited to an affected marsh area of 50 acres per year.

- BMP 5. Upgrade or install culverts, weirs, bridges
- BMP 6. Naturalize existing ditches
- BMP 7. Install shallow spur ditches
- BMP 8. Back-blading and/or sidecasting material into depressions
- BMP 9. Create small fish reservoirs in mosquito breeding areas
- BMP 10. Break internal berms
- BMP 11. Install tidal channels
- BMP 12. Plug existing ditches
- BMP 13. Construct large ponds
- BMP 14. Fill existing ditches
- BMP 15. Remove dredge spoils

It was recognized that in some instances it will not be possible to immediately implement preferred long-term management programs at particular sites. In those cases, Interim Management Practices can be used until more permanent approaches are undertaken. The four Interim Management/Ongoing Maintenance Actions (IMAs) were:

- IMA 1. Natural Process (No action reversion)
- IMA 2. Selective ditch maintenance
- IMA 3. Culvert repair/maintenance when tidal restrictions are apparent

- IMA 4. Stop-gap ditch plug maintenance

- In response to comments, the County reclassified the BMPs as follows: Actions having No or Minimal Impacts (BMPs 1-2)
- Actions having Minor Impacts (BMPs 3-4)
- Actions having the potential for Significant Impacts (BMPs 5-9)
- Actions having the potential for Major Impacts (BMPs 10-15)

This is a much more restrictive classification than was formerly considered.

Review processes were established for all projects. For one, all potential projects are to be presented to and discussed with local natural resource officials (at the Towns or through the Trustees). The Wetlands Stewardship Committee (see just below for more details) will formally review and approve all activities using BMPs 10-15, and will be notified of all projects using BMPs 5-9. The Wetlands Stewardship Committee membership can consider for formal review any project it deems to be significant, noteworthy, or otherwise of interest. All projects involving BMPs 5-15 will undergo SEQRA review. All necessary permits will be applied for, including New York State Department of Environmental Conservation (NYSDEC) permits for all projects involving BMPs 2, and 4-15. The Wetlands Subcommittee, a voluntary group composed of technical resource specialists from the immediate area, will be advisory to all parties in this process. Figure ES-1 lays out this program conceptually; it is discussed in more detail in this document in Section 3.3, and in Section 4 of the Long-Term Plan (and Section 2 of its associated Wetlands Management Plan). With the 15 acre threshold for review for BMPs 5-9 has been eliminated, in response to public comments; all BMPS will be reviewed in accordance with Figures ES-2 through ES-6.

Figure ES-1. Overall Hierarchy of Proposed Best Management Practices

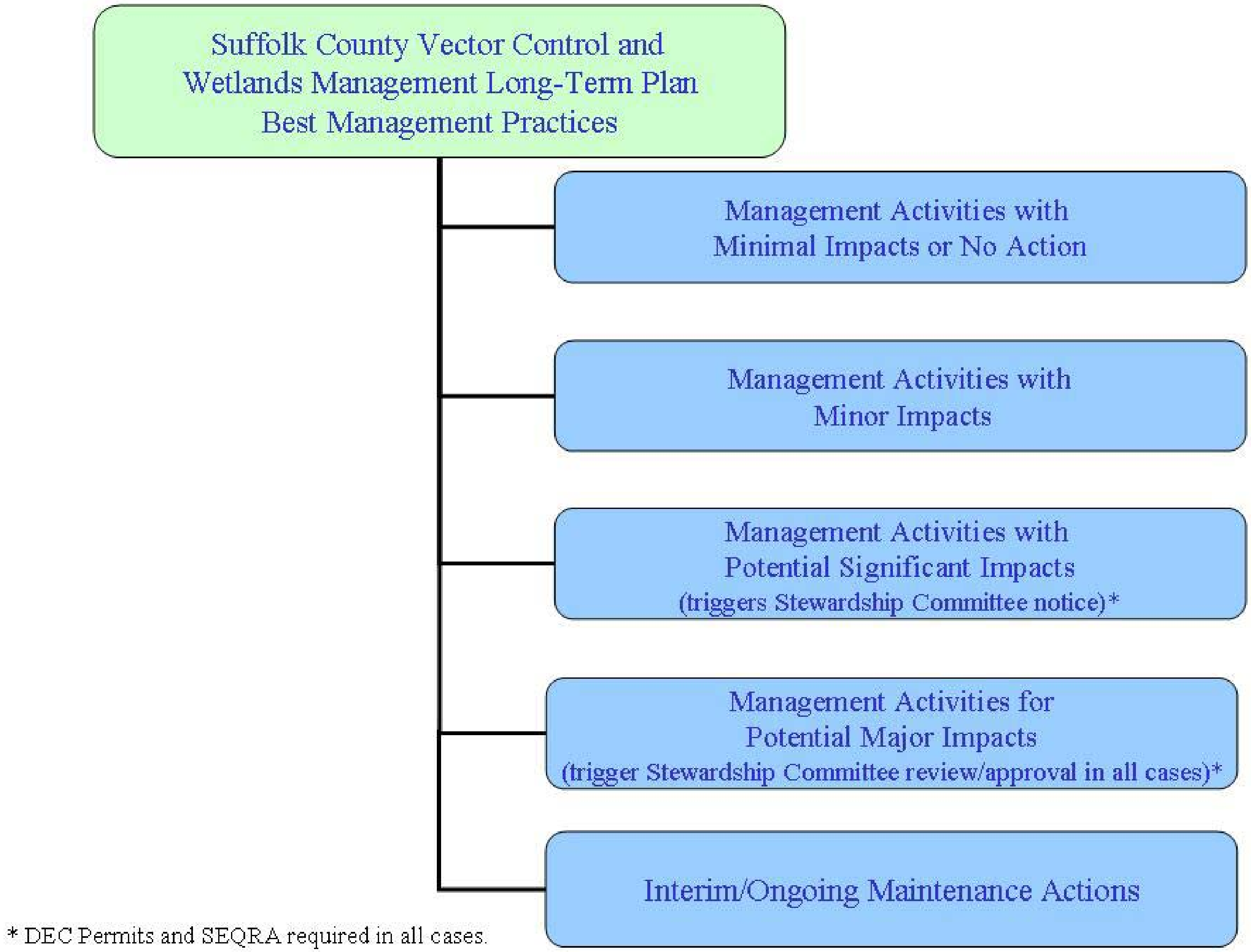
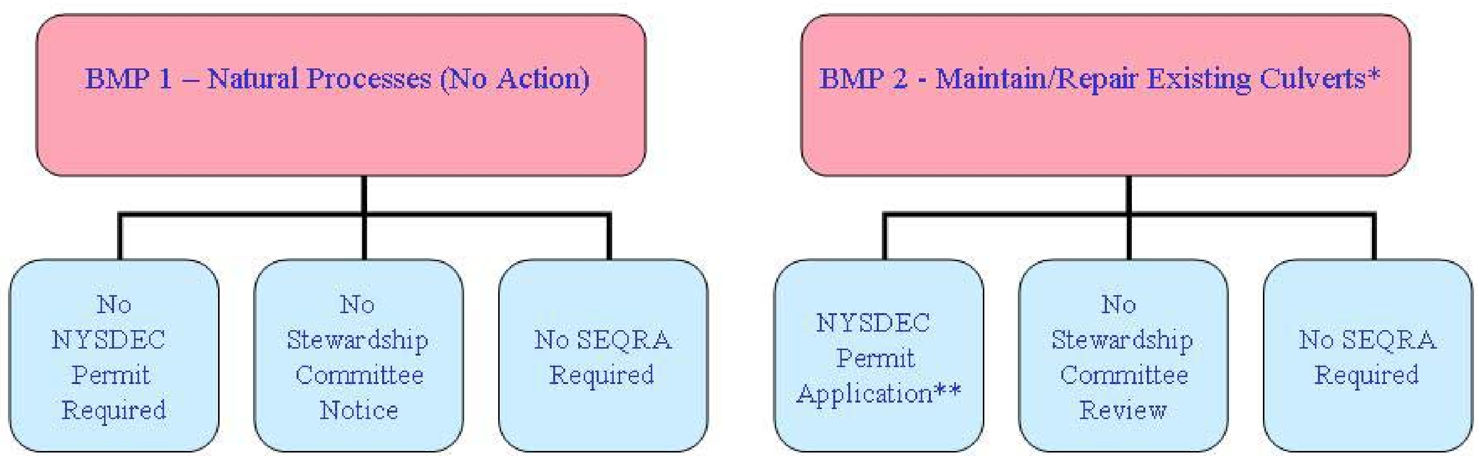


Figure ES-2. Review Process for Management Activities with No or Minimal Impacts

S.C. Vector Control and Wetlands Management Long-Term Plan

Review Process for Wetlands Activity

NO ACTION & MINIMAL IMPACT



* Replacement in-kind with substantially identical culvert.

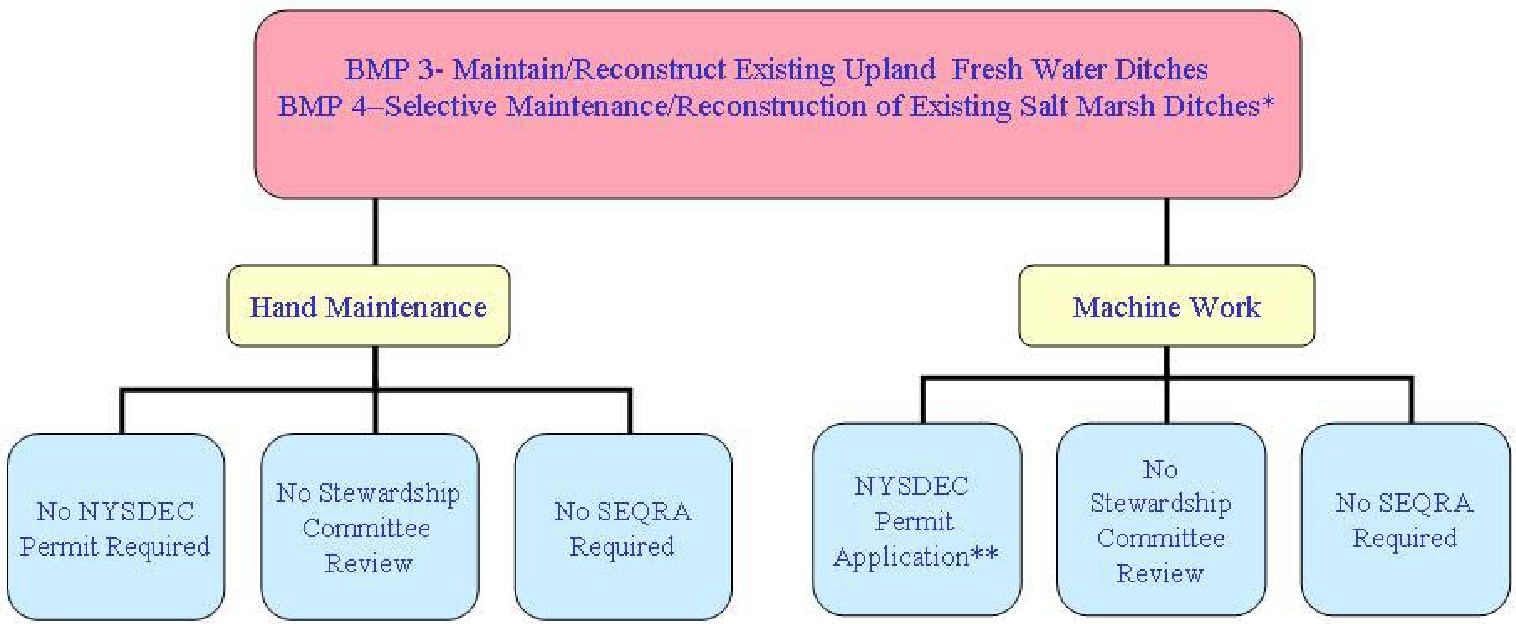
** Notice will also be sent to Town and Trustee jurisdictions.

Figure ES-3. Review Process for Management Activities with Minor Impacts

S.C. Vector Control and Wetlands Management Long-Term Plan

Review Process for Wetlands Activity

MANAGEMENT ACTIVITIES WITH MINOR IMPACTS



* Minimal machine maintenance when required for critical public health or ecological purpose (50,000 feet/year, 50 acres max).

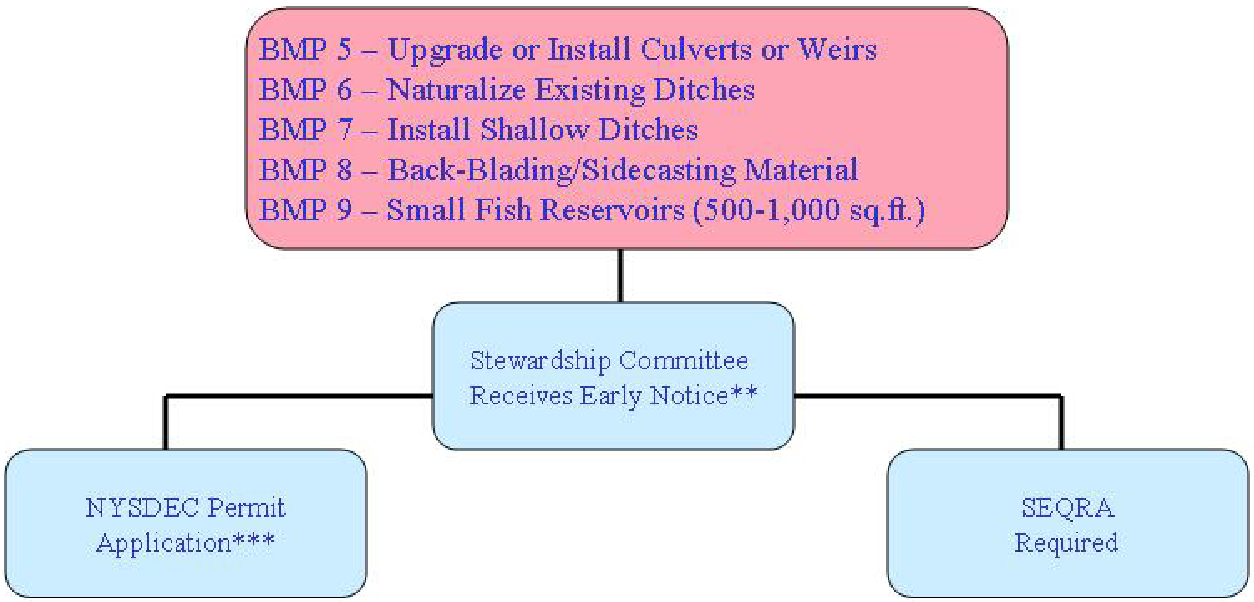
** Notice will also be sent to Town and Trustee jurisdictions.

Figure ES-4. Review Process for Management Activities with the Potential for Significant Impacts

S.C. Vector Control and Wetlands Management Long-Term Plan

Review Process for Wetlands Activity

MANAGEMENT ACTIVITIES WITH POTENTIAL SIGNIFICANT IMPACTS*



* In former plan drafts, BMP's 5-9 were designated "minor impacts" unless they affect 15 or more acres. In the current plan all are presumed to have "potential significant impacts," irrespective of size.

** Stewardship Committee can submit comments to project sponsor and/or SEQRA lead agency prior to project approval. Stewardship Committee meetings can also occur, as needed.

*** Notice will also be sent to Town and Trustee jurisdictions.

Figure ES-5. Review Process for Management Activities with the Potential for Major Impacts

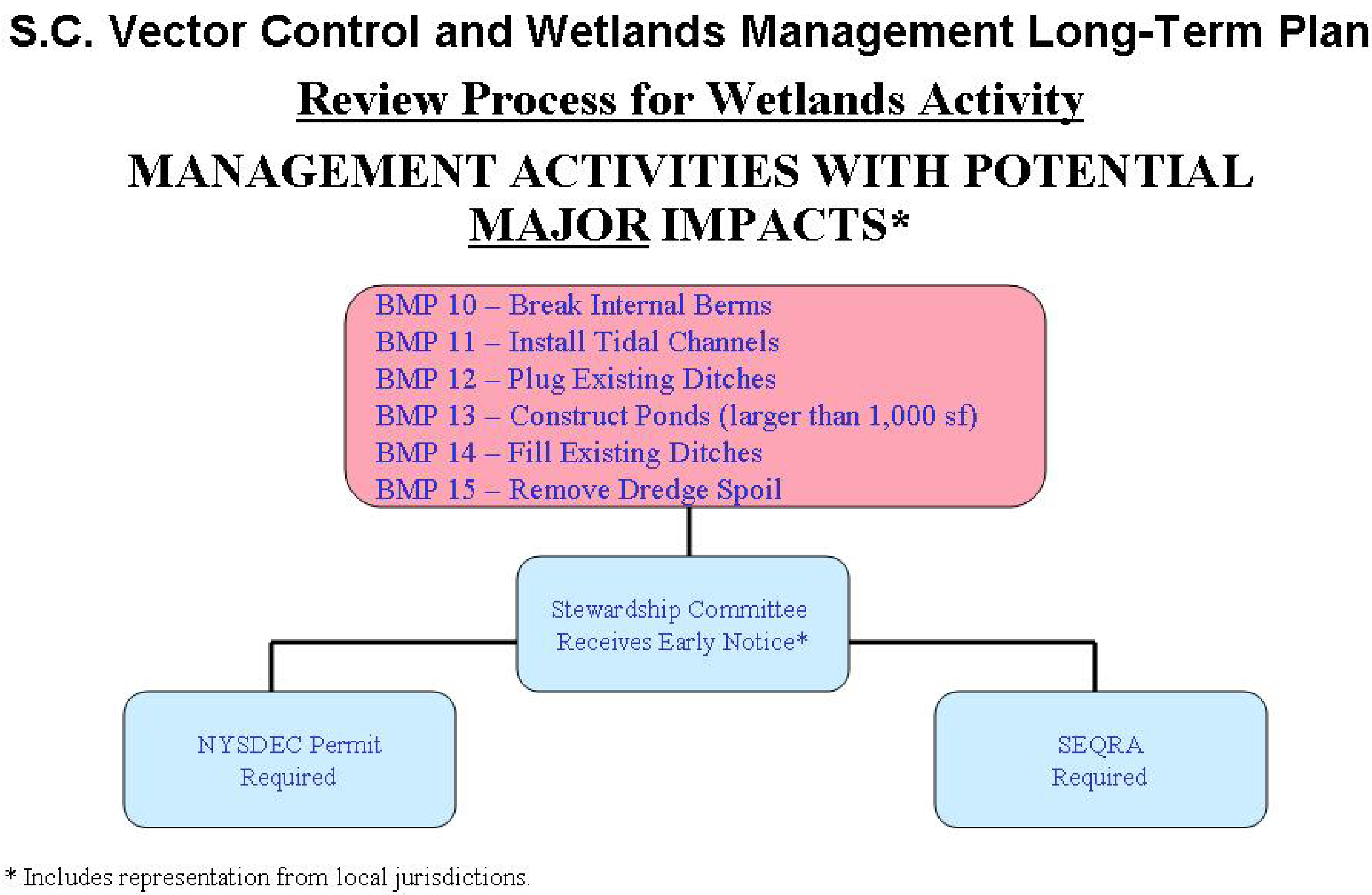
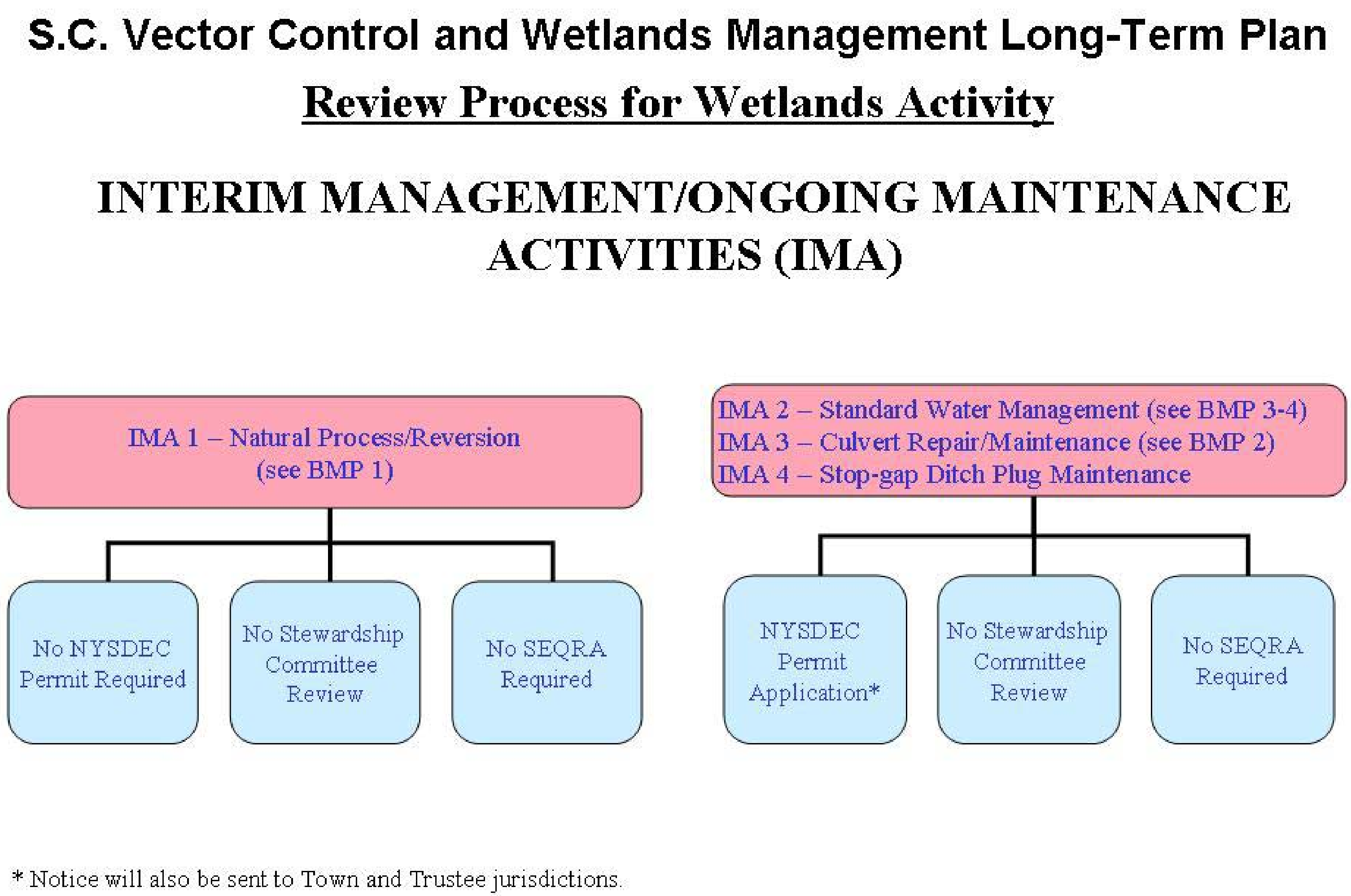


Figure ES-6. Review Process for Interim Management/Ongoing Maintenance Activities



The Wetlands Stewardship Committee is an important element in the County's review processes, and in determining overall wetlands management for the County. It has been revised in accordance with public comments and is intended to have the following composition:

Estuary programs:
- Long Island Sound Study (LISS) representative
- Peconic Estuary Program (PEP) representative
- South Shore Estuary Reserve (SSER) representative

State
- New York State Department of Environmental Conservation (NYSDEC) Region I
- NYSDEC Bureau of Marine Resources
- New York State Department of State (NYSDOS)

County
- County Legislature
- County Executive
- Suffolk County Department of Health Services (SCDHS)
- Suffolk County Department of Public Works (SCDPW)
- Suffolk County Department of Environment and Energy (SCDEE)
- Suffolk County Department of Planning
- Suffolk County Department of Parks
- Council on Environmental Quality (CEQ)

Local
- Town representative (based on project location)
- Trustees representative (based on project location)

Non-governmental Organizations
- Two appointed by County Legislature
- Two appointed by County Executive

Thus, the Wetlands Stewardship Committee consists of 19 permanent members, with Town representatives participating based on project location.

This committee will have important project review responsibilities, as outlined above and in Section 3.3. Additionally, the Wetlands Stewardship Committee has been tasked with developing a County-wide definition of marsh health. This is a key element in determining the potential for impact by any project, as the preservation of and enhancement of marsh health is a goal for all projects under the Long-Term Plan.

This definition of wetlands health will then be used by the Wetlands Stewardship Committee to develop a comprehensive assessment and marsh management plan for the 17,000 acres of coastal marshes in Suffolk County. The Wetlands Screening Committee has been renamed to the Wetlands Stewardship Committee to better capture the nature of its operations. The new name also avoids confusion with the Steering Committee.

In the May 3, 2006 version of the Long-Term Plan, the County envisioned a deliberate but comprehensive implementation of the Wetlands Management Plan, so that all of the necessary planning and project implementation might be completed within 12 years. This would have included conducting several significant projects in Wertheim National Wildlife Refuge and on County properties. In light of the comments received from the interested public, which especially expressed concerns regarding the more ambitious elements of the water management program, the County will restrict its efforts to actions in Wertheim National Wildlife Refuge, as identified by the landowner, US Fish and Wildlife, and low impact projects elsewhere in the County. It seems most probable that all such projects will be conducted on County-owned wetlands. This will allow for the development of the comprehensive marsh management plan and for integration of the definition of marsh health, as created by the Wetlands Stewardship Committee, into the Long-Term Plan. Integration will finally occur as part of the first Triennial Plan Report/update.

ES-3. Summary of Key Issues Raised in Comments

As stated above, many of the comments led to changes in the Long-Term Plan. Others disputed the facts or analyses used in the DGEIS. This section will discuss some of the key issues raised by comments, and provide summaries of the County responses to those comments. The County identified these major areas:

- Nuisance versus disease control

- Health issues, predominantly being the modeling conducted by the County to determine potential impacts to residents from West Nile virus (WNV) in the absence of any mosquito control.

- Environmental issues associated with pesticide use, with most concerns being raised regarding the use of the larvicide, methoprene

- Environmental issues associated with the implementation of water management, where philosophical issues and concerns regarding the quality of information used by the County to draw conclusions were the topics that may have been of greatest concern

The following addresses each in turn. This overview is not intended to be exhaustive; and detailed responses to all comments are contained in subsequent sections.

ES-3.1. Nuisance versus disease

The Long-Term Plan has consistently determined that it is functionally impossible to separate nuisance control from disease control. This is true for several reasons.

For one, this is the perspective maintained in Public Health Law. The law reflects the position that severe infestations of mosquitoes that result in large numbers of people receiving many bites are clearly not a "healthy" situation, even if no specific disease is transmitted. State and County Public Health Law call conditions leading to mosquito infestations as a "public health nuisance" regardless of whether or not pathogens have been detected. A public health nuisance is, by definition, a condition that adversely affects public health (irrespective of whether it causes fatal disease or some sublethal impacts). This point of view is consistent with the way other public health pests are viewed (e.g. head lice).The position taken by many is that control to minimize disease impacts, using West Nile virus (WNV) as a good example, can be clearly distinguished from other mosquito control actions. This is not accurate. WNV occurs and reoccurs across nearly all the County in most years. Nearly all human-biting mosquitoes found in the County have the potential to transmit WNV, changing the program definition. Source reduction, water management, and larval control efforts are intended to prevent the generation of adult mosquitoes. Since female adult mosquitoes that have fed at least once are the only mosquitoes that carry WNV, the application of these techniques necessarily occurs prior to the mosquitoes becoming infected. However, implementing these control measures clearly reduces the potential for infection by reducing the pool of mosquitoes that can transmit disease. This preventative approach has long been recognized as sound public health policy as well as the most effective way to control mosquitoes. The County believes that WNV impacts in the County are much less than they might be expected to be in the absence of such control measures. It is quite probable that other factors, such as the composition of the County's mosquito population, also impacts the infection rate here. However, the control program also has a role in shaping the mosquito population, so that again it is difficult to separate out clearly the impact of the control program from other factors. Those who argue that the control program should be abandoned would have us believe that the resulting order of magnitude or of increase in mosquito populations would have no impact on disease transmission.

Some commenters have argued that the adult control program has an explicit divide between nuisance and disease control. The terminology used for certain applications of adulticide is "Health Emergency" applications, after all. These are situations where the Commissioner of the Suffolk County Department of Health Services (SCDHS), acting under authority granted by the New York State Department of Health, has determined that immediate risks to human health need to be reduced by applying adulticide, and reducing adult mosquito populations in a certain area is necessary because, in that area, there is a particularly high risk of human transmission. The implication is that other applications are not made to reduce health risks, and they purportedly constitute nuisance control. However, the Long-Term Plan has accurately designated these applications "Vector Control" applications (i.e., control vectors with potential to adversely affect public health, prior to detection of WNV or other pathogens). The terminology is intended to underline the status of all human-biting mosquitoes in the County as potential vectors of WNV, and that the reduction of large numbers of these mosquitoes will reduce risks that they become vectors of disease. This indirect, but clear connection between the reduction of large numbers of human-biting mosquitoes and decreases in disease risk is the reason that all aspects of the County control program, particularly with the presence of WNV, are seen to be part of an overall disease control effort. It is true that alleviation of impacts to quality of life does result from these efforts as well, and the County does recognize that as an important ancillary benefit of the program. However, all of the efforts are inextricably intertwined with disease risk reductions, and so making a distinction between nuisance and disease control no longer has meaning for the Suffolk County mosquito control program. The Long-Term Plan has conceded, however that the term "vector control" can be used interchangeably with "public health nuisance control" in the context of the discussion above.

ES-3.2. Modeling WNV effects in the absence of vector control in Suffolk County

For the DGEIS, the County developed a simple model to estimate the potential for WNV impacts in the County if there were no mosquito control. The model used data derived from blood sample tests (serosurveys) in Douglaston, Queens, in 1999, and from two sampling efforts in 2002, in Cuyahoga County, Ohio, and Peel, Ontario. Conservative estimates of overall infection rates, the percentage of infected people who might develop neuroinvasive diseases, and the number who might therefore die were developed for Suffolk County. The model was run for the period 2000 to 2004 to compare to actual disease rates, and for the period 2005 to 2025 to estimate if rising immunity rates might lead to reduced disease impacts, as once infected with a virus, people are usually become immune. The model found that something like 150 serious illnesses and 16 deaths might have occurred each year absent a control program, or 64 deaths in total from 2000 to 2004, compared to the four fatalities that actually occurred. Because immunity rates only reached approximately one in three by 2025, the impact of the disease was not forecast to decrease much (to somewhere around 140 serious hospitalizations and 14 deaths, if the entire County were to be exposed to the virus).

This model was said to overestimate impacts, based on a 2006 paper on the incidence of WNV in blood bank donations. A key finding was that instead of one in every 150 or so infections leading to a hospitalization, only one in 260 appeared to result in serious illnesses, according to the blood bank data. This suggests that if the infection rate were the same as found in the serosurvey work, the number of resulting serious illnesses and deaths would be much less (about 40 percent less).

However, the blood bank data suggested that infection rates might be much higher (in four states, the infection rate was between four and five percent). In addition, the "fact" known in the areas where the serosurveys were made was the number of serious illnesses. The infection percent was derived from the blood samples. Therefore, if the higher ratio of undetected illness is applied to the number of serious illnesses in those areas, infection rates ranging from three to five percent result.

Therefore, the model was rerun, but using higher infection rates (three, four, and five percent) and the higher ratio of undetected cases (260 compared to 150). The results were not that different. And, even though the higher infection rates led to higher immunity rates over time, in 2025 there were still significant rates of serious illness and deaths (see Table ES-1). Even under the Busch assumptions, tens of deaths and hundreds of serious illnesses would be reported, or an order of magnitude higher then witnessed under the existing vector control program.

Table ES-1. Two Comparisons among the Serosurvey and Busch et al. (2006) Suffolk County Infection Models

Model Basis	Year	Infection Rate	Exposed Population	Illnesses Expected	Deaths Expected	Resultant Immunity Rate
Serosurveys	2000	2%	1,135,878	152	15	1.5%
Busch et al.	2000	3%	1,135,878	131	13	2.3%
Busch et al.	2000	4%	1,135,878	175	18	3.0%
Busch et al.	2000	5%	1,135,878	218	22	3.8%
Serosurveys	2025	2%	1,558,775	138	14	31.7%
Busch et al.	2025	3%	1,558,775	95	9	47.9%
Busch et al.	2025	4%	1,558,775	106	11	57.9%
Busch et al.	2025	5%	1,558,775	105	11	65.9%

Notes: 2000 exposed population = ~75% of entire County based on positive dead birds and positive mosquito pools by zip code. 2025 exposed population = 100% of projected population (based on 2010 build-out).

ES-3.3 Non-target impacts of methoprene

Comments were received on the County's proposed use of methoprene and its potential for environmental impacts. Methoprene is a mimic of the hormones used by insects (and some other organisms) that control the maturation of larvae. It prevents mosquito larvae from developing properly, and they die. The comments tended to focus on two areas:

1) The County ignored important scientific findings in making its analysis

2) The County did not correctly interpret a study conducted in Minnesota

Michael Horst has published research regarding impacts of methoprene on various crustaceans since 1999. He has found serious impacts, especially to larval stages of crabs and lobsters. The County has three comments on Dr. Horst's research findings:

- Methoprene is applied in wetland areas, not where larval crabs and lobsters used by Dr. Horst are found. Blue claw crabs hatch offshore and only arrive in estuaries when they are close to being fully developed. It is unlikely any are present in salt marshes in larval forms. Lobsters hatch offshore, develop offshore, and live offshore. A modeling exercise, made to estimate the maximum amount of pesticides that could have been in Long Island Sound when the 1999 lobster die-off occurred, found the maximum amount of methoprene that could be present in the near offshore waters of the sound was measured in the parts per quadrillion, and the lowest concentration linked to effects are in the parts per billion.

- Dr. Horst tends to overestimate the concentration of methoprene that could be present in salt marsh ponds, ditches, and streams, and in estuarine waters, according to all other researchers in the field. He also finds effects that, sometimes, others cannot duplicate.

- Dr. Horst has identified effects from methoprene that other researchers have not found, and have not looked for. This is because he is concerned about impacts from methoprene effects on endocrine systems of organisms. It is possible that pesticides (and other chemicals) that affect endocrine systems are not being correctly evaluated. However, the work in this field is preliminary (at best), and cannot and should not be used to draw conclusions regarding any environmental impacts, based on only a few, limited laboratory studies.

To more specifically illustrate problems with the methoprene research cited by commentators, Horst and Walker (1999) conducted methoprene experiments using concentrations up to 500 times higher that those contained in the risk assessment (i.e., levels present in real-world vector control applications). More recent work by Walker et al (2005a, 2005b) suggested that there was increased mortality in Stage II lobster larvae in experiments conducted utilizing concentrations of 1 to 2 ppb methoprene continuously during a 72 hour exposure. For purposes of this discussion, the new Horst/Walker data are assumed to be scientifically valid and relevant, even though there are questions associated with the studies (potential organism cannibalism, 15 percent population impact thresholds vs. the typical 50 percent impact used in LD_{50} studies, etc.). Significantly, the Horst/Walker results were not reproduced by other researchers, including recent Stony Brook University analyses (Zulkowsky et al., 2005).

Questions about the validity of the Horst work notwithstanding, a one ppb methoprene exposure continuously for 72 hours is an extremely unrealistic experimental exposure, from a vector control perspective. Nominal concentrations of methoprene rapidly decrease to near or below detection limits of 5 ng/L (0.005 ppb) within two hours of application. The Caged Fish Study conducted as part of the Long-Term Plan, with independent verification by the USGS (Abbene et al., 2005), clearly demonstrate that the Horst/Walker duration of concentration cannot result from vector control applications, and that methoprene does not persist in the water column. Monitoring at 24, 48 and 96 hours post spray similarly showed no detection in nearly every instance.

Commenters also suggested that the 20 ppb exposure levels (i.e., threshold to determine potential impacts) used in the initial risk assessment was not conservative based on this new data. Even given that the concentration cannot be maintained for even two hours, much less 72, Integral Consulting re-evaluated the risk assessment work utilizing maximum nominal vector control application concentrations (3.3 ppb, which rapidly degrades to non-detectable), coupled with the lowest purported crustacean impact threshold in the literature (1 ppb). All hazard quotients remained well below one, indicating that non-target organism impacts are not expected to occur under a Vector Control application scenario.

The evidence available to the County, and that the County developed itself through sponsored research in this project, indicate that methoprene is toxic to mosquito larvae, and does not cause any non-target effects of concern.

The County reached this conclusion after considering the findings of a long-term study made in fresh water wetlands in Minnesota, on the effects of methoprene and *Bacillus thuringiensis var israelensis* (Bti), a bacterial product (Hershey, et.al., 1998). The study was conducted by University of Minnesota researchers in conjunction with other researchers from the Minneapolis-St. Paul Metropolitan Mosquito Control District. The main portion of the study ran from 1989 to 1994. Three years of control data were collected, and three years of treatment data were collected from 27 wetlands. The researchers found that, in year two of treatment, impacts to aquatic insects (primarily chironomids) occurred where methoprene was applied, and in year three, impacts to insects were found in both the methoprene and Bti wetlands. However, when researchers hired by the Metropolitan Mosquito Control District resampled the sites in 1997-1998, they found no difference in the treatment and control sites.

Those concerned about the potential for non-target effects from methoprene focus on the first set of results. It is clear that distinct differences between control and treatment sites were found. The study had been designed to look for propagation of any effects either up or down the food chain, but none were found. The experiment was begun under drought conditions. This apparently suppressed invertebrate populations, as during the treatment periods actual numbers of the organisms at all sites increased. However, in year two of treatment (1993), the numbers at the methoprene sites did not continue to rise as quickly as those at the control or Bti sites. In year three (1994), both the Bti and methoprene sites did not increase as quickly as the control sites. The invertebrate populations at the treatment sites were not as diverse, either.

Others believe that the resampling demonstrates that the first results were an artifact of some kind. In 1997 and 1998, very wet conditions predominated, and the wetlands were extremely fecund. The numbers and diversity of invertebrates at the sites far exceeded the earlier findings, and there were no differences between control and treatment sites. These results suggest that there are no long-lasting impacts from methoprene or Bti use (the pesticides continued to be used from 1992 onwards at the treatment sites).

There are no plausible mechanisms for a methoprene effect to be found after two years of treatments. Nearly all species of chironomids have multiple generations in a season. The change in numbers and diversity was not found at all in year one. They appeared in year two, were found to be worse in year three for methoprene, and also suddenly appeared for Bti. Yet, in year six the effects were gone. This strongly suggests that the pesticide applications are not the controlling factor in the changes in insect numbers and diversity, despite the intent of the experiment to detect if any such change was the result of the applications.

In summary, the Hershey results do not document potential adverse impacts of methoprene, particularly in terms of Suffolk County's vector control setting. Scientifically, the Hershey results are equivocal, at best. The Minnesota impacts were apparently anomalous, as variations in chironomid populations occurred only in later years of the study, with no apparent causal explanation. Confounding factors such as meteorological variations may have been the root of observed impacts on chironomids. Significantly, Hershey's results were not reproduced in subsequent studies and years (i.e., no impacts, despite continuing pesticide use). Finally, it is important to emphasize that, even though the Hershey study was rigorously evaluated, it is substantially irrelevant to Suffolk's vector control program. Hershey's work was performed exclusively in fresh water systems, while Suffolk's use of methoprene is focused predominantly on salt marshes. As such, Hershey dealt with different use patterns and ecological settings than those present in Suffolk.

Again, there is no study that was evaluated as part of the Long-Term Plan which suggested that methoprene, as used in vector control applications in Suffolk County (as per NYSDEC-approved label requirements), has significant adverse ecological impacts. To the contrary, the Long-Term Plan's comprehensive risk assessment found that methoprene has no such impacts.

Risk assessment peer reviews, commissioned by the Technical Advisory Committee and solicited by commentators, were extremely helpful in understanding the strengths and potential limitations of the comprehensive risk assessment performed by the subconsultants. Overall, the risk assessment results were resoundingly validated. Minor changes in terminology were made as a result of the risk assessment, such "negligible" human health risks (risks which do not exceed established standards), rather than "no" human health risks. Also, refinements in the Task 8 report executive summary will be made to further clarify assumptions, data sources, conclusions, etc.

ES-3.4. Definitional and research issues with the water management analysis

Many commenters were concerned that the County was describing effects associated with its water management program, explicitly conducted for mosquito management, as marsh restoration. Some believe that mosquito management cannot involve marsh restoration, on a definitional basis, they are just mutually exclusive. People who maintain this position will never be convinced that the Long-Term Plan approach may have validity.

Other people believe that restorations need to return conditions to a prior, better state. Most of the water management techniques in the Best Management Practices (BMP) Manual do not try to return marsh conditions back to the way they were before ditches were installed in the marsh, although some try to return certain measures of marsh functions back to those conditions (such as overall hydrology, for instance). Therefore, those that understand restoration to refer to a return pre-disturbance return will not accept the Long-Term Plan position, either.

There are many who accept that restoration is a term used to describe environmental improvements, usually aimed at undoing effects of some previous manipulation. The focus in this case is to enhance certain functions and values related to the ecosystem. The Wertheim National Wildlife Refuge Demonstration Project, which was undertaken to reduce larval mosquito populations and therefore reduce needs for aerial larvicide applications, also intended to increase water fowl use of the marsh, increase the amount of surface water in the marsh, fill in parts of the gird ditch system, enhance finfish productivity in the marsh, and reduce the extent of *Phragmites*. For Suffolk County and the United States Fish and Wildlife Service, this made it a marsh restoration project. A collaborative group of agencies, including the New York State Department of Environmental Conservation, helped design the project. This is an example of how the County envisioned that mosquito control techniques could be integrated in marsh restoration.

Water management has the potential to cause impacts to coastal marsh systems because it involves alterations of the hydrological systems of the marshes. This is true for the BMPs identified in the BMP Manual. However, the experiences of other jurisdictions in employing these techniques, documented in peer-reviewed scientific journals, in "gray literature" (such as published professional meeting proceedings, project reports, or implementation manuals), and in the professional testimonials of technically-adept and scientifically trained public servants, all show that careful implementation of these techniques do not lead to unacceptable environmental conditions. Mosquito control agencies in New Jersey have been conducting this kind of work for approximately 40 years; other jurisdictions such as Delaware and Connecticut also have 20 years or so of experience. Impacts to the marsh tend to be short-term, and to be the result of construction activities rather than structural changes to the marsh environment. Changes to marsh ecology tend to be favorable, in the views of documenting marsh professionals, resulting in more fish use of the marsh, greater use of the marsh by aquatic birds of all kinds, and no major changes in marsh vegetation (except where tidal circulation has intentionally been greatly expanded, in which case halophytes often expand their extent at the expense of fresh or brackish water species).

Previous rigorous documentation of many of the projects, especially for long-term effects, is not extensive. This is foreseeable, given that meaningful long-term monitoring is labor-intensive and expensive. Also, it can be difficult to generate good, scientifically useful data sets, because of interannual variability associated with weather and other uncontrollable events, confounding and correlated factors, etc. However, it is also true that the lack of documentation of long-term effects also means that the burgeoning field of scientific research on marsh ecological issues has not identified water management practices as causes of marsh degradation, either. This is because the suite of techniques used in more modern water management is more sensitive to marsh processes and functions than was the more coarsely-applied technique of grid-ditching. Some claims have been made that these techniques will cause impacts, but the claims are largely based on analogies to other settings or situations, and are not based on direct determinations of negative impacts. For instance, the State of Maryland, which is the only jurisdiction to employ extensive marsh management as mosquito source reduction and then abandon the practice, had concerns that the techniques might be reducing the ability of marshes to serve as black rail habitat. Suffolk County and its consultants have not found any documentation that this was the case, and some officials in other jurisdictions have suggested that there may have been no concrete evidence this was occurring. Similarly, because different guilds of birds have different habitat needs, concerns have been expressed that changing the high marsh through marsh management will reduce the use of that part of the marsh by birds that currently make the most use of the habitat as it is. There is a reasonable hypothesis; however, it is certainly an untested one. There are a very few, short-term monitoring programs of bird use of altered marshes. Those few examples appear to show continued use of the wetland by marsh and upland guilds (for instance, this is the case over the first two years at the Wertheim National Wildlife Refuge project sites). This could be because the changes to the physical fabric of the marsh, for most water management projects, are relatively small in overall extent (surface water extent on the marsh may change by 1 to 5 percent, for instance, for the largest projects).

The County intends to mitigate the potential for impacts from its water management program through extensive oversight and project review. NYSDEC has strongly expressed its intention to conduct required regulatory reviews of potential projects, to ensure that all projects meet the requirements of statute and regulation. In addition, the County has established a review process involving a suite of interested and involved parties. The County has committed to having the

Wetlands Stewardship Committee develop a definition of marsh health, and to create an overall marsh management framework that extends far beyond the concerns of mosquito control. This will allow projects to be considered and evaluated so as to ensure the protection and preservation of functions, values, and the health of the County's remaining coastal marsh systems, and also to allow the County to conduct source reduction of mosquitoes so as to control mosquitoes while reducing its use of pesticides.

It is important to emphasize that the County is not proposing major marsh restoration projects over the next three years (other than the potential for more work at the Wertheim National Wildlife Refuge). The Wetlands Stewardship Committee is charged with refining indicators of wetlands health and developing strategies to address management needs of all wetlands County-wide. The result of the Wetlands Stewardship Committee's work will be incorporated into the first Triennial Report.

ES-4. Compliance with SEQRA

A Final Generic Environmental Impact Statement has several purposes, as outlined in SEQRA. It must include or summarize all substantive comments received on the DGEIS. It must respond to the comments, and identify mitigations for previously undetermined environmental impacts. It must identify the issues for which additional SEQRA determinations are required, and those for which supplemental environmental impact statements must be prepared.

Including each written submission, separate oral testimony, and submission made at the public hearings, a total of 114 separate submissions were made to CEQ during the comment period. The preparers of the FGEIS identified 1,544 separate comments in the submissions (including some duplicate submissions and comments). All of these comments were treated as substantive. The submissions and the identification of specific comments in each submission are found in Appendices 1-4. Catalogs and summaries of the comments are found in Section 2.

Section 4 contains responses to all comments: comments were aggregated according to topic. Several comments purportedly identified errors in the DGEIS. Some sparked changes in the Long-Term Plan. None was identified as requiring additional environmental review in terms of changing conclusions or findings of the DGEIS, however. Section ES-2 summarizes the changes made as a result of comments, and some of the key issues that were raised. Section 3 also serves as an expanded summary of some key issues.

Section 5 identifies areas where additional environmental review will be necessary. Essentially, if Annual Plans of Work conform to important issues discussed in the DGEIS, they will not be subject to SEQRA. If they do not conform to the key issues, additional SEQRA will be warranted on an Annual Plan of Work.

Certain water management projects will require additional SEQRA. The County identified all projects using BMPs 5 to 15 as requiring some additional SEQRA determinations.

No particular project or Long-Term Plan function was identified as specifically requiring a Supplemental Environmental Impact Statement. CEQ will be able to identify such projects as part of any additional environmental review.

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1 Summary of the Environmental Review Process to Date for the Long-Term Plan

1.1 Introduction

The New York State Environmental Quality Review Act (SEQRA) is set forth in Article 8 of the New York State Environmental Conservation Law (ECL), and implementing regulations for SEQRA are located at 6 New York Code of Rules and Regulations (NYCRR) Part 617.

SEQRA applies to any public agency that has the authority to issue a discretionary permit or other type of approval for an action, or if the agency funds or directly undertakes the action. Where there is more than one governmental agency involved in issuing permits or approvals for a particular action, the agency principally responsible for undertaking, funding or approving an action is designated the "lead agency." This lead agency will then have the primary responsibility for ensuring that SEQRA is observed, and that any required studies are undertaken in compliance with its provisions (6NYCRR §617.6). With respect to this project, the lead agency is the Suffolk County Legislature.

SEQRA requires that governmental agencies review and consider the environmental impacts of an action prior to undertaking, funding or approving the action (ECL §8-0109). "Actions" are broadly defined at ECL §8-0105, and under appropriate circumstances, may include vector control programs and the issuance of governmental permits for such programs. Certain categories of actions which are not subject to SEQRA environmental review requirements are denoted as "Type II" actions. These include actions undertaken on an emergency basis for the protection of life, health, property, or for the preservation of natural resources (6NYCRR §617.5[b] [33]), acts of the New York State Legislature, courts, and the State Governor, (6NYCRR §617.5[b] [37]), and routine or continuing agency administration and management (6NYCRR §617.5[b] [20]).

The governmental agency must take a "hard look" at the environmental impacts of the proposed action. If the agency finds that environmental impacts are not significant through its review of an Environmental Assessment Form (EAF), then the agency may issue a "negative declaration," and undertake, fund or approve the action without further proceedings under SEQRA. In the event that an action may have significant environmental impacts, the lead agency must prepare (or cause to be prepared), and then present for public comment, an Environmental Impact

Statement (EIS). An EIS evaluates the potential environmental impacts and identifies how potential impacts can be avoided or minimized as well as alternatives. The EIS is a document for public review and comment. The agency must then prepare findings regarding the proposed action and its environmental impacts. The findings statement identifies environmental impacts and incorporates mitigation measures to ensure that adverse environmental effects will be minimized or avoided to the maximum extent practicable. At this point, the SEQRA review process is complete. The agency may then undertake, fund or approve the action (ECL §8-0109, 6NYCRR §617.11).

This document represents the Final Generic Environmental Impact Statement (FGEIS) for the Suffolk County Vector Control and Wetlands Management Long-Term Plan (Long-Term Plan). The Long-Term Plan provides a description of the means that the County will use to manage mosquitoes over the coming years, including management of marshes (which represent important potential mosquito breeding sites). The Long-Term Plan describes the Integrated Pest Management (IPM) approach selected by the County to achieve its desired level of mosquito control. Mosquito control conducted through IPM requires that problems be identified through scientific surveillance, and then addressed through source reduction (including water management), biocontrols, larval control, and, if all these elements do not suffice to reduce risks to public health and welfare, adult control. Public education and outreach are essential for any successful program, and may reduce the need for organized control efforts.

Final Environmental Impact Statements are described in 6NYCRR §617.9(8). The following elements are identified:

- The draft EIS, including any revisions or supplements to it
- Copies or a summary of substantive comments and their source (meaning, if the comments were received in the context of a hearing or not)
- Lead Agency responses to comments

The SEQRA Handbook notes that

> a final generic EIS is similar to all other final EIS's in that it must respond to all substantive comments raised in the review of the draft. (See also section 5-F,

p.74). The final generic EIS should list those environmental issues for which supplemental determinations of significance and/or supplemental EIS's will be required.

This FGEIS meets the substantive requirements of SEQRA, therefore, by:

- Explicitly stating that the May 3, 2006 DGEIS is incorporated into it by reference
- Including Section 2 in the FGEIS, which contains summaries of all comments received during the review process of the DGEIS
- Including Appendices 1-4, which are copies of the written and oral comments made on the DGEIS
- Including Section 4, which comprises the specific responses of the County to comments made on the DGEIS
- Including Section 5, which lists all issues for which supplemental environmental reviews (to be conducted pursuant to SEQRA) will be required

1.2 Summary of the Environmental Review Process to Date

In 2002, the Legislature directed SCDPW (as fiscal manager) and SCDHS (as project manager) to prepare and issue a Request for Proposals (RFP) for the preparation of a Long-Term Vector Control and Wetlands Management Plan together with any associated environmental reviews. Suffolk County issued a RFP on April 30, 2002, soliciting professional services in conjunction with the development of the Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement related to SCVC mosquito control activities. Cashin Associates, PC (CA) (Hauppauge, NY), in conjunction with Cameron Engineering and Associates, LLP (Syosset, NY), together with an array of expert sub-contractors, responded on June 17, 2002. This proposal was selected as the most responsive from the proposers that replied. A contract was signed on September 24, 2002, covering the initial aspect of the project, which consisted of Scoping and finalization of a workplan.

A draft Scoping document was prepared by SCDHS. The public Scoping process was initiated when that document, dated August 7, 2002, was circulated for public review. In association with the draft Scope, the County also made the following documents available for review:

- The RFP, dated April 2002, issued by SCDPW and SCDHS
- Amendments to the RFP, dated May 24, 2002, issued by SCDHS
- The Draft Workplan, prepared by CA and Cameron Engineering, dated June 17, 2002
- Amendments to the Draft Workplan, as specified in the Addendum to the Proposal, also prepared by CA and Cameron Engineering, dated August 12, 2002
- 2002 Annual Plan of Work for SCVC.

A public Scoping hearing was held on September 10, 2002, at the Suffolk County Legislative Building in Hauppauge. This hearing was conducted by the CEQ, acting on behalf of the County Legislature, as authorized by Chapter 279 of the Suffolk County Administrative Code. The CEQ held open the public Scoping record until September 25, 2002, in order to afford the opportunity for additional written comments regarding the scope of the DGEIS. All written comments received through that date, as well as minutes and summaries from the various meetings conducted as part of the Scoping process, were collected together. The compendium of comments, titled "Scoping Comments," was distributed to involved and interested parties, including State and local agencies, interested federal agencies, and local environmental and civic groups. In addition, CA and Cameron Engineering prepared a Scoping Responsiveness Document. The Scope of the DGEIS was amended, and was published by the County for public comment and review, December 2, 2002. The Final Scope was adopted by the Legislature by Resolution 1122 (dated December 16, 2003). The resolution was signed by County Executive Robert Gaffney on December 18, 2003.

As discussed in Section 1.4 of the DGEIS (pp. 12-24), preparation of the Long-Term Plan and its associated DGEIS involved a very open and public process. The "management plan" development process used by the US Environmental Protection Agency (USEPA) National Estuary Program was followed. This meant that the project was overseen by a Steering

Committee. Interested and involved parties could participate in either the Technical Advisory Committee or Citizens Advisory Committee. Other supporting groups (e.g., a Wetlands Subcommittee and a Monitoring Committee) were created as needed. Intermediate project work products, such as major Task Reports and the results of the Literature Search were made available for public review and comment. In fact, the project paid for independent reviews of certain Literature Search reports and the Risk Assessment (the Task 8 Report). Work products were presented before the committees for discussion and other reviews, and experimental results were shared and presented to the public. Both the BMP Manual and the Wetlands Management Plan were shared with Wetlands Subcommittee prior to their formal release; input from this group led to revisions of both documents.

A draft copy of the Long-Term Plan was released for informal public review and comment in September, 2005. Presentations were made to the Technical Advisory Committee (jointly with the Citizens Advisory Committee) and the Steering Committee in September. The Long-Term Plan was revised on the basis of comments received. A revised draft Long-Term Plan was released in December, 2005. A draft of the DGEIS was submitted to CEQ and for public comment in December, 2005. Following public review and the receipt of comments from CEQ, the Long-Term Plan and the DGEIS were further revised.

On May 3, 2006, the County submitted the Long-Term Plan (dated April 15, 2006) and the DGEIS on the Long-Term Plan (dated May 3, 2006) to CEQ. At its meeting on May 17, 2006, CEQ:

- Accepted the DGEIS as complete, per SEQRA
- Set a 60-day comment period on the DGEIS (through July 17, 2006)
- Determined that two public hearings would be held on the DGEIS (dates to be determined later)

Two public hearings were indeed held, on Thursday, June 29, 2006, from 6 to 9 pm, at the Maxine S. Postal Legislative Auditorium, Riverhead, and on Thursday, July 6, 2006, from 10 am to 1 pm in the Rose A. Caracappa Legislative Auditorium, Hauppauge, before members of CEQ, with CEQ Chair Dr. R. Lawrence Swanson presiding.

In response to comments received, the Long-Term Plan was revised. This current version of the Long-Term Plan, dated October 2006, and its associated documents, is included as appendices to the FGEIS. The changes to the Long-Term Plan did not require revisions to or supplements to the DGEIS.

At the CEQ meeting held on August 9, 2006, CEQ determined that the comments received in writing and at the hearings were substantive in nature, and forwarded a recommendation to the Legislature that it cause to have a FGEIS prepared. The Legislature, at its meeting on October 17 2006, passed resolution 1103-2006 authorizing the preparation of a FGEIS. The resolution was signed by County Executive Steve Levy on October 20 2006.

The County submitted the FGEIS to the CEQ at its meeting on November 9, 2006.

1.3 Steps Remaining to Complete the Environmental Review Process

Upon receipt of the FEIS, the CEQ shall prepare a notice of completion, in accordance with the SEQRA Regulations. The CEQ shall also file, circulate and make available the notice of completion and copies of the FEIS, in accordance with the SEQRA Regulations.

The CEQ shall forward the FEIS and notice of completion together with its comments and comments received from other parties on the FEIS, to the County Executive and Legislature within thirty (30) days of the receipt thereof and shall provide a copy of its comments, and any others, to the initiating unit. The SEQRA Regulations require that prior to the lead agency's decision on a action that has been the subject of a final EIS, it shall afford agencies and the public a reasonable time period (not less than 10 calendar days) in which to consider the final EIS before issuing its written findings statement.

Based on the information and analysis contained in the DGEIS and FGEIS, the Legislature can adopt a Statement of Environmental Findings, which is the final step in the SEQRA process. The Findings Statement will constitute the environmental basis for the Legislature's decision, and either: (a) will establish that the proposed action avoids or mitigates significant adverse environmental impacts to the maximum extent practicable, consistent with social, economic and other essential considerations from among the reasonable alternatives available (Positive

Findings); or (b) will establish that the proposed action does not satisfy this prerequisite for approval (Negative Findings).

Positive Findings will be issued by resolution of the Legislature, following which the County Executive will approve or veto the resolution

If Negative Findings are issued, either the Legislature can terminate the Long-Term Plan or remand the case to the initiating unit for necessary changes to the project or the FGEIS. It then is resubmitted to the CEQ, the Legislature, and the County Executive for reconsideration.

In addition to these steps conducted by the County with regard to this action, according to 6NYCRR §617.11(e),

> no state agency may make a final decision on an action that has been the subject of a final EIS and is located in the coastal area until the agency has made a written finding that the action is consistent with applicable policies set forth in 19NYCRR 600.5. When the Secretary of State has approved a local government waterfront revitalization program, no state agency may make a final decision on an action, that is likely to affect the achievement of the policies and purposes of such program, until the agency has made a written finding that the action is consistent to the maximum extent practicable with that waterfront revitalization program.

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2 Summary of Substantive Comments Received

SEQRA requires that all comments received regarding the DGEIS be included in the FGEIS, and that the substantive comments be identified and summarized (and responded to). This section identifies the potentially substantive comments received, and categorizes them so as to allow comprehensive and complete responses to be generated, without the necessity of responding to each and every individual comment.

The DGEIS was deemed complete by CEQ on May 17, 2006. The comment period was from May 17 to July 17. Two public hearing were held during that time, on Thursday, June 29, 2006, from 6 to 9 pm, at the Maxine S. Postal Legislative Auditorium, Riverhead, and on Thursday, July 6, 2006, from 10 am to 1 pm in the Rose A. Caracappa Legislative Auditorium, Hauppauge. Various exhibits were submitted at the hearings, and were incorporated into the comment record.

Several written submissions were received after July 17. At its August 9, 2006 meeting, the CEQ determined that those submissions should be considered. This meant that a total of 36 separate submissions were received in writing. This includes various attachments submitted with the submissions. Table 2-1 lists the submissions by date. If a submission was an attachment to another submission, it is classified by the date of the primary submission. Each of the 36 submissions was assigned a letter (from A to AJ). Within each submission, potentially substantive comments were marked along the right hand margin, and assigned a number. Each comment is thus identifiable by a letter-number pairing. Each comment was also generally categorized by subject area, and a brief interpretation of its content was made. The topics listed in the table refer to the section headings in Section 4.

A total of 17 people spoke at the June 29 hearing. A transcript was made of the hearing, and the transcript of each speaker was treated similarly to the written submissions. Table 2-2 lists the speakers in the order they spoke. Each of the 17 speakers was assigned a letter (from AK to BA). Within each submission, potentially substantive comments were marked along the right hand margin of the transcript, and assigned a number. Each comment is thus identifiable by a letter-number pairing. Each comment was also generally categorized by subject area, and a brief interpretation of its content was made. The topics listed in the table refer to the section headings in Section 4.

A total of nine people spoke at the July 6 hearing. A transcript was made of the hearing, and the transcript of each speaker was treated similarly to the written submissions. Table 2-3 lists the speakers in the order they spoke. Each of the 17 speakers was assigned a letter (from BB to BJ). Within each submission, potentially substantive comments were marked along the right hand margin of the transcript, and assigned a number. Each comment is thus identifiable by a letter-number pairing. Each comment was also generally categorized by subject area, and a brief interpretation of its content was made. The topics listed in the table refer to the section headings in Section 4.

Exhibits were submitted by speakers at the hearings, or generated by CEQ (such as speaker cards and attendance lists). Table 2-4 lists the exhibits. Cashin Associates identified 26 separate exhibits, which were labeled BK to CJ in the order they were created. Comments embedded in the exhibits were identified along the margins of the exhibits, and numbered. However, verbatim transcripts submitted by several speakers were not so analyzed. In addition, one newspaper article submitted was not legible as reproduced for much of the article, and so portions of that exhibit were not analyzed. The topics listed in the table refer to the section headings in Section 4.

Table 2-5 organized the comments in terms of the outline proposed for Section 4. Table 2-5 was used to assist the County in organizing its responses to the comments, although the actual comments were always referred to. The topics listed in the table refer to the section headings in Section 4.

Please understand that the categorization and interpretation of the comments is not as nuanced as some of the comments were, and so the short-hand methods used to generalize and organize for this document may be perceived as somewhat inaccurate by some. In all cases, the responses crafted by the County were made in light of the actual words submitted, not in terms of the material presented here in the tables.

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
6-19-06	Paul Capotosto	Connecticut DEP	A	1	Water Management	Connecticut water management called Integrated Marsh Management	4.6.1
				2		BMPs are good	4.6.4
				3		Connecticut has been using BMPs for 20 years with negligible impacts	4.6.4
				4		BMPs reduce mosquito populations while minimizing environmental change or enhancing natural resource values	4.6.8
6-26-06	Eileen Schwinn et al.	Eastern Long Island Audubon Society	B	1	Water Management	Water management (OMWM) plans are not restoration plans but total marsh degradation plans	4.6.4
				2		OMWM will increase salt water in high marsh	4.6.4
				3		More salt water will destroy nesting populations of rare and endangered birds, destroy rare plants, increase water levels on adjoining property owners land	4.6.4
				4		Salt marshes hold back storm and tidal surges	4.6.4
				5		Salt marshes mitigate sea level rise	4.6.4
				6		Any interference in salt marshes will affect sea level rise mitigation	4.6.4
				7		Physical changes do not increase biodiversity but threaten existing diversity	4.6.4
				8		Marshes filter upland pollutants	4.6.4
				9		Less marsh means less filtering	4.6.4
				10		OMWM will degrade a valuable ecological community	4.6.4
6-26-06	Richard Mendelman		C	1	Mosquito ecology	Swallows prey on mosquitoes	4.1.12
				2		Purple martin houses would be plentiful if paid for using pesticide monies	4.1.12
				3		Bat houses should also be given away	4.1.12
				4	Adulticide	Lemon Joy in a white plate is an alternative	4.9.9
				5	Water Management	BMP 14 has to define fill	4.6.3
				6		BMP 15 improperly uses "spoil"	4.6.3
				7		Fill should not be a liability	4.6.3
				8		Fill use should be compatible with PEP and SSER policies	4.1.7

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				9		Urges use of modeling for projects	4.6.7
6-28-06	Joseph Conlon	AMCA	D	1	General	Most comprehensive of its kind	4.1.9
				2	Risk assessment	Template for future EISs	4.1.2
				3		Glad to see actual use/mitigation strategies addressed	4.1.2
				4	General	Program meets with EPA PESP goals	4.1.7
				5	Field work	Excellent information of use elsewhere	4.1.3
				6	Pesticides	Will remain an element of Integrated mosquito management for foreseeable future	4.1.13
6-29-06	Edward Romaine	Suffolk County Legislature	E	1	Pesticides	Negative impacts on health	4.9.1
				2	Pesticides	Negative impacts on the ecology of LI	4.9.5
				3	Pesticides	Not considered safe by USEPA	4.9.1
				4	Pesticides	NYSDOH finds risk to human health	4.9.1
				5	General	Distinguish nuisance and disease control	4.1.1
				6	Pesticides	Only used when evidence of disease	4.9.3
				7	Water management	Modifications to wetlands only to fix past ditching projects	4.6.7
				8		Only to restore marsh health	4.6.7
				9	Public education	Stress impacts of pesticides	4.3.1
				10		Means of mosquito control	4.3.2
				11		Mosquito tolerance	4.3.3
				12	Water Management	17,000 acres in extent	4.6.1
				13		Ponds and channels will change marsh hydrology	4.6.4
				14		Ponds and channels could have negative ecological effect	4.6.4
				15		Mosquito control efficacy unproven	4.6.4
				16		Marsh substrate filters pollutants	4.6.4
				17		Marshes are sponges, absorb water from rains and road runoff	4.6.4
				18		Marshes protect shoreline from storms	4.6.4
				19		SSER has lost 35% of its marshes since the 1930s	4.6.4
				20		OMWM may reduce marsh filtering capabilities	4.6.4
				21		Machines will damage marsh	4.6.4

Table 2-1. Written Comments, Organized by Commenter							
Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
				22		No compelling evidence that OMWM will be an effective restoration technique	4.6.8
				23		No compelling evidence that OMWM will be effective at absorbing pollutants	4.6.8
				24		No compelling evidence that OMWM will be effective at absorbing stormwater	4.6.8
				25		No compelling evidence that OMWM will control mosquitoes	4.6.8
				26		May impact current marsh species	4.6.4
7-2-06	Mary Laura Lamont		F	1	Public Education	CAC brochure misleading	4.3.4
				2	Mosquito-borne disease	Not true all mosquitoes carry EEE and WNV	4.10.2
				3	Water management	Not true that water management necessary to prevent WNV and EEE	4.6.8
				4	Mosquito-borne disease	Fresh water mosquitoes vectors	4.10.2
				5		Salt marsh mosquitoes not vectors	4.10.2
				6	Water management	Mosquito management is not appropriate reason for salt marsh management	4.6.7
				7		Nuisance management not appropriate reason for salt marsh management	4.6.7
				8		Marshes hold back storms and tides	4.6.4
				9		Marsh management is intended to destroy high marsh	4.6.4
				10	General	Distinguish between nuisance and illness causing mosquitoes	4.10.2
7-10-06	Lawrence Merryman	Great South Bay Audubon Society	G	1	Mosquito-borne disease	No to little evidence salt marsh mosquitoes spread WNV	4.10.2
				2	General	Program for human health purposes?	4.1.4
				3	Water management	Will dig up peat that required centuries to accumulate	4.6.4
				4		Salt marshes filter contaminants from run-off	4.6.4
				5		Digging holes in the marsh will reduce filtration	4.6.4
				6		OMWM will cost County taxpayers millions of dollars	4.1.5
				7		OMWM efficacy at controlling mosquitoes is unknown	4.6.8

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				8	General	Long Island Audubon Council opposes the Long-Term Plan	
				9	Water management	No scientific evidence digging ponds restores wetlands	4.6.4
				10		No scientific evidence digging ponds controls salt marsh mosquitoes	4.6.8
				11		Wertheim visit – no difference between treated-untreated areas (no mosquitoes)	4.6.8
				12		All mosquito reduction data anecdotal	4.6.8
				13		Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance	4.6.4
				14		Deeply dug ponds cannot promote wading bird use	4.6.4
				15		Area of filled ditches does not equal excavated area of ponds & channels	4.6.4
				16		Screening committee is weighted towards governmental entities, not conservationists	4.6.2
				17		15 acres size may lead to loopholes	4.6.2
				18		Audubon New York: water management plan has not been proven effective	4.6.8
				19		Audubon New York supports vector control methods that are proven effective based on best available science	4.1.9
				20		Audubon New York supports vector control methods that do not negatively affect habitat	4.1.9
				21		Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations	4.1.9
				22		Rising sea levels and hurricane activities argue against experimentation in salt marshes	4.6.4
				23		Foolhardy to reduce salt marshes	4.6.4
				24		Long-Term Plan OMWM are unproven	4.6.8
				25		Long-Term Plan OMWM will be damaging	4.6.4
7/11/06	Victoria Russell	Town of Babylon DEC	H	1	General	Commend participants	4.1.9
				2		Town of Babylon recognizes need for mosquito control	4.1.4
				3		SCVC has used scientific approach to mosquito control for nuisance and public health reasons	4.1.1
				4		Overall project approach was sound	4.1.9

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				5		Babylon concurs with overall goals of the Long-Term Plan	4.1.4
				6	Adulticides	Least preferable option	4.9.2
				7		Signal failure in earlier control efforts	4.9.2
				8	General	Hierarchical approach proper	4.1.13
				9		Long-Term Plan supports many aspects of current practice and identifies areas for improvement	4.1.9
				10		Plan must receive adequate support	4.1.5
				11	Surveillance	County must reduce time taken to identify disease	4.4.4
				12	Adulticides	Wetland buffer areas should be reduced	4.9.7
				13	Caged Fish	No elevated risks to humans or the environment	4.1.3
				14	Risk Assessment	No elevated risks to humans or the environment	4.1.2
				15	Pesticides	EIS allays fears associated with program pesticide use	4.9.1
				16	General	Extensive public outreach provided opportunities for comment	4.1.9
				17		Meets requirements of SEQRA	4.1.16
7-12-06	James King	Town of Southold Town Trustees	I	1	Water management	Support restoration of ditched marshes	4.6.7
				2	General	Support reductions in pesticides	4.1.4
				3	Water management	Pond construction does not preserve the integrity of the marsh	4.6.1
				4		OMWM requires digging ponds in the marsh	4.6.1
				5		Ponds reduce wetlands vegetation	4.6.4
				6		Ponds increase construction impacts	4.6.4
				7		Marsh disturbances may bring in Phragmites	4.6.4
				8		Decrease existing habitat for marsh birds	4.6.4
				9		Not enough hard evidence that ponds lead to mosquito control	4.6.8
				10		May cause more problems than 1930s ditching	4.6.4
				11		Ponds fragment marsh habitat	4.6.4
				12		Ponds inappropriate for Southold marshes	4.6.7
				13		Great deal of marsh loss recently	4.6.4
				14		Causes of recent marsh loss is not well known	4.6.4
				15		Reductions in mosquito habitat not justified because of changes to marsh	4.6.7

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				16		Reductions in mosquito habitat not justified because of potential damage to marsh	4.6.7
				17		Follow successful East Hampton model for marsh restoration	4.6.7
				18		Use ditch plugging	4.6.7
				19		Enlarge culverts	4.6.7
				20		Remove dredge spoil along ditches	4.6.7
				21		Remove dredge spoil on marshes	4.6.7
				22		Allow reversion of ditches	4.6.7
				23		Remove Phragmites	4.6.7
				24	General	Main concern with mosquitoes is mosquito-borne disease	4.1.1
				25	Mosquito-borne disease	No cases of WNV in salt marsh mosquitoes	4.10.2
				26		WNV is a fresh water mosquito disease	4.10.2
				27		WNV incidence has been decreasing over the past several years	4.10.1
				28	Surveillance	Increase population & disease sampling	4.4.4
				29	General	Distinguish nuisance and disease control	4.1.1
				30	Pesticides	Nuisance does not justify harmful effects of pesticide use	4.1.1
				31	Water management	Nuisance does not justify marsh impacts	4.1.1
				32	Larvicide	Primary pesticide is methoprene	4.8.1
				33		Methoprene has non-target impacts (other insects, mosquito predators, beetles, ladybugs, crabs, grass shrimp)	4.8.1
				34	Biocontrols	Natural predators of mosquitoes include bats, birds, frogs, fish	4.1.12
				35	Pesticides	Affect development of frogs	4.8.1
				36	General	DGEIS does not specify use of IPM	4.1.13
				37	Pesticides	Specify effectiveness	4.9.8
				38		Specify amount used for each application	4.9.7
				39		Comply with NYSDEC agricultural standards	4.1.13
				40		NYSDEC agricultural standards demonstrate resistance	4.9.7
				41	Water management	Experts/conservationists on Steering committee	4.6.2
				42		Town/Town trustees on committee	4.6.2

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				43	Education	Better distribute flyers	4.3.4
				44	Mosquito ecology	Majority of mosquitoes breed in fresh water	4.1.12
				45	Source reduction	Time of day watering reduces mosquitoes	4.5.2
				46		Avoiding pooled water reduces mosquitoes	4.5.2
				47		Fish ponds reduce mosquitoes	4.5.2
				48		Bat boxes reduce mosquitoes	4.1.12
				49		Plantings and habitat enhancement for swallows reduce mosquitoes	4.1.12
				50		Plantings and habitat enhancements for dragonflies reduce mosquitoes	4.1.12
7-14-06	Fred Anders	NYSDOS	J	1	Water management	Baseline data on ecological risks associated with BMP 8 is not presented	4.6.4
				2		Baseline data on Class III BMPs not presented	4.6.4
				3		No substantive details regarding project consideration except will be in Annual Strategy Plans	4.6.7
				4		No substantive details regarding project design except will be in Annual Strategy Plans	4.6.7
				5		No substantive details regarding project implementation except will be in Annual Strategy Plans	4.6.7
				6		No substantive details regarding project monitoring except will be in Annual Strategy Plans	4.6.6
				7		Will participate in the wetlands subcommittee	4.6.2
				8		Will participate in the Screening Committee	4.6.2
Undated (transmittal e-mail dated 7/14/06)	Jack Mattice		K	1	General	Include acronyms with definitions	4.1.14
				2	Biocontrols	Explain conditions when fish may be introduced	4.7.1
				3		Are the species considered "invasive"	4.7.2
				4		Are the proposed fish widespread	4.7.2
				5	Larvicides	Triggers are too generic	4.8.2
				6	Surveillance	How will larval triggers beyond presence-absence be developed	4.8.2

Table 2-1. Written Comments, Organized by Commenter							
Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
				7		How will resources for development of other larval triggers be found	4.1.5
				8	Adulticides	Who conducts the risk determination	4.9.2
				9		Provide more specifics on the risk determination	4.9.2
				10		How does community preference factor in	4.9.2
				11		Can one communities preferences affects risks of another	4.9.7
				12	Surveillance	More specifics re: QA/QC team membership	4.4.3
				13	Adulticides	QA/QC team role in decision-making	4.9.7
				14		Can the County ever reduce to Tier I (NYS WNV Response Plan)	4.1.7
				15	Surveillance	When will County determine need for more CDC traps	4.4.4
				16		Define cycling center & amplification area	4.1.14
				17	Adulticides	Malathion use conditions	4.9.7
				18		Relocate application restrictions	4.1.14
				19		Discuss role of applicator judgment more thoroughly	4.9.7
				20		Identify decision-maker for canopy-dwelling mosquito approach	4.9.7
				21		Identify decision-maker for pre-dawn application	4.9.7
				22		Map areas where pesticides applications are impractical	4.9.7
				23	Larvicides	Discuss Table ES-10 format	4.1.14
				24	General	Ensure decision-makers are identified	4.1.14
7-14-06	William Meredith	Delaware DNREC	L	1	Water management	OMWM practiced in Delaware since 1979	4.6.4
				2		OMWM most effective salt marsh mosquito control (based on science and qualitative observations)	4.6.8
				3		Mosquito control efficacy ~ 95%	4.6.8
				4		Effective for 15 to 25 years	4.6.8
				5		OMWM typically lasts 15-25 years	4.6.8
				6		OMWM removes breeding sites and promotes habitat for larvae-consuming fish	4.6.8
				7		OMWM eliminates nearly all need for larvicides	4.6.8
				8		OMWM reduced need for adulticides to nearly 0	4.6.8
				9		Effects are nearly instantaneous	4.6.8
				10		OMWM cost effective	4.6.8
				11		Care required to avoid vegetation community impacts	4.6.4
				12		Open systems can “dewater” marshes	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				13		Excessive spoil deposition can hinder vegetation recovery	4.6.4
				14		Excessive spoil deposition can raise marsh surface elevation	4.6.4
				15		Vegetation usually recovers in 1-2 seasons	4.6.4
				16		Training allows for identification of problems	4.6.9
				17		Mitigation of mistakes possible	4.6.9
				18		OMWM never exacerbates wetland loss due to sea level rise	4.6.4
				19		Created surface water limited to 3-5% of marsh	4.6.4
				20		No evidence small ponds contribute to salt marsh erosion	4.6.4
				21		Installation of ponds not marsh loss, but habitat conversion	4.6.4
				22		Ponds effective on grid-ditched marshes where ditches dewatered marsh	4.6.8
				23		Benefits waterfowl, shorebird, and wading bird populations	4.6.4
				24		Creates good fish and aquatic invertebrate habitat	4.6.4
				25		Restoration of lost habitat type	4.6.4
				26		Careful installations natural looking and aesthetically pleasing	4.6.4
				27		Delaware has treated 7000 acres of marsh, predominantly high marsh	4.6.4
				28		Variety of property owners – federal, state, private	4.6.4
				29		Bombay Hook NWR exclusion from OMWM (never grid-ditched); implies USFWS endorsement of larviciding	4.6.7
				30		Delaware Division of Fish and Wildlife endorses OMWM	4.6.4
				31		OMWM reduces threat of mosquito-borne disease	4.6.8
7-16-06	Deborah Long	USFWS	M	1	Wertheim	Larval control conducted at Wertheim	4.6.5
				2		USFWS guidance calls for reducing mosquito-associated health threats with IPM, including practical, compatible non-pesticide actions to reduce mosquito production, that give consideration to non-target organisms and communities	4.6.5

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				3		Partner with the County to: restore natural hydrology, reduce the need for pesticides, and increase diversity to benefit fish and wildlife	4.6.5
				4		Project size = 80 acres; project footprint = 20 acres (including staging areas)	4.6.5
				5		OMWM included: dredging small ponds in areas of highest mosquito breeding	4.6.5
				6		OMWM included: constructing sinusoidal creeks to mimic natural creeks and maintain flow to ponds	4.6.5
				7		OMWM included: filling/grading ditches to restore hydrology	4.6.5
				8		OMWM included: grading small areas of existing high marsh that was in decline	4.6.5
				9		County has collected pre- and post-construction data at two sites and two control areas, including mosquito breeding across the Refuge	4.6.5
				10		Construction in Area 1: March 2005 and March 2006 (minor adjustments); in Area 2: February-March 2006	4.6.5
				11		Revegetation in all but most disturbed parts	4.6.5
				12		Plants in construction area are salt marsh and brackish marsh plants	4.6.5
				13		Phragmites extent greatly reduced (especially in Area 1)	4.6.5
				14		Larval production reduced	4.6.5
				15		Need for larvicides reduced	4.6.5
				16		Mummichogs in large numbers found in sampling and by observation in ponds	4.6.5
				17		Mummichogs, sheepshead minnows, and silversides in channels	4.6.5
				18		Numerous shorebird, wading bird, and waterfowl use of Areas 1 and 2 post construction	4.6.5
				19		RTE species spotted post-construction (black rail, northern harrier, short-eared owl, and black skimmer)	4.6.5
				20		County has committed to long-term monitoring of the site	4.6.5
				21		Monitoring should provide information on long-term effects	4.6.5

Table 2-1. Written Comments, Organized by Commenter

Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
6-17-06	Matthew Atkinson	Peconic Baykeeper	N	1	Pesticides	Peer reviews show greater than disclosed impacts	4.9.5
				2		Previous comments show greater than disclosed impacts	4.8.1
				3	Water management	Peer reviews show greater than disclosed impacts	4.6.4
				4		Previous comments show greater than disclosed impacts	4.6.4
				5	General	Benefits of program overstated	4.1.15
				6		DGEIS does not provide adequate information for decision-maker	4.1.16
				7	Adulticide	DGEIS says efficacy is 90%+; Pimental says less than half that for trucks	4.9.8
				8	Adulticides	DGEIS: no adverse impacts; Pimental and Reviewer #2 say differently	4.9.5
				9	General	Different standards for impacts from mosquito-borne disease and pesticides	4.1.2
				10	Larvicides	Emphasis on salt marsh mosquito control	4.8.2
				11	Adulticides	Emphasis on salt marsh mosquito control	4.9.2
				12	Water management	Emphasis on salt marsh mosquito control	4.6.7
				13	Mosquito-borne disease	Salt marsh mosquitoes represent small disease risk	4.10.2
				14	General	No distinction between disease and nuisance control	4.1.1
				15	Mosquito-borne disease	Primary amplification vector: container breeding Culex (according to S. Campbell)	4.10.2
				16		Primary transmission vector: container breeding Culex (according to S. Campbell)	4.10.2
				17		Risks from other mosquito-borne diseases are trivial	4.10.6
				18	General	Reject responses that do not acknowledge the controversy over potential harm and benefits of the Long-Term Plan	4.1.15
				19		Mosquito control is political	4.1.15
				20		Westchester County only has a WNV Response Program	4.1.1
				21		No rational alternatives presented	4.1.8
				22	Water management	Water management choices are given as: no water management; maintenance of all ditches; selective ditch maintenance	4.6.7

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				23	Water management	DGEIS: Beneficial water management can be joined with restoration (see CT); not so (Rosza (CT))	4.6.1
				24		OMWM presented as a panacea	4.6.4
				25	General	CEQ accept the body of opinion in the scientific community	4.1.15
				26		Baykeeper believes there is a spectrum of mosquito-control activities (control methods, public education, artificial source reduction, surveillance) that would be embraced	4.1.4
				27		Long-Term Plan is too argumentative	4.1.15
6-16-04 (submitted by Matthew Atkinson, 7-17-06)	Ron Rosza		O	1	Water management	OMWM is a series of techniques to control mosquitoes	4.6.1
				2		OMWM is different than ditching: does not attempt to change marsh hydrology	4.6.1
				3		Ditches change marsh hydrology because they are connected to the estuary, rise and fall with tide, and promote draining of pools and pannes	4.6.4
				4		OMWM: pools and non-tidal ditches	4.6.1
				5		OMWM not restoration	4.6.1
				6		Restoration seeks to restore to pre-disturbance	4.6.1
				7		CT restoration seeks to return pools and ponds lost to ditching	4.6.4
				8		Tidal flow return results in pannes – waiting for pools.	4.6.4
				9		Use historic aerials to determine ponds	4.6.4
				10		Adamowicz studied natural pools in New England	4.6.4
				11		CT. experimenting with pond excavation and filling ditches	4.6.4
				12		Guilford: plugged all ditches – a mistake	4.6.4
				13		Quinnipiac: left every 3rd ditch open	4.6.4
				14		Lower CT River: restore tidal hydrology by ditch plugging to control Phragmites and shift drainage to tidal creek remnants	4.6.4
				15		May use these techniques for habitat restoration	4.6.1

Table 2-1. Written Comments, Organized by Commenter

Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
				16		Pond restoration does not target mosquito breeding area or use radial or reservoir ditches	4.6.1
				17		Will ponds return to restored marshes?	4.6.4
7-17-06	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	P	1	General	Technical & professional work in the Plan	4.1.15
				2	General	There is a clear distinction between nuisance and disease	4.1.1
				3		It is dangerous not to distinguish between nuisance and disease	4.1.1
				4	Adulticides	Blurred distinction between nuisance and disease leads to more adulticide applications	4.9.2
				5		Applications have adverse impacts on humans	4.9.4
				6		Applications have adverse impacts on wildlife	4.9.5
				7		Applications have adverse impacts on the environment	4.9.5
				8	General	Annual Plans of Work (2000-2004) have distinguished between nuisance control and human health protection	4.1.1
				9		Agree there is a need for disease control in Suffolk County	4.1.4
				10		Linking all mosquito control to disease control creates false impression all mosquitoes are harmful or potentially deadly.	4.1.1
				11		Misapprehension of disease risk leads to greater calls for adulticides use	4.1.1
				12		Misapprehension of disease risk leads to increased use of DEET on children	4.1.1
				13		Misapprehension of risk leads to overapplication of other dangerous pesticides on children	4.1.1
				14	Mosquito-borne disease	Untrue that reducing salt water mosquito populations decreases WNV risks	4.10.2
				15		Salt water mosquitoes are not carriers of WNV in Suffolk County	4.10.2
				16		Salt water mosquitoes are not good vectors of WNV in Suffolk County	4.10.2
				17		Primary function of the program is to reduce risks from EEE	4.10.3

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				18		Only NY cases of EEE in Onondaga County (since 1960)	4.10.3
				19		Never a case of EEE in Suffolk County	4.10.3
				20		It's false that EEE is carried by salt water mosquitoes	4.10.3
				21		It's false that EEE is carried by fresh water mosquitoes	4.10.3
				22		It's false that it is an acute threat	4.10.3
				23		Onondaga County only has a disease control program	4.1.7
				24		Onondaga County sprays when mosquito pools test positive for EEE	4.9.3
				25		Suffolk County should only adulticide in a limited targeted way when disease is discovered	4.9.3
				26	Public education	CCE understood the Plan would contain a component to increase public tolerance for mosquitoes	4.3.3
				27		Long-Term Plan should contain such a component	4.3.3
				28		Tolerance for mosquitoes conflicts with depiction they are harmful, dangerous, and disease-ridden	4.3.3
				29	Adulticiding	NYS WNV Response Plan cites specific triggers for adulticiding under health threat conditions; these define difference between nuisance and disease control	4.1.1
				30		Long-Term Plan should use similar language as in WNV Response Plan for adulticiding criteria	4.9.2
				31	General	FINS has clear distinctions between nuisance control and disease control	4.1.1
				32		National Wildlife Refuge has clear distinction between nuisance and disease control	4.1.1
				33	Surveillance	Suffolk has an excellent surveillance program	4.4.4
				34	General	Detection of disease should be trigger for disease control	4.1.4
				35	Adulticides	Precise triggers should be set for adulticide applications (current Plan is too vague)	4.9.2
				36		Specify species in traps and landing rate counts	4.9.2
				37		Specify landing rate procedures better	4.9.2
				38		Clarify landing rate count discrepancy (Long-Term Plan)	4.9.2
				39		Chemicals only used when disease is uncovered	4.9.3
				40		Follow CT adulticiding model	4.9.2
				41		Ecological impacts not well researched	4.9.5

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				42	Caged Fish	Does not determine ecological impacts of adulticiding (confounding factors)	4.1.3
				43		Laboratory results were not sufficient	4.1.3
				44		Not appropriate to determine long-term or sub-lethal impacts	4.1.3
				45	Adulticides	"Must be used in residential areas" is untrue statement	4.9.2
				46		Adulticide use cannot stop mosquito biting	4.9.8
				47		Inappropriate for nuisance control	4.9.3
				48	Mosquito-borne disease	Mosquito bites are itchy annoyance	4.10.5
				49	General	Risks of mosquito control far outweigh benefits	4.1.15
				50	Water management	All projects reviewed by Screening Committee	4.6.2
				51		15 acre size criteria not best	4.6.2
				52		Leaves out BMPs 9 and 6	4.6.2
				53		Size criteria could lead to project segmentation to avoid reviews	4.6.2
				54		Change the composition of the Screening Committee (add 2 more environmental NGOs)	4.6.2
				55	Public education	Evaluate the effectiveness of public education in behavior modification	4.3.2
				56		Effective public education can eliminate the need for adulticides	4.3.2
				57		Public education focus on mosquito avoidance is improper; should stress mosquito tolerance	4.3.3
				58		Excessive fear of mosquitoes can lead to improper use of chemicals	4.3.3
				59		Excessive exposure to chemicals can harm humans (especially children)	4.3.1
				60		Fight the Bite is a bad title	4.3.4
				61		Reporting of efficacy data is good	4.3.5
				62		Use reverse 911 for adulticide application notices	4.3.5
				63	Water management	Use SCERP research when discussing ditch impacts	4.6.4
				64		SCERP analyzed nutrient runoff (particularly N) in numerous LI marshes	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				65		SCERP analyzed FC from open and closed ditches	4.6.4
				66		SCERP analyzed ditches for conduits of N and fecal coliform	4.6.4
				67		SCERP results contradict Cashin Associates results	4.6.4
				68		SCERP research provides site-specific supplement to general literature search	4.6.4
				69		Mosquito ditches account for ~25% of N to the southern portion of Flanders Bay, 10% of N to whole Bay	4.6.4
				70		Plugging ditches can eliminate ditch flow	4.6.8
				71		Ditch plugging is warranted in western Peconic Estuary	4.6.7
				72	Larvicides	Methoprene use warrants caution as it may have impacts to the marine environment	4.8.1
				73		Alternatives to methoprene need to be aggressively pursued	4.8.1
				74	Source control	Central tenet is to reduce pesticides through source reduction	4.6.1
				75		Reliance on control of salt marsh breeding habitats	4.6.1
				76	Water management	Improve management of 17,000 acres of salt marsh	4.6.1
				77		All “progressive water management” is “OMWM”	4.6.1
				78		Long-Term Plan: OMWM will reduce pesticides use	4.6.8
				79		Long-Term Plan: OMWM will restore County marshes	4.6.8
				80		Individual techniques and practices may indeed restore marsh health	4.6.8
				81		Reservations concerning large scale projects for primary purpose of mosquito control	4.6.7
				82		15 projects will restore 4,000 acres	4.6.1
				83		Plan may not result in ecological health improvements	4.6.4
				84		OMWM success in NJ, CT, RI for mosquito control	4.6.8
				85		No peer-reviewed work citing ecological improvements from OMWM	4.6.4
				86		No long-term studies documenting impact on overall marsh attributes	4.6.4
				87		Many professionals refer to OMWM as experimental	4.6.4
				88	Wertheim	Useful to demonstrate SCVC technical/logistical abilities	4.6.5
				89		Too early to draw any conclusions	4.6.5

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				90	Water management	Literature (Lathrop and Cole, 2000) finds OMWM does not recreate unaltered marsh	4.6.1
				91		Literature cites lack of understanding of salt marsh functions	4.6.4
				92		OMWM is not restoration	4.6.1
				93		Restoration means returning marshes to pre-20th C ditching conditions	4.6.1
				94		OMWM does not return marshes to pre-20th C ditching conditions	4.6.1
				95		Definition of restoration in DGEIS too vague	4.6.1
				96		DGEIS restoration definition would allow any alteration of a non-pure marsh	4.6.1
				97		OMWM silver bullet	4.6.4
				98		Large-scale OMWM projects lack scientific support at this time	4.6.4
7-17-06	Nicole Maher et al.	COPOPAW	Q	1	General	Improvements made to Plan since October 2005	4.1.9
				2	Adulticides	Addition of numeric criteria good	4.9.2
				3	General	Good plan where vector control is consistent with ecological values	4.1.4
				4		Reducing pesticides good goal	4.1.4
				5		Improving marsh health good goal	4.1.4
				6	Adulticides	Clarify thresholds and criteria for use	4.9.2
				7		Clarify availability of trap data	4.9.2
				8		Clarify landing rate trigger	4.9.2
				9	Larvicides	Clarify criteria for use	4.8.2
				10		Document procedures to be used	4.4.1
				11		Document staff training	4.4.1
				12	Water management	Amend Screening Committee membership (4 environmental non-profits and 3 estuary reps)	4.6.2
				13		Debate among reputable scientists regarding OMWM impacts	4.6.4
				14		Debate among scientists regarding OMWM mosquito control efficacy	4.6.8
				15		Change in composition will add scientific expertise	4.6.2

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				16		Change in composition will change focus to wetlands health	4.6.2
				17		Screening Committee should have written notice of all projects	4.6.2
				18		BMPs 6, 7, 9 are controversial	4.6.3
				19		Screening Committee should evaluate design of all projects	4.6.2
				20		Screening Committee should evaluate monitoring protocols	4.6.2
				21		Evaluate projects for ecological restoration	4.6.2
				22		Evaluate projects for mosquito control effectiveness	4.6.2
				23		Reject projects that damage marsh health	4.6.2
				24		Determine which projects require no further review	4.6.2
				25	Public education	Long-Term Plan: good start	4.3.5
				26		Necessary part of mosquito control	4.3.5
				27		Provide additional details	4.3.5
				28		Informed population more likely to take steps towards mosquito control	4.3.2
				29		Add: PSAs	4.3.5
				30		Add: elementary education programs	4.3.5
				31		Add: homeowner association programs	4.3.5
				32		Add: school property inspections	4.3.5
				33		Add: Waste tire collection service	4.3.5
				34		Add: commercial/residential inspections	4.3.5
				35	Water management	County should create a Wetlands Recovery Project	4.6.2
				36		Set objectives for acquisition, restoration, and enhancement of coastal wetlands	4.6.2
				37		Secure funding from state, federal, local, or private sectors	4.6.2
				38		Collaborative, effort with multiple stakeholders	4.6.2
				39		Use scientific principles, and focus on wetlands health	4.6.2
				40		Managed by SCDEE	4.6.7
				41	General	Revise DGEIS to meet comments from peer reviewers	4.1.16

Table 2-1. Written Comments, Organized by Commenter

Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
				42	Risk Assessment	No dermal exposure	4.9.4
				43	Mosquito-borne disease	Exaggerated risks for WNV (Busch et al., 2006)	4.10.1
				44	Pesticides	Downplayed risks with pesticide exposure	4.9.1
				45	Adulticides	Include permethrin cancer information	4.9.6
				46		Include resmethrin cancer information	4.9.6
				47		Pyrethroid-Parkinson’s disease links	4.9.6
				48	Mosquito-borne disease	Distinguish between known disease vectors, suspected disease vectors, and aggressive salt marsh mosquitoes	4.10.2
				49	Pesticides	Understate non-target insect impacts	4.9.5
				50	Adulticides	Address toxicity of pyrethroids to fish	4.9.5
				51		Address toxicity of pyrethroids to fish with weekly applications	4.9.5
				52	Surveillance	Discuss use of trap data	4.4.4
				53	Pesticides	Include efficacy data	4.9.8
				54		Disagree with presented efficacy data	4.9.8
				55	Larvicides	Inadequate discussion of methoprene impacts on crustaceans	4.8.1
				56		Inadequate discussion of methoprene on non-target organisms	4.8.1
				57	Caged Fish	Limited to no replication	4.1.3
				58		Short duration	4.1.3
				59		Excessive background stresses	4.1.3
				60		Limit study’s applicability	4.1.3
5-15-06 (submitted by Maher et al 7-17-06)	Unidentified	COPOPAW (?)	R	1	General	Significantly improved Plan	4.1.9
				2	Water management	Improvements: three-year workplan	4.1.5
				3		Continuing & expanded regional wetlands planning	4.6.7
				4		Reducing mosquitoes not paramount project goal, exclusive of biodiversity and wetlands health	4.6.7
				5		Screening Committee can consider non-vector control projects	4.6.2

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				6		Screening Committee can refine wetlands planning	4.6.2
				7		Screening Committee can reject proposed projects	4.6.2
				8		Screening Committee will include 2 non-profit reps, and 3 estuary program reps	4.6.2
				9	General	Lack of thresholds for action	4.1.14
				10	Public education	Not enough details provided	4.3.5
				11	General	Distinguish between actions for disease control and those for nuisance control	4.1.1
				12		Distinguishing between nuisance and disease characterizes real risks to community from disease	4.1.1
				13		Allows public to weigh costs and benefits of mosquito control actions	4.1.1
				14		County is managing health risk on a zero-based risk scale	4.1.2
				15		EPA-FDA manage risks differently	4.1.2
				16		County conflates health and nuisance control (“vector control”) because reducing vectors to less-than-significant levels reduces public health risk to zero	4.1.2
				17		This zero-based risk posture overstates disease risk	4.1.2
				18	Mosquito-borne disease	County should establish an acceptable disease risk level	4.1.2
				19		Failing to differentiate the two leads to suites of management actions based on the presence of mosquitoes	4.1.2
				20	Pesticides	Pesticides have health risks	4.9.1
				21		Health risks are not recognized in the Risk Assessment	4.9.4
				22	General	Axiomatic that society will allow more risks for health preservation than nuisance issues	4.1.1
				23		Many places manage under two sets of guidelines: one for general mosquito control, and one for confirmed disease presence	4.1.1
				24		NYS WNV Response Plan example of separation of disease from general mosquito control	4.1.1
				25	Adulticides	Used only when risk of disease is intolerably high	4.9.3
				26	Surveillance	County data sets can determine intolerable health risk	4.4.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				27		Establish level of surveillance necessary to confirm unacceptable risk	4.4.4
				28	General	Commit to certain mosquito control actions in the face of unacceptable risks	4.1.13
				29	Adulticide	Criteria are caricatured	4.9.2
				30		Criteria allow responses at almost any mosquito density	4.9.2
				31		Criteria do not balance risks and benefits	4.9.2
				32		Should only be used in the face of imminent disease threat	4.9.3
				33	Public education	Key element of mosquito control	4.3.5
				34	General	Long-Term Plan focuses on controlling mosquitoes through chemical, physical, biological methods`	4.1.13
				35	Mosquito-borne disease	Tidal marshes are unlikely source of WNV vectors	4.10.2
				36	Public education	Aggressive public education can reduce needs for other elements of mosquito control	4.3.2
				37		Precis of Long-Term Plan elements	4.3.5
				38		Details and commitment of carry out Long-Term Plan	4.1.5
				39		People informed about mosquitoes are more likely to mosquito-proof their home	4.3.2
				40		Add: PSAs	4.3.5
				41		Add: elementary education programs	4.3.5
				42		Add: homeowner association programs	4.3.5
				43		Add: school property inspections	4.3.5
				44		Add: Waste tire collection service	4.3.5
				45		Add: commercial/residential inspections	4.3.5
				46	Risk Assessment	Release peer reviews from TAC-approved peer reviewer	4.1.9
12-13-05 (submitted by Maher et al 7-17-06)	Citizens Campaign for the Environment et al	COPOPAW	S	1	Adulticides	Add specific criteria and thresholds	4.9.2
				2	General	Distinguish between nuisance and disease	4.1.1
				3	Larvicides	More fully characterize methoprene	4.8.1
				4		Include work from the Long Island Sound Study	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				5	General	Include separate NEPA analysis	4.1.14
				6	Mosquito dynamics	More thoroughly explore mosquito dynamics	4.1.12
				7		Examine impact of removal of prey from system	4.1.12
				8	Stormwater	Describe interface between vector control and stormwater management	4.5.1
				9	General	Closely examine other nearby programs	4.1.7
				10	Public education	Examine efficacy of public education in changing behaviors	4.3.2
				11	Water management	Establish a comprehensive water management program in which vector control will be a part	4.6.1
				12		Establish clear standards for action	4.6.7
				13		Discuss efficacy of all water management actions	4.6.8
				14	General	Previous Plans of Work have distinguished between nuisance and public health control	4.1.1
				15	Mosquito-borne Disease	Lack of distinction leads the public to view all mosquitoes as harmful or possibly deadly.	4.10.2
				16	Adulticides	Viewing all mosquitoes as dangerous leads to more calls for adulticide use	4.9.2
				17	Public Education	Viewing all mosquitoes as dangerous leads to more DEET use	4.3.1
				18	Pesticides	Viewing all mosquitoes as dangerous leads to more use of dangerous pesticides on children	4.3.1
				19	Mosquito-borne disease	Reducing salt water mosquito populations does not reduce disease risk	4.10.2
				20		Salt water mosquitoes are not carriers of WNV in Suffolk County	4.10.2
				21		Salt marsh mosquitoes are not good vectors of WNV in Suffolk County	4.10.2
				22		Primary function of the program is to reduce risks from EEE	4.10.3
				23		Only NY cases of EEE in Onondaga County (since 1960)	4.10.3
				24		It's false that EEE is a serious threat	4.10.3
				25	Public Education	Expected a component calling for tolerance of mosquitoes as part of life on Long Island	4.3.3

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				26		Tolerance of mosquitoes is impossible if they are all described as dangerous	4.3.3
				27	General	NYS WNV Response Plan is an example of distinguishing between disease and nuisance control	4.1.1
				28		FINS has specific triggers based on risk of disease to distinguish between nuisance and disease control	4.1.1
				29		The National Wildlife Refuge has specific triggers based on risk of disease to distinguish between nuisance and disease control	4.1.1
				30	Source control	Central tenet is to reduce pesticides through source reduction	4.1.4
				31		Reliance on control of salt marsh breeding habitats	4.1.4
				32	Water management	Improve management of 17,000 acres of salt marsh	4.6.1
				33		All “progressive water management” is “OMWM”	4.6.1
				34		Long-Term Plan: OMWM will reduce pesticides use	4.6.8
				35		Long-Term Plan: OMWM will restore County marshes	4.6.8
				36		Individual techniques and practices may indeed restore marsh health	4.6.8
				37		Reservations concerning large scale projects for primary purpose of mosquito control	4.6.7
				38		15 projects will restore 4,000 acres	4.6.1
				39		Plan may not result in ecological health improvements	4.6.4
				40		OMWM success in NJ, CT, RI for mosquito control	4.6.8
				41		No peer-reviewed work citing ecological improvements from OMWM	4.6.4
				42		No long-term studies documenting impact on overall marsh attributes	4.6.4
				43		Many professionals refer to OMWM as experimental	4.6.4
				44	Wertheim	Useful to demonstrate SCVC technical/logistical abilities	4.6.5
				45		Too early to draw any conclusions	4.6.5
				46	Water management	Literature (Lathrop and Cole, 2000) finds OMWM does not recreate unaltered marsh	4.6.1
				47		Literature cites lack of understanding of salt marsh functions	4.6.4
				48		OMWM is not restoration	4.6.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				49		Restoration means returning marshes to pre-20th C ditching conditions	4.6.1
				50		OMWM does not return marshes to pre-20th C ditching conditions	4.6.1
				51		OMWM silver bullet	4.6.4
				52		Large-scale OMWM projects lack scientific support at this time	4.6.4
				53	General	Long-Term Plan primary objectives mosquito control and disease management	4.1.4
				54		Primary objective not ecologically sensitive marsh restoration and management	4.1.4
				55	Water management	Marshes serve a broad array of functions	4.6.1
				56		Nearly all County marshes have been manipulated and need attention	4.6.1
				57		Many marshes fail to serve their complete spectrum of functions	4.6.1
				58		Many marshes need restoration	4.6.1
				59		Plan scope too narrow – only 4,000 acres	4.6.1
				60		9,000 acres will be assessed – too relaxed an approach	4.6.1
				61		4,000 acres will not be managed	4.6.1
				62		Marsh restoration to be accomplished for the purpose of vector control, not marsh health	4.6.1
				63		Marsh management administered by another agency, not SCVC, with a specific mandate towards County biodiversity and ecological health	4.6.7
				64	Larvicide	Methoprene routinely applied to Suffolk marshes	4.8.1
				65		Methoprene found to have no impacts to estuarine non-target organisms at environmental concentrations	4.8.1
				66		Methoprene review was deficient	4.8.1
				67	Caged Fish	Results were inconclusive	4.1.3
				68	Larvicides	Book 7 of Literature Search did not include 16 studies finding adverse impacts from methoprene	4.8.1
				69		Book 7 excessively relies on Antunes-Kenyon and Kennedy, 2001 for crustacean results.	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				70		Book 7 ignores negative reports in Antunes-Kenyon and Kennedy, 2001	4.8.1
				71		LIS Lobster Initiative Research ignored in Book 7	4.8.1
				72		Methoprene MSDS identifies it as toxic to aquatic organisms; may cause long-term adverse impacts in the aquatic environment	4.8.1
				73	Caged Fish	Found no impacts from methoprene	4.8.1
				74		USGS sampling found concentrations considered to be lethal/sublethal to larval crustaceans	4.8.1
				75	Larvicides	Do not account for impacts to juvenile crustaceans	4.8.1
				76		NYC EIS found adverse effects for methoprene	4.8.1
Undated (submitted by Maher et al 7-17-06)	Peer reviewer #1		T	1	Risk Assessment	Follows accepted methodologies	4.1.2
				2		Adequately characterizes worst case exposure scenarios	4.1.2
				3		Revise Executive Summary to avoid conclusions	4.1.15
				4		Avoid statements of “no risk”	4.1.2
				5		Give more credit to NYC EIS	4.1.2
				6		Update to include post-2005 work (REDs and primary literature)	4.1.2
				7	Adulticides	Do not include dermal exposures (see Moore et al, 1993, and Peterson, 2006, not USEPA)	4.1.2
				8	Pesticides	Risks from background exposure are not serious and do not exceed levels of concern	4.9.4
				9		Exposure to vector control insecticides much smaller than exposures to insecticides from other sources	4.1.2
				10	Larvicides	Correct characterization of human risk assessment	4.1.2
				11	Mosquito-borne Disease	Don’t speculate about when exotic disease will be introduced to Suffolk County	4.10.6
				12		Discuss effectiveness of yellow fever vaccine	4.10.6
				13	Adulticide	Enhance discussion of community gardener	4.9.4
				14		Provide basis for pyrethrum evaluation	4.9.4
				15	Risk Assessment	Define straw man plan	4.9.4
				16		Explain choice of agents	4.9.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				17		Explain scenario selection	4.9.4
				18		Specify application rates	4.9.4
				19		Reviewer prefers specific product evaluations	4.9.4
				20	Larvicide	General discussion (Risk Assessment page 3-8) does not include time-release formulations	4.8.1
				21	Adulticides	Biomagnification discussion of malathion is confusing	4.9.4
				22	Larvicides	Bs may affect non-target dipterans	4.8.1
				23	Risk Assessment	Should have included irrigated croplands	4.9.4
				24	Risk Assessment	Identify surrogate for salamanders	4.9.4
				25		Turtles considered terrestrial or aquatic	4.9.4
				26		Birth to 6 too broad an age grouping	4.9.4
				27		Incomplete pathway used	4.9.4
				28		Why was a fractional intake used in Tier 1?	4.9.4
				29		Modeling approach must be made more transparent	4.9.4
				30		Maximum point estimate too conservative	4.9.4
				31		Assumptions for worst case are too conservative	4.9.4
				32		LOAEL to NOAEL calculation is too cavalier	4.9.4
				33		Adding PBO & pyrethroid risks, because is synergistic, is not necessarily conservative	4.9.4
				34		Malathion risks are overstated	4.9.4
				35		Insecticides “stack” against a building	4.9.4
				36		Update sumithrin (use 2000 reference)	4.9.4
				37		Dermal exposure may need to be considered	4.9.4
				38		Rework non-target flying insect impact section	4.9.5
				39		Buffer area too large	4.9.4
				40		Refine discussion of Minnesota larvicides studies	4.8.1
				41		Discuss acute exposure scenarios	4.9.4
				42		Discuss very small child exposure considerations	4.9.4
Undated (submitted by Maher et al 7-17-06)	Peer Reviewer #2		U	1	General	Rewrite Task 8 Executive Summary	4.1.15
				2		Overall Plan approach is appropriate	4.1.2

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				3	Water management	Marsh management plan is a strength	4.1.13
				4	General	Broad conceptualization of vector control roles/responsibilities is good	4.1.13
				5	Risk assessment	Risk assessment well-organized	4.1.2
				6	Mosquito-borne disease	Mosquito-borne disease section contains correctable errors	4.10.1
				7	Risk Assessment	Should have evaluated a higher than normal use	4.9.4
				8		Impacts of pesticides should have included life-cycle effects	4.1.2
				9		Efficacy data should have been included (insofar as it might impact derivation of risks)	4.1.2
				10		Explaining efficacy of alternative methods helps explain why tried & true is so often used	4.1.2
				11		Certain effects not addressed – i.e., arguable endocrine effects of pyrethroids	4.1.2
				12		Nuanced impacts might temper blanket statements regarding overall safety	4.1.2
				13		Assessment communication would be stronger using a better means of expressing risks	4.1.2
				14	Adulticides	Public unaware of small role played by mosquito control pesticides in overall pesticide risks	4.9.6
				15		CDC work (2005) documenting insignificant increases in pesticide metabolites in urine important point of discussion	4.9.6
				16	Mosquito-borne disease	Modeling approach useful	4.10.1
				17	Water management	Proposed plan is likely to further reduce disease risk based on results in CT and other NE states, although results are not likely to be completely the same	4.6.8
				18		Proposed Plan is likely to reduce salt marsh mosquito populations based on results in CT and other NE states, although results are not likely to be exactly the same	4.6.8

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				19	Risk Assessment	Prefer another means of characterizing risk. Pesticide use is not risk-free	4.9.1
				20	Pesticides	Risks from mosquito control pesticides are very low because of low exposures to the pesticides	4.9.1
				21	Water management	Define “progressive”	4.6.1
				22	General	Goals are clear and positive	4.1.4
				23		Goals may not be founded in data/experience	4.1.4
				24	Water management	Basis for 75% reduction?	4.6.8
				25	Mosquito-borne disease	Diseases of greatest concern?	4.10.6
				26		Disease risk discussion is incomplete	4.10.1
				27		Add indirect health effects that stem from limited outdoor time	4.10.5
				28		Correct technical discussion of diseases	4.10.6
				29		More detailed discussion of local vector species needed	4.10.2
				30		Reconsider disease risks in light of Busch et al (2006)	4.10.1
				31		WNV penetrates US population more quickly than thought (higher immune rates)	4.10.1
				32		Infection rate is > 2%	4.10.1
				33		Neuro-invasive disease cases may be being misdiagnosed	4.10.1
				34		Ensure changing diagnoses of WNV are accounted for	4.10.1
				35		“Less serious” WNV is now recognized as having longer and more deleterious effects	4.10.1
				36		Exposed populations sum of zip codes?	4.10.1
				37		Exposure only at residence? Bad assumption.	4.10.1
				38		2% infection rate resulted in 1.5% infected population? How?	4.10.1
				39		Risks may be lower than stated (if Busch et al. is used)	4.10.1
				40		Add discussion of predictive models of WNV incidence	4.10.1
				41	Adulticides	Impact of malathion degradates would strengthen the assessment	4.9.4
				42		Malathion poses greater risks to bees because it is not a repellent	4.9.5

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				43	Pesticides	GRAS status of garlic oil does not make it safe	4.9.1
				44		Garlic oil lacks efficacy data	4.9.1
				45	Risk assessment	Degradation rates should be lower in urban environments	4.9.4
				46	Larvicides	Bacillus compounds have applicator human risks	4.8.1
				47	Risk assessment	How is prenatal exposure addressed?	4.9.4
				48		Uncertainties regarding mode of action of pyrethroids	4.9.6
				49		Environmental measurements have not been set by regulators	4.9.6
				50		Low concentration exposures seem to result in very complex reactions	4.9.6
				51		EPA has classified permethrin as potential carcinogen via oral route	4.9.6
				52	Adulticides	Potential link to Parkinson's Disease	4.9.4
				53		No asthma impact in NYC (malathion and resmethrin)	4.9.4
				54	Risk Assessment	Avian good surrogate for reptiles?	4.9.4
				55	Adulticides	Use qualitative information and judgement for non-target flying insect impacts.	4.9.4
				56		Insects other than honeybees may not return after pyrethroid repellent effect	4.9.5
				57		Pyrethroids may be found more in sediments than in the water column	4.9.6
				58		CA testing found pyrethroids above levels of concern in sediments	4.9.6
				59		Mosquito control pesticides were not detected in the CA study	4.9.6
				60		High concentrations appear to be a function of high irrigation flows (thus, high residues in CA but not in TN)	4.9.6
				61	Caged Fish	Found low water column concentrations below those needed to cause toxic effects in lab	4.8.1
				62	Adulticides	DeLorenzo et al found very low concentrations of permethrin affected larval shrimp development	4.9.6
				63		Presence of sediment ameliorated effects	4.9.6

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				64		Hunter et al. found only dissolved pyrethroids were bioavailable	4.9.6
				65		USEPA concerned about pyrethroids, including mosquito control uses, because sediment bound pesticides may be bioavailable	4.9.6
				66		Pyrethroid residues widely found in CA stream sediments	4.9.6
				67		Residue concentrations could be reach levels to cause organism toxicity	4.9.6
				68		Mosquito control pesticides not found	4.9.6
				69	Pesticides	JSR discussed mosquito control pesticide contributions to the WLIS die off	4.9.6
				70	Public education	Recent DEET information	4.3.1
				71		DEET misuse may rise if increased usage occurs	4.3.1
				72	Mosquito ecology	Culex feed preferentially on robins?	4.10.2
				73	Water management	Conceptually: good, but unable to critique it technically	4.6.4
				74		More explanation for the 75% larvicide reduction goal is needed	4.6.8
7-17-06 (submitted by Maher et al 7-17-06)	Jake Kritzer	Environmental Defense	V	1	Caged Fish	Focus is on Part 1: Impacts to Biota	
				2		Limited utility due to lack of replication	4.1.3
				3		Limited utility due to limited time periods for monitoring for effects	4.1.3
				4		Limited utility due to substantial background stress that clouds detection of pesticide effects	4.1.3
				5		Replication was only the minimum for statistical purposes	4.1.3
				6		9-9 event was not properly replicated	4.1.3
				7		Adulticide events not properly replicated	4.1.3
				8		Tracked impacts over 4-6 days	4.1.3
				9		Suspect this is too short a time period	4.1.3

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				10		Growth requires more time to measure impacts	4.1.3
				11		Environmental toxins often have impacts over periods of weeks to years	4.1.3
				12		Study notes low DO as stressor	4.1.3
				13		Food supply, density, caging effects may have affected results	4.1.3
Undated (submitted by Maher et al 7-17-06)	David Pimentel		W			No significant comment presented	
Undated (submitted by Maher et al 7-17-06)	Michael Horst		X	1	Caged Fish	Methoprene will bind to plastics and be biologically unavailable	4.1.3
				2		Source of shrimp?	4.1.3
				3		How many survivors brought back to lab	4.1.3
				4		Type of container that collected water	4.1.3
				5		Water sampling did not account for water volume and movement	4.1.3
				6		Source of unexpected mortality	4.1.3
				7		Survivorship in deeper water due to less pesticide or more DO?	4.1.3
				8		Test should have been conducted on larval shrimp	4.1.3
				9		Discuss DO drops	4.1.3
				10		Source for shrimp DO data	4.1.3
				11		Mortalities due to combination of stressors?	4.1.3
				12		Prey-capture has scientific validity	4.1.3
				13		Observations in literature that methoprene causes lethargy in crustaceans	4.1.3
				14		Rationale for attributing mortality to low DO	4.1.3
				15		30 minute methoprene concentration meets LD50 for Stage III lobster larvae	4.8.1
				16		Needs increased frequency of sampling	4.8.1
				17		Report methoprene concentration in sediments	4.8.1
				18		Why will methoprene sink?	4.8.1
				19		Half-life in sediments long enough to affect lobsters	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				20		Worms may consume detrital methoprene	4.8.1
Undated (submitted by Maher et al 7-17-06)	Michael Horst		Y	1	Adulticides	Why not use neem?	4.8.4
				2		Explain more about Adapco Wingman	4.9.7
				3	General	Acreages do not add up	4.6.1
				4	Mosquito-borne disease	Influenza more important	4.10.1
				5	Water management	PSA selection query	4.6.4
				6	Risk Assessment	Impacts do not propagate up the food chain: what is source	4.9.4
				7	Caged Fish	Did not address non-lethal effects	4.1.3
				8	Larvicide	Define biorational	4.8.1
				9	Surveillance	Will pre-spray surveillance include non-target organisms	4.4.3
				10	Water management	Blue crabs share habitat with mosquitoes	4.6.4
				11	Public education	Citronella + picaridin other options besides DEET	4.3.1
				12	Larvicides	Bacillus incorrectly identified	4.8.1
				13		Methoprene incorrectly identified	4.8.1
				14		Methoprene not specific to insects	4.8.1
				15	Risk Assessment	Did not include annelids	4.9.4
				16	Adulticide	Clove oil is alternative	4.8.4
Undated (submitted by Maher et al 7-17-06)	Michael Horst		Z	1	Larvicide	Methoprene briquets can last 1-3 months, releasing pesticide all the while	4.8.1
				2		Methoprene has the potential to affect all arthropods	4.8.1
				3		Methoprene is not safe: impacts honey bees	4.8.1
				4		Alternative is Neem	4.8.1
				5		Literature shows neem has been safely used for hundreds of years	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				6		Methoprene has been shown to be toxic to many organisms	4.8.1
				7		Methoprene persistence in ponds is long enough to cause toxic effects	4.8.1
				8		A combination of larvicides is better than one alone	4.8.1
				9		Methoprene use in every storm drain, followed by heavy rainfall, would wash significant pesticides into the nearby estuary and WLIS	4.8.1
				10		Correct terminology associated with juvenile hormone	4.8.1
				11		Duration of methoprene effect depends on the formulation	4.8.1
				12		Breakdown of methoprene produces methoprenic acid	4.8.1
				13		Methoprenic acid has not had acute toxicity testing in arthropods	4.8.1
				14		Methoprene impacts grass shrimps, mud crabs, and lobsters (Stage III larval LD50 = 3 ppb)	4.8.1
				15	Caged Fish	Sublethal impacts may have been missed	4.1.3
				16	Larvicides	Use of methoprene in a salt marsh will lead to significant effects of crab and shrimp	4.8.1
				17		It is not really true that methoprene use has no impacts on aquatic life	4.8.1
				18		Slow release of methoprene can result in concentrations of 15 ppb	4.8.1
				19		15 ppb could cause significant mortality to crab and shrimp	4.8.1
				20		How will wash-out of briquets into the estuary be prevented	4.8.1
				21	Pesticides	Majority of pesticide use is in summer when shellfish molt, increasing metabolic stress	4.8.1
				22	Larvicides	Methoprene adheres to plastics; if sampled in plastic, may be lost from water	4.8.1
				23	Adulticides	Neem is an alternative	4.8.4
				24	Larvicides	Was Suffolk County methoprene data published	4.8.5
				25		Was it published in a peer reviewed journal	4.8.5
				26		Peer review establishes accuracy of scientific work	4.1.6
				27		DeGuise, McElroy, Horst data included?	4.1.2

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
Undated (submitted by Maher et al 7-17-06)	Michael Horst		AA	1	General	NYC-Westchester DGEISs ever reviewed for scientific accuracy	4.1.2
				2	Risk assessment	Annelids were not included	4.9.4
				3		Behavior should be included as an impact	4.1.2
				4		Repeated exposures may lead to chronic exposure through bioaccumulation	4.1.2
				5		Nothing new published since 2001 according to the Ecotoxicology Study	4.1.2
				6	Larvicides	Refine discussion of the mode of action of methoprene	4.8.1
				7		Methoprene generally degrades quickly in the environment is misleading	4.8.1
				8		Methoprene may bioaccummulate 250-fold in non-target organisms (lobsters)	4.8.1
				9	Adulticide	Lit search did not overlook bioaccumulation with permethrin	4.8.1
				10		Toxicity to bees mentioned but not followed up	4.9.4
				11		Why were other repellents not studied	4.1.2
				12		Why was AGRICOLA data base not included in study?	4.1.2
				13	Risk Assessment	Why were nematodes not included	4.9.4
				14	General	Define hormesis	4.9.4
				15	Risk Assessment	Implies inconsistency regarding “acute” conditions	4.9.4
				16		Distinguish between “lethality” and LD72	4.9.4
				17		Suggests for crustaceans, absorption through digestive tract may be more important route of exposure than aqueous exposure	4.9.4
				18	Larvicides	Refine discussion of the mode of action of Bacillus	4.8.1
				19		Work should be based on published accounts	4.8.1
				20		Floyd washed methoprene out of storm drains	4.8.1
				21		Oversimplification to state relatively rapid degradation makes use in estuaries of no concern	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				22		Discuss expected environmental concentrations of methoprene	4.8.1
				23		Recognize the two isomers of methoprene	4.8.1
				24		Define biomarker	4.8.1
				25		Although permethrin bioconcentration factors are cited, 2005 work by DeGuise and Walker on methoprene is not, making work suspect	4.8.1
7-13-06 (submitted by Maher et al 7-17-06)	Michael Horst	University of Maine	AB	1	Caged Fish	Testing methoprene under environmental conditions is not sufficient	4.8.1
				2	Larvicides	JSR issue on lobsters available	4.8.1
				3		Concentrations lethal to mosquitoes may impact non-target invertebrates	4.8.1
				4		Antunes-Kenyon and Kennedy not peer-reviewed and so may not be accepted in the scientific community	4.8.1
				5		Found 3 ppb 72 hr LD50 for Stage III lobsters	4.8.1
				6		Suggests crabs and shrimp will also be affected	4.8.1
				7		Estuary important breeding ground for members of the food chain	4.8.1
				8		Report found fast degradation times for methoprene	4.8.1
				9		Methoprene bioaccumulates in lobsters up to 250 fold (over 24 hours)	4.8.1
				10		May remain stable in the lobster for days	4.8.1
				11		Mode of action of methoprene on lobsters	4.8.1
				12	Caged Fish	Should have tested all major groups before honing in on only two species	4.1.3
				13	Larvicides	Synergy between environmental stress and pesticides inadequately addressed	4.8.1
				14		Methoprene not only mimics JH III but also methyl farnesoate	4.8.1
				15		Mode of action of methoprene	4.8.1
				16		Because methoprene affects organisms hormones, must be identified as a different kind of environmental impact	4.8.1
				17		The Kow of methoprene means that it is difficult to control experimentally	4.8.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				18		Because methoprene is particle-attracted it enters the detrital food path and enters the food chain in a fashion not considered in the analysis	4.8.1
				19		Briquets may wash out into nearby streams and estuaries	4.8.1
6-28-06 (submitted by Maher et al 7-17-06)	David Pimentel	Cornell University	AC	1	General	Overall an excellent job	4.1.15
				2	Risk Assessment	"no risk" vs. "significant risk"	4.1.15
				3	Pesticides	No pesticide is entirely safe	4.9.1
				4	Risk Assessment	Honey bees are not good surrogates for non-target insects	4.9.5
				5	General	Most insects are beneficial (only 1% are pests)	4.9.5
				6	Adulticides	High toxicity of pyrethroids to fish is not mentioned	4.9.5
				7		Disagrees that pyrethroids do not pose unacceptable risks	4.9.5
				8		Believes risks from pyrethroids outweigh the benefits	4.1.15
				9	Public Education	DEET is a pesticide	4.3.1
				10		Extreme caution is urged for DEET use with children	4.3.1
				11	Adulticides	Impossible to eliminate risks to non-target insects	4.9.5
				12		Proposed trap counts/landing rates are positives	4.9.8
				13		How extensive are they	4.9.8
				14		90% control required for determination of success	4.1.7
				15		CDC advises a focus on larval control not adulticiding	4.9.2
				16		Set traps out 5 days ahead of treatments	4.9.2
				17		Provide 72 hours warning to homeowners	4.9.2
				18		WNV positive birds and relatively abundant mosquitoes mean an adulticide treatment	4.9.2
				19		Discussion of ULV effectiveness, especially with regard to upwind-downwind	4.9.8
				20		Only a few reliable efficacy studies have been conducted	4.9.8
				21		Results tend to be poor	4.9.8
				22		Aerial applications a little better	4.9.7
				23		Aerial efficacy discussion	4.9.8
				24		Most aerial applications drift from the target area	4.9.8

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				25		Aerial applications cover more ground	4.9.7
				26		Aerial applications cost more	4.9.7
				27		Wide area applications lead to serious public health and environmental problems	4.9.1
7-17-06	Enrico Nardone	Seatuck Environmental Association	AD	1	Water management	The grouping of all proposed water management techniques as Progressive Water Management blurs the distinction between mosquito control and marsh restoration	4.6.1
				2		OMWM always involves excavation of ponds/channels or other manipulations of the marsh	4.6.1
				3		OMWM always involves excavation	4.6.1
				4		County's definition is unique in that it allows for inclusion of other techniques	4.6.1
				5		Confirmed by use of the term "OMWM proper"+	4.6.1
				6		Therefore, impact discussion is blurred by the inclusion of other marsh restoration activities	4.6.4
				7		Understand there is little scientific rigor associated with OMWM	4.6.4
				8		Therefore, the blending of mosquito control with other techniques hides this lack of information	4.6.4
				9		Little unbiased information – all comes from mosquito control officials	4.1.6
				10		DGEIS refers to restoration studies	4.6.4
				11		DGEIS refers to non-peered reviewed articles	4.6.4
				12		DGEIS cites personal inspections of NJ projects	4.6.4
				13		Wolfe is a review paper	4.6.4
				14		Use of statement from USFWS scientist	4.6.4
				15		Lack of citation for bird use of ponds compared to ditches	4.6.4
				16		Maryland stopped OMWM due to negative impacts to hydrology	4.6.4
				17		MD stopped OMWM due to concerns regarding black rail habitat	4.6.4
				18		CT program experimental	4.6.8
				19		DE would like to conduct long-term studies on impacts	4.6.8

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				20		Great majority of university scientists believe OMWM is a mosquito control technique	4.6.1
				21		Great majority believe OMWM is highly praised by mosquito control officials	4.6.4
				22		Great majority believe it has not been sufficiently studied	4.6.4
				23		A great deal believe it has caused considerable damage to the health of marshes	4.6.4
7-17-06 (submitted by Nardone, 7-17-06)	M. Bertness et al.		AE	1	Water management	Tidal wetlands are inherently complex systems	4.6.4
				2		Often misunderstood hydrological regimes	4.6.4
				3		Reliance on OMWM is a concern	4.6.4
				4		OMWM involves artificial pond creation	4.6.1
				5		OMWM involves unnatural creek construction	4.6.1
				6		OMWM involves leveling of high marsh terrain by backblading	4.6.1
				7		OMWM is mosquito control	4.6.1
				8		It is not synonymous with marsh restoration	4.6.1
				9		Very little is known about its long-term impacts	4.6.4
				10		Scientific literature contains no comprehensive studies of OMWM	4.6.4
				11		USGS/USFWS study had mixed results	4.6.4
				12		Based on current understanding of marsh hydrology OMWM does nothing to restore lost ecological functions	4.6.4
				13		Based on current understanding of marsh ecology OMWM does nothing to restore lost ecological functions	4.6.4
				14		There are concerns that structural changes associated with OMWM lead to unnatural alterations of salt marsh functions	4.6.4
				15		OMWM is unproven and experimental	4.6.4
				16		OMWM is no substitute for careful, comprehensive marsh restoration	4.6.1
				17		OMWM may do more harm than good to Suffolk County marshes	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
7-17-06	Steve Papa	USFWS	AF	1	Pesticides	Use of low flying helicopters could impact Federally-listed species	4.8.3
				2	Water management	If an ACOE permit is needed, a consultation under the Endangered Species Act is required	4.2.6
				3	General	Other activities may require a consultation due to potential impacts to listed species	4.2.6
7/17/06	John Pavacic	NYSDEC	AG	1	General	Ambitious project that has received much effort	4.1.15
				2	Water Management	Conceptual agreement on reduction in pesticides, preservation/increase in wetlands acreage, reductions in Phragmites	4.1.4
				3		Tables present information well	4.6.4
				4		Too conclusory that the Plan is best under all conditions	4.1.15
				5		Not enough identification of potential conflicts between mosquito control and preservation of wetlands values and functions	4.1.15
				6		Marshes breeding mosquitoes may be functioning well	4.6.4
				7		OMWM or other manipulation of a good functioning marsh is not “restoration” (it’s “alteration”)	4.6.1
				8		Least amount of alteration to control mosquitoes should be preferred course of action in well-functioning marshes	4.6.7
				9		Need to preserve marsh may outweigh any public health benefits	4.6.7
				10		Projects weighed on: minimal impacts; sufficient monitoring to ensure goals are met	4.6.7
				11		All projects evaluated case-by-case	4.6.7
				12		Supports no new ditches policy	4.1.4
				13		Supports presumptive ditch reversion, with some reservations	4.1.4
				14		Remote sensing good tool if used frequently enough	4.6.6
				15		Remote sensing needs field verification	4.6.6
				16		Ditched marshes may be functioning well	4.6.1
				17	Wertheim	Premature to say action was a “restoration.”	4.6.5
				18	Water Management	Remote sensing has not been shown to be effective yet	4.6.6
				19	General	Need for further SEQRA on minor water management projects	4.2.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				20	Caged Fish	Not an "extensive" project	4.1.3
				21	General	Substitute "preserve-increase acreage, values, and functions for "Mosaic of biodiversity."	4.1.4
				22	Water management	Creation of new habitat may be most appropriate, especially in substantially degraded marshes that are breeding mosquitoes	4.6.7
				23	Wertheim	"Jury still out" as to whether Wertheim alterations have long-term benefits	4.6.5
				24	Water Management	Major water management actions require monitoring	4.6.6
				25		Major water management projects may require maintenance (see Seatuck)	4.6.9
				26	Legal	Discussion of County and State authority for County right to enter onto other governmental lands for mosquito control is needed	4.2.2
				27	Caged Fish	Results may be affected by environmental factors and small number of events	4.1.3
				28		Not all organisms checked prior to treatment, and so it is not known if mortalities occurred before, during, or after the spray events	4.1.3
				29		Experiment involved a small number of events and a small number of samples	4.1.3
				30	Source reduction	Address ecological recharge basins as well as standard recharge basins	4.5.1
				31	Water management	NYSDEC evaluation of water management projects to be based on regulation lists of values, which does not include mosquito control	4.6.1
				32		Habitat creation is not beneficial in all cases	4.6.1
				33		Identify mitigation of project failures	4.6.9
				34		Water management goals should be broader to match NYSDEC regulation values list	4.6.1
				35		Killifish focus should include other finfish	4.6.4
				36		Activities that eliminate mosquitoes from a good functioning marsh may not be beneficial for the marsh	4.6.1
				37		4,000 acres of aerially larvicided marshes are candidates for progressive water management	4.6.1

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				38	Wertheim	Broader discussion of project design history needed	4.6.5
				39	Water management	No data received on past projects, hindering ability to determine effectiveness of past projects, and to limit monitoring needs for future projects	4.6.6
				40		Accumulation of project information may lead to streamlined project review process	4.6.6
				41		Revise compatibility lists for regulations	4.2.5
				42		Revise Table ES-5 to reflect conformance with any required permits	4.2.5
				43	Biocontrols	Provide reference for fathead minnows ubiquity in Long Island fresh water systems	4.7.2
				44		Why not use control using native species	4.7.3
				45		More information needed on predacious copepods	4.7.3
				46	Surveillance	Discuss establishing larval indexes	4.4.2
				47		Define multivoltine and univoltine	4.1.14
				48	Adulticiding	Include weather criteria in decision-making	4.9.2
				49		Refine discussion of Health Emergency Authorizations	4.9.7
				50		Correct wetlands buffer	4.9.7
				51		Define MIR	4.1.14
				52	Water management	Explicate contradictions between Redfield (1972) and Merrimam (1974)	4.1.14
				53		Refine explanation of USEPA Phase II	4.6.4
				54	Mosquito populations	Improve discussion of natural mosquito dynamics	4.1.12
				55	Larval control	Claims regarding selectivity of Bti and Bs	4.8.1
				56		Bti and Bs affect non-target dipterans	4.8.1
				57		Hershey et al. showed Bti can have impacts on the food web	4.8.1
				58		Hershey et al changed predator-prey dynamics	4.8.1
				59		Discuss methoprene breakdown products	4.8.1
				60	Risk Assessment	Terrestrial amphibians not accounted for	4.9.4
				61		Does not discuss long-term stress to the organisms	4.9.4
				62		Does not discuss how long-term stress may lead to reduced survivorship	4.9.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				63		Does not discuss how long-term stress may reduce fecundity	4.9.4
				64		Does not discuss synergistic effects with other stressors	4.9.4
				65		Does not discuss the toxicity of breakdown products	4.9.4
				66	Larval controls	Why are monomolecular films not selected for use in Suffolk County	4.8.4
				67	Legal	Water management criteria suggested as SEQRA triggers for future action are too vague	4.2.1
				68		Reduce the acreage threshold for water management projects to 10 acres to match well-established Type I threshold	4.6.1
				69	General	Amend attendance lists	4.1.14
				70	Larvicides	Documentation regarding the methoprene decision in New York City	4.8.1
				71		NYC DEIS documents impacts of methoprene to support decision	4.8.1
				72	Legal	Refine Table 3-2 so as to assure it is complete	4.2.6
				73		Discuss differences between Federal Minimum Risk classifications and NYSDEC regulations	4.2.4
				74		Correct citation of Tidal Wetlands regulations	4.2.5
				75		Emergency authorizations for adulticide applications near wetlands are made under Article 24, and are not exempt	4.2.4
				76	Public Education	Pamphlet “Dump the water” needs to be amended to ensure residents do not clear vegetation in a State-regulated wetland	4.3.4
				77	Legal	NYSDEC regulates wetlands that are 12.4 acres (not 12.6 acres) in size	4.2.5
				78	Water management	Expand the background discussion of marsh loss found on pp. 488-489	4.6.4
				79		Expand discussion of Natural Heritage reference marshes (page 500)	4.6.4
				80		Proposed marsh health indices should only be understood to be a starting point for discussion	4.6.6
				81		Matthew Draud (Post) has information on diamondback terrapins (particularly juveniles)	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				82		Any studies citing mosquito populations in healthy unaltered marshes?	4.1.12
				83		Any studies citing impacts of reducing mosquito populations?	4.1.12
				84		Many references on OMWM from mosquito-control oriented publications/sources	4.1.6
				85		More details desired on project monitoring	4.6.6
				86		More details desired on the intent of projects (mosquito control only, or broader goals included)	4.6.1
				87		Vegetation balance for LI ditch plug sites	4.6.4
				88	Legal	Correct reference to smaller than 12.4 acre authority for NYSDEC administration	4.2.5
				89	Water management	Why is McKay Lake listed as a coastal plain pond	4.6.4
				90		Add maps and aerials of each PSA and the Wertheim site	4.6.4
				91		Why no DO data for Captree Island West	4.6.4
				92		Address discrepancies between data tables for Pepperidge Hall and the text (salinities, DO, temperature)	4.6.4
				93		Provide aerials with transects for the Wertheim-Seatuck retrospective	4.6.4
				94		Put data for Wertheim-Seatuck retrospective in tabular form	4.6.4
				95	Wertheim	Premature to say natural resource values have improved	4.6.5
				96		Construction of ponds constitutes an alteration not restoration	4.6.5
				97		Increased surface water on marsh is not necessarily beneficial	4.6.5
				98		Marsh loss in Jamaica Bay has not been sudden	4.6.4
				99		Water management must not exacerbate marsh loss trends	4.6.4
				100		NYSDEC will not participate in project monitoring	4.6.6
				101		Restoration of tidal flows is supported	4.6.7
				102		BMP 14 should discuss the potential loss of habitat associated with filling ditches	4.6.4
				103		Agree reversion can be “undone”	4.6.9

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				104		All reversion sites need to be closely monitored	4.6.6
				105		Amend Table 105 to reflect all RTE species	4.2.6
				106	Caged Fish	No data presented with conclusions	4.1.14
				107	Larvicides	Reconsider discussion of papers recounting methoprene impacts (Table 7-4)	4.8.1
				108	Larvicides	Impacts from application methods on nesting birds not accurate	4.8.3
				109	Water management	NYSDEC to participate on Screening Committee	4.6.2
				110	Legal	If SCVC has authority under State law to enter onto all lands, how does that interact with pre-State Constitution rights associated with the Towns	4.2.2
				111	Biocontrol	Use of fathead minnow seems reasonable and acceptable	4.7.2
				112	Water management	Expand discussion of impacts to all State functions and values	4.6.4
				113	Wertheim	Expand discussion of the project redesign and permit acquisition at Wertheim	4.6.5
				114	Biocontrols	Mentions of potential biocontrols need to indicate whether species are native or not (Long-Term Plan)	4.7.3
				115	Larvicides	Impact of methoprene degradation products, especially to amphibians	4.8.1
				116	Legal	Note that although most states do not regulate barrier treatments, New York regulates all mosquitocides	4.2.4
				117		Note that traps using octenol are regulated by NYSDEC	4.2.4
				118		Refine discussion of applicator educational requirements	4.9.7
				119	Water management	OMWM improving fish habitat is speculative/unsupported statement	4.6.4
				120	General	Plans are poorly referenced	4.1.14
				121		Long-Term Plan does not include environmental impact assessments	4.1.14
				122		Project scope dependent on landowner	4.6.7
				123		Projects need to balance mosquito control needs and marsh health	4.6.1
				124		Landowner must be involved in all aspects of project development	4.6.7

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				125	Water management	Estimate ownership of salt marshes	4.6.7
				126		Why are adulticide reductions not a goal?	4.1.4
				127	Wertheim	References to Wertheim as a progressive and holistic approach to water management are inappropriate	4.6.5
				128		Complete post-project data needed before assessing project	4.6.5
				129	General	Permit holder must be landowner	4.6.2
				130	Wertheim	Scope of monitoring	4.6.5
				131	Water management	Scope of monitoring	4.6.6
				132	Mosquito dynamics	Citation regarding Oc. sollicitans effect on development	4.10.5
				133	Water management	Citation for truism that mosquitoes are not found where killifish are found	4.6.8
				134		When inspecting marshes, report failing structures	4.6.7
				135		Correctly cite PEP ditch maintenance policy	4.1.7
				136		Explain Objective 1, Goal 1 (Wetlands Management Plan)	4.1.4
				137		Monitoring of projects sufficient to ensure project success is necessary	4.6.6
				138		Correct Figure 1 (Wetlands Management Plan)	4.6.2
				139		Suffolk County also always has monitoring responsibility?	4.6.6
				140		Screening Committee membership may require permission of the Governor/NYSDEC Commissioner	4.6.2
				141		Concerns regarding role as regulator will conflict with Steering Committee membership	4.6.2
				142		Wetlands Subcommittee to review project monitoring information	4.6.2
				143	Legal	Federal governments are not exempt from State regulations	4.2.3
				144	Water management	Include more specific discussion of remote sensing	4.6.6
				145		Fish other than killifish should be monitored for	4.6.6
				146		How OMWM will enhance fish habitat is not specified	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				147		No studies showing fish population enhancement under OMWM are cited	4.6.4
				148		Won't reversion allow for fish enhancement	4.6.4
				149		Marsh loss has been documented by NYSDEC in sites other than Jamaica Bay	4.6.4
				150		Water management projects possibly may lead to loss of vegetated marsh	4.6.4
				151		Projects will need to demonstrate that they will not impact finfish diversity or productivity	4.6.7
				152		NYSDEC is willing to discuss streamlining project reviews that do not result in the generation of insufficient information to properly assess project success or failure	4.6.7
				153		NYSDEC believes current permit and review system is adequate	4.6.7
				154		Assessments focus disproportionately on insect-consuming fish	4.6.4
				155		Expand impact assessment to address other fish utilizing creeks, ditches, marsh fringes	4.6.4
				156		Expand Fundulus spp. biology discussions	4.6.4
				157		Impacts on Fundulus trapped on marsh surface	4.6.4
				158		Discuss increase in mosquito populations at Seatuck	4.6.8
				159		Reassess impact level of BMPs 7 & 9	4.6.3
				160		Spurs & ponds may trap certain larval/juvenile fish on marsh causing mortalities	4.6.4
				161		Larger ponds may create bad habitat for fish	4.6.4
				162		Pre-project monitoring should include surveys of fish & wildlife, especially for RTE species	4.6.6
				163		SEQRA reviews of wetlands projects should cite SEQRA regs. regarding DGEIS further reviews	4.2.1
				164		Issuance of general permits even for GCp activities unlikely.	4.2.1
				165		That ditching leads to a monoculture appearance should be taken out of the BMP manual	4.6.4
				166		Low marshes are a monoculture of S. alterniflora	4.6.4
				167		Spur ditches may create unfavorable habitat for other fish	4.6.4

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				168		Discuss role of potholes and pannes in marsh ecology	4.6.4
				169		Expand discussion of LI Marsh deficiencies in surface waters	4.6.4
				170		Ditch plugs do not create optimal fish habitat	4.6.4
				171		Ditch plugs do not create optimal invertebrate habitat	4.6.4
				172		What materials would fill marsh ditches?	4.6.3
7-18-06	Michael Reynolds	FINS	AH	1	General	Impressed with work and analysis	4.1.15
				2		Commends County for efforts to decrease human health risks, restore wetlands, and reduce pesticide use	4.1.4
				3	Legal	NEPA process necessary for permit to adulticide or larvicide within FINS	4.1.16
				4		Separate plan for FINS needs to be accomplished	4.1.16
				5		Separate plan being produced	4.1.16
				6	Adulticides	Concern regarding complaints as a trigger for adulticiding	4.9.2
				7		NPS policies do not allow for control of pests without specific disease threats	4.9.3
				8	Biocontrols	Non-native species are forbidden	4.7.3
				9		Native species may be acceptable if of same stock and will not impact existing conditions	4.7.2
				10	Larvicides	Criteria and triggers may be different for FINS	4.8.2
				11	Water management	Ditched marshes will not be altered unless they are shown to have caused significant change in natural wetland functions	4.6.1
				12		Any alteration of ditched marshes must restore lost functions	4.6.1
				13		Envision no water management in a FINS-specific plan	4.6.1
7-18-06	Roger Wolfe	CT DEP	AI	1	General	Comprehensive with far reaching implications to all mosquito control agencies	4.1.15
				2	Water management	Progressive water management seems a reasonable term for wetland restoration + mosquito management	4.6.1
				3		OMWM and Progressive water management are not interchangeable	4.6.1
				4		CT uses Integrated marsh management (IMM)	4.6.1
				5		IMM like an IPM but with broader wetlands applications	4.6.1

Table 2-1. Written Comments, Organized by Commenter							
Date	**Name**	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
				6		IMM not only contains all mosquito management elements but adds Phragmites control, tidal flow restoration, fill removal, habitat enhancement, and education.	4.6.1
				7		OMWM a subset of IMM	4.6.1
				8		OMWM has become catchphrase for almost all marsh management	4.6.1
				9		OMWM technically is a mosquito source reduction technique	4.6.1
				10		OMWM by itself is not marsh restoration in the pure sense	4.6.1
				11		OMWM usurps ovipositioning sites	4.6.1
				12		OMWM provides habitat for larvivorous fishes	4.6.1
				13		OMWM therefore reduces larvicide use	4.6.1
				14		OMWM can enhance or restore wetlands functions and values	4.6.1
				15		OMWM is not a panacea	4.6.4
				16		OMWM cannot be used in every situation	4.6.7
				17		Provides effective long-term mosquito control	4.6.8
				18		CT has used OMWM for 20 years	4.6.8
				19		Eliminated the need to larvicide 2000 acres	4.6.8
				20		OMWM in CT still reduces mosquito populations	4.6.8
				21		OMWM has reduced pesticide use	4.6.8
				22		OMWM has saved money	4.6.8
				23		OMWM sites are being used by waterbirds	4.6.4
				24		OMWM sites are being used by invertebrates	4.6.4
				25		OMWM sites are being used by fish	4.6.4
				26		Misunderstanding of terms used may be part of the problem	4.6.1
				27		Without OMWM, mosquito control will rely on pesticides	4.1.13
				28		Infilling ditches can create more pesticide use	4.1.13
7-24-06	Joy Squires	Huntington Conservation Board	AJ	1	General	Very thorough, serious	4.1.15

Table 2-1. Written Comments, Organized by Commenter

Date	Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
				2	Mosquito-borne disease	There will continue to be a health threat from WNV	4.1.4
				3		Current program reduces disease risks	4.10.1
				4		Long-Term Plan reduces risks further	4.10.1
				5		In-place control program should reduce risks associated with a novel disease	4.10.6
				6	General	Supports a program to reduce disease risks	4.1.4
				7		IPM program is best	4.1.13
				8		Stress education, surveillance, source control in Huntington	4.1.13
				9	Source reduction	Storm water structures can support C. pipiens	4.5.1
				10		Focus on storm water structure maintenance	4.5.1
				11		Maintaining storm water structures can help water quality in Long Island Sound	4.5.1
				12		Continue inspector response to calls	4.5.2
				13		Supports a cooperative marsh restoration program for Town marshes	4.6.2
				14	Pesticides	Regrets continued use of pesticides	4.9.1
				15		Minimizing pesticide use will result in long-term health and environmental benefits	4.9.1
				16		Will work with County to identify sensitive sites across the Town	4.9.7
				17	General	Reasonable means of addressing a difficult problem	4.1.15
				18		Statements, research, presentation persuasive	4.1.15

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
Keith Romaine	Moriches Bay Civic Association	AK	1	General	Represent residents living in Moriches, Center Moriches, and East Moriches	
			2		Represent Legislator Ed Romaine	
			3	Pesticides	Negative impacts on health	4.9.1
			4	Pesticides	Negative impacts on the ecology of LI	4.9.5
			5	Pesticides	Not considered safe by USEPA	4.9.1
			6	Pesticides	NYSDOH finds risk to human health	4.9.1
			7	General	Distinguish nuisance and disease control	4.1.1
			8	Pesticides	Only used when evidence of disease	4.9.3
			9	Water management	Modifications to wetlands only to fix past ditching projects	4.6.7
			10		Only to restore marsh health	4.6.7
			11	Public education	Stress impacts of pesticides	4.3.1
			12		Means of mosquito control	4.3.2
			13		Mosquito tolerance	4.3.3
			14	Water Management	17,000 acres in extent	4.6.1
			15		Ponds and channels will change marsh hydrology	4.6.4
			16		Ponds and channels could have negative ecological effect	4.6.4
			17		Mosquito control efficacy unproven	4.6.4
			18		Marsh substrate filters pollutants	4.6.4
			19		Marshes are sponges, absorb water from rains and road runoff	4.6.4
			20		Marshes protect shoreline from storms	4.6.4
			21		SSER has lost 35% of its marshes since the 1930s	4.6.4
			22		OMWM may reduce marsh filtering capabilities	4.6.4
			23		Machines will damage marsh	4.6.4
			24		No compelling evidence that OMWM will be an effective restoration technique	4.6.8
			25		No compelling evidence that OMWM will be effective at absorbing pollutants	4.6.8
			26		No compelling evidence that OMWM will be effective at absorbing stormwater	4.6.8
			27		No compelling evidence that OMWM will control mosquitoes	4.6.8
			28		May impact current marsh species	4.6.4
Bob McAlevey		AL	1	General	Agree with previous speaker	
			2	General	Plan says it's okay to dig up marshes	4.6.1

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter						
Name	**Organization**	**ID**	**Com. #**	**Topic**	**Content**	**Table 2-5 Topic #**
			3		Plan says it's okay to spray pesticides	4.1.13
			4		Study of the Peconic Estuary disagrees	4.1.7
			5		County committed to the PEP CCMP	4.1.7
			6		By extension, PEP CCMP applies to all County estuaries	4.1.7
			7		PEP prepared by outside agencies compared to Long-Term Plan prepared by County and its consultant	4.1.9
			8		"Impartial consultants" is an oxymoron	4.1.9
			9		Governments decide what to do and get consultants to rubberstamp the plan	4.1.9
			10	Public education	CAC conducted a poll	
			11		Poll found people believe there are about equal risks from mosquitoes, WNV, and Pesticide spraying	4.3.6
			12		3:1 in favor of wetlands protection over short-term mosquito	4.3.6
			13		2:1 believe the deer tick is a greater health risk than mosquitoes	4.3.6
			14		Deer ticks cause 100 to 200 times the number of illnesses mosquitoes do	4.1.10
			15		A county in NJ cut deer tick illness incidence in half through public education	4.1.10
			16		Suffolk County should drop this Plan and do a similar program	4.1.10
Georgeanne Spates		AM	1	General	Former director of the Quogue Refuge	
			2	Pesticides	Disregarding manufacturers' warnings regarding toxicity	4.9.5
			3	Wetlands management	Dredging in upper marsh will destroy peat	4.6.4
			4		Dredging in upper marsh will destroy grasses	4.6.4
			5		Dredging in upper marsh will destroy ribbed mussels	4.6.4
			6		Peat, grasses, mussels are basis of marsh filtration	4.6.4
			7		Impacts from construction	4.6.4
			8	General	Distinguish between nuisance control and control of mosquitoes for health reasons	4.1.1
			9	Mosquito-borne disease	Plan links WNV with water management	4.10.2
			10		Freshwater mosquitoes are known vector of WNV	4.10.2
			11	General	Plan may cost millions of dollars	4.1.5
			12	Water management	Plan is flawed since some municipalities have dropped OMWM	4.6.4

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			13	Mosquito ecology	Effective control of mosquitoes occurs without human intrusion	4.1.12
Eileen Schwinn	Eastern LI Audubon Society	AN	1	Water Management	Water management (OMWM) plans are not restoration plans but total marsh degradation plans	4.6.4
			2		OMWM will increase salt water in high marsh	4.6.4
			3		More salt water will destroy nesting populations of rare and endangered birds, destroy rare plants, increase water levels on adjoining property owners land	4.6.4
			4		Salt marshes hold back storm and tidal surges	4.6.4
			5		Salt marshes mitigate sea level rise	4.6.4
			6		Any interference in salt marshes will affect sea level rise mitigation	4.6.4
			7		Physical changes do not increase biodiversity but threaten existing diversity	4.6.4
			8		Marshes filter upland pollutants	4.6.4
			9		Less marsh means less filtering	4.6.4
			10		OMWM will degrade a valuable ecological community	4.6.4
Matthew Atkinson	Peconic Baykeeper	AO	1	General	Plan is an advertisement for IPM	4.1.13
			2		Entities responsible for implementing the Plan crafted it	4.1.9
			3	Pesticides	Program will have no impact from pesticides	4.1.15
			4		County Phase-out Law	4.1.7
			5		PEP CCMP seeks to get rid of pesticides in the Peconic Estuary	4.1.7
			6	Water management	Plan states OMWM is a good thing	4.6.4
			7		OMWM improves wetlands	4.6.4
			8		Papers in support of OMWM are written by mosquito control people	4.1.6
			9		Papers with peer review and scientific impartiality are ambivalent	4.6.4
			10		Papers with peer review and scientific impartiality find it is hard to assess impacts	4.6.4
			11		Papers with peer review and scientific impartiality find it is impossible to predict mosquito control	4.6.8
			12		Dug 600 miles of ditches and it didn't work at controlling mosquitoes	4.6.4
			13		Program should be based on conducting small projects with 5 years pre-project study and 5 years post project study	4.6.6
			14	General	Long-Term Plan calls for expanded program	4.1.9
			15		Efficacy of the program is unknown	4.1.9

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			16	Mosquito-borne Disease	EEE is highlighted in the report	4.10.3
			17		Never a case of EEE in the County	4.10.3
			18		Should be concerned about diseases that have never appeared in the County	4.10.6
			19		WNV is a serious disease	4.10.1
			20		Based on zero risk for disease	4.1.2
			21		EPA does not support zero-based risk for disease	4.1.2
			22	Risk Assessment	EPA criteria for ecological and pesticide risks are 1:10,000 to 1:1,000,000	4.1.2
			23	Adulticides	One trigger is 1-5 mosquitoes landing rate per minute	4.9.2
Kevin McAllister	Peconic Baykeeper	AP	1	Water management	Since 1930s lost 38% of wetlands in SSER	4.6.4
			2		Since 1974 lost 7%	4.6.4
			3		Losses due primarily to dredging and filling	4.6.4
			4		Grid ditching causes damage to biofiltration	4.6.4
			5		Grid ditching alters hydrology	4.6.4
			6		Grid ditching alters habitat type	4.6.4
			7		Plan calls for removal of 1,000 year old peat	4.6.4
			8		Plan calls for loss of biomass	4.6.4
			9		Plan calls for loss of biofiltration	4.6.4
			10	Larvicides	Horst found impacts on crustaceans at levels as low as 1ppb	4.8.1
			11		Antunes-Kennedy report found application rate is 5-10 ppb	4.8.1
			12	Caged Fish	Study is limited	4.1.3
			13	Larvicides	NYC and Westchester abandoned methoprene use in estuarine waters	4.8.1
			14		Methoprene MSDS says it may cause long-term adverse impacts in the aquatic environment	4.8.1
			15	General	Plan was crafted in advance and the process is building a firewall around a flawed plan	4.1.9
Tom Stock		AQ	1	Pesticides	Decline in bees due to mite and pesticides	4.9.5
			2		Application aerosols land on plants in the high marsh and along edges of tidal wetlands – bees are impacted	4.9.5
			3		Many farmers now hiring beekeepers to pollinate crops	4.9.5
			4	Water management	Dredging large ponds will affect marshes ability to absorb storm energy	4.6.4
			5		Taking away even one inch impacts people living along the shoreline	4.6.4

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
Heather Cusack	Southold Trustees	AR	1	Water management	No evidence the Plan will decrease mosquitoes	4.6.8
			2		Plan will cause a lot of impact to the marshes	4.6.4
			3		Habitat would be destroyed	4.6.4
			4		Marshes would be changed	4.6.4
			5		Ponds would break up marsh	4.6.4
			6		Fragmented marsh decreases habitat for marsh birds	4.6.4
			7		Would support marsh restoration projects involving ditch plugging	4.6.3
			8		Ditch plugs retain water, do not allow marsh to dry out	4.6.4
			9		Done in other Towns in conjunction with dredge spoil removal	4.6.4
			10		Ditch plugs allow for reestablishment of Spartina	4.6.4
			11		Enlarging culverts better than pond creation	4.6.3
			12		Natural reversion better than pond creation	4.6.3
			13		Supports Phragmites removal	4.1.4
			14	General	Doesn't clarify nuisance vs. disease control	4.1.1
			15	Water management	Nuisance control is not a justification for the harmful effects of marsh alteration	4.10.2
			16	Pesticides	Nuisance control is not a justification for the harmful effects of pesticides	4.9.3
			17	Larvicides	Not enough information on hormone inhibitor non-target effects	4.8.1
Nicole Maher	Nature Conservancy	AS	1	General	Applauds plan for notion that vector control should be consistent with ecological values	4.1.4
			2		Good there is to be reductions in pesticide use and marsh restoration	4.1.4
			3	Adulticides	Clarify triggers	4.9.2
			4		Trap criteria should be used	4.9.2
			5		Quantitative data collected at all locations prior to spraying	4.9.2
			6	Water management	Screening Committee composition should be changed	4.6.2
			7		Screening Committee given notice of all projects	4.6.2
			8		Screening Committee have discretion to concentrate on projects of real concern	4.6.2
			9		Screening Committee should evaluate past and on-going studies	4.6.2
			10		Screening Committee review monitoring protocols	4.6.2
			11		Screening Committee determine effectiveness of projects for mosquito control and ecological restoration	4.6.2
			12	Public education	Inform people about mosquito biology and control measures	4.3.2

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			13		People so informed are more likely to mosquito proof their homes	4.3.2
			14	Mosquito ecology	Standing water in yards is a breeding ground for freshwater mosquitoes	4.1.12
			15	Mosquito-borne disease	Fresh water mosquitoes are more potent vectors than salt marsh mosquitoes	4.10.2
			16	Water management	Plan currently calls for a comprehensive marsh management plan	4.6.2
			17		Need something more: a wetlands recovery project	4.6.2
			18		Wetlands Recovery Project should set goals for acquisition, restoration and enhancement of local wetlands	4.6.2
			19		Should secure funding	4.6.2
			20		Be science based, and collaborative	4.6.2
			21		Should be directed by SCDEE	4.6.7
Dominick Licata	Smith Point Beach Property Owners Association	AT	1	General	Smith Point property owners suffer from mosquitoes every year	4.10.5
			2	General	They challenge quality of life for 50,000 visitors to FINS	4.10.5
			3		They challenge public safety for 50,000 visitors to FINS	4.10.5
			4		Campers ask for money back	4.10.5
			5		Could present liability issues	4.10.5
			6		Impacts children	4.10.5
			7		Buy chemicals to prevent impacts	4.9.9
			8		Mosquito not more important than 50,000 people	4.1.4
			9	Adulticides	Applications seem to make problem worse	4.9.8
Ron McKenna	Fire Island Pines	AU	1	General	95% of the community think SCVC does a good job	4.3.6
			2	Water management	Would like 3 ditches cleaned	4.6.7
			3		Apparently depends on a FINS survey	4.6.7
Bob DeLuca	Group for the South Fork	AV	1	General	Don't think the document is complete	4.1.16
			2		Note there will be a triennial plan update	4.1.5
					Concern that assessment means is not well defined	4.1.5
Lawrence Merryman	Great South Bay Audubon Society	AW	1	General	Long Island Audubon Council opposes the Long-Term Plan	
			2	Water management	No scientific evidence digging ponds restores wetlands	4.6.4
			3		No scientific evidence digging ponds controls salt marsh mosquitoes	4.6.4

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			4		Wertheim visit – no difference between treated-untreated areas (no mosquitoes)	4.6.8
			5		All mosquito reduction data anecdotal	4.6.8
			6		Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance	4.6.4
			7		Deeply dug ponds cannot promote wading bird use	4.6.4
			8		Area of filled ditches does not equal excavated area of ponds & channels	4.6.4
			9		Screening committee is weighted towards governmental entities, not conservationists	4.6.2
			10		15 acres size may lead to loopholes	4.6.2
			11		Audubon New York: water management plan has not been proven effective	4.6.8
			12		Audubon New York supports vector control methods that are proven effective based on best available science	4.1.9
			13		Audubon New York supports vector control methods that do not negatively affect habitat	4.1.9
			14		Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations	4.1.9
			15		Rising sea levels and hurricane activities argue against experimentation in salt marshes	4.6.4
			16		Foolhardy to reduce salt marshes	4.6.4
			17		Long-Term Plan OMWM are unproven	4.6.8
			18		Long-Term Plan OMWM will be damaging	4.6.4
Frank Lombardo		AX	1	General	3 kids in Smith point cannot let out of the house after 4	4.10.5
			2	Pesticides	Individuals can buy any pesticide in Home Depot	4.9.9
			3		Vector control maintains some control over use	4.9.7
			4	General	Quality of life impacted by out-of-control mosquito population	4.10.5
Robert Dean		AY	1	General	Mosquitoes are a problem – make you a prisoner in your own home	4.10.5
Allen Hawkridge		AZ	1	General	In favor of plan that stops mosquito attacks	4.1.1
			2		Worse at Smith Point than ever had experienced in 83 years	4.10.5
Adrienne Esposito	Citizens Campaign for the Environment	BA	1	General	Needs to distinguish between nuisance and disease control	4.1.1
			2		No distinction is dangerous	4.1.1

Table 2-2. Comments from the June 29 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			3		No distinction is misleading to the public	4.1.1
			4		No distinction will cause more spraying to be needed	4.9.2
			5		No distinction will cause more spraying to occur	4.9.2
			6		Previous Annual Plans of Work have made the distinction	4.1.1
			7		There is a need for disease control in Suffolk County	4.1.4
			8		Linking of all mosquito control with disease control is not a reflection of disease control	4.1.1
			9		Will cause increased demand for adulticides	4.9.2
			10		Plan calls for 75% reduction in adulticides	4.1.4
			11		Will cause increased application of chemicals	4.1.4
			12		Will cause increased application of chemicals to children	4.3.1
			13	Mosquito-borne disease	Plan claims reducing salt marsh mosquitoes will reduce incidence of WNV	4.10.2
			14		Science has not said salt marsh mosquitoes are good vectors of WNV	4.10.2
			15		Science has not said salt marsh mosquitoes are competent vectors of WNV	4.10.2
			16	Public education	Was supposed to contain a component increasing public tolerance of mosquitoes	4.3.3
			17		If public is told mosquitoes can kill you or cause disease, increased tolerance will not be possible	4.3.3
			18	Surveillance	County has an excellent surveillance program	4.4.4
			19	General	Trigger for disease control should be disease detection	4.1.4
			20	Adulticides	Specific triggers for adulticide applications	4.9.2
			21		Vagueness in guidelines to allow for management decisions, but needs more science and less political concerns	4.9.2
			22	Water management	Change composition of Screening Committee	4.6.2
			23		Site review criteria of 15 acres is arbitrary	4.6.2
			24	Legal	Site specific EIS for each water management project	4.2.1
			25	Water management	Each wetlands system is different	4.6.7
			26		Generic analysis of the DGEIS may not be enough	4.2.1
			27		Screening Committee needs to examine projects case-by-case	4.6.2

Table 2-3. Comments from the July 6 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
Bob McAlevey		BB	1	General	PEP CCMP can be interpreted as saying no spraying in the Peconic Estuary	4.1.7
			2		PEP CCMP can be interpreted as saying no ditching in the Peconic Estuary	4.1.7
			3	Larvicides	No basis for saying methoprene poses no threat to human health	4.8.1
			4		No basis for saying methoprene has little to no ecological impact	4.8.1
			5	General	On page 1310, women and fetuses were not directly assessed	4.9.4
			6	Pesticides	At 1 ppb, shellfish and finfish eggs are killed (according to scoping documents) (not addressed in DGEIS)	4.9.4
			7		Applications lead to 5 ppb being applied	4.9.4
			8	Mosquito-borne disease	Natural fluctuations in bird populations exceed mortality effects attributed to WNV	4.10.1
			9	Pesticides	Necropsies of birds show pesticides	4.10.1
			10		Especially necropsies of raptors	4.10.1
			11		Therefore although birds were WNV positive, pesticides caused their deaths	4.10.1
			12	General	Embryos and fetuses must more vulnerable than children	4.9.4
			13	Pesticides	The pesticides that pregnant women are exposed to pass through the placenta	4.9.4
			14		Study fails to adequately address impact on human health	4.9.4
			15		Study fails to adequately address impact on ecology, especially estuarine ecology (finfish and shellfish)	4.9.5
Lawrence Merryman	Great South Bay Audubon Society	BC	1	General	Long Island Audubon Council opposes the Long-Term Plan	
			2	Water management	No scientific evidence digging ponds restores wetlands	4.6.4
			3		No scientific evidence digging ponds controls salt marsh mosquitoes	4.6.4
			4		Wertheim visit – no difference between treated-untreated areas (no mosquitoes)	4.6.8
			5		All mosquito reduction data anecdotal	4.6.8
			6		Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance	4.6.4
			7		Deeply dug ponds cannot promote wading bird use	4.6.4
			8		Area of filled ditches does not equal excavated area of ponds & channels	4.6.4
			9		Screening committee is weighted towards governmental entities, not conservationists	4.6.2
			10		15 acres size may lead to loopholes	4.6.2
			11		Audubon New York: water management plan has not been proven effective	4.6.8

Table 2-3. Comments from the July 6 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			12		Audubon New York supports vector control methods that are proven effective based on best available science	4.1.9
			13		Audubon New York supports vector control methods that do not negatively affect habitat	4.1.9
			14		Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations	4.1.9
			15		Rising sea levels and hurricane activities argue against experimentation in salt marshes	4.6.4
			16		Foolhardy to reduce salt marshes	4.6.4
			17		Long-Term Plan OMWM are unproven	4.6.8
			18		Long-Term Plan OMWM will be damaging	4.6.4
Kasey Jacobs	Citizens Campaign for the Environment	BD	1	General	Distinguish between nuisance and disease control	4.4.1
			2		It is dangerous not to distinguish between nuisance and disease control	4.1.1
			3	Adulticides	Only used for disease control	4.9.3
			4		Only conduct adulticides use for disease control in a limited, targeted fashion	4.9.3
			5		Refine criteria to reflect which mosquitoes are being counted	4.9.2
			6	Caged Fish	Appears to be adequate for larvicides	4.1.3
			7		Should not be used for adulticides impact on marsh ecology	4.1.3
			8		Adulticides at Johns Neck results confounded by low DO	4.1.3
			9		Results do not hold up to rigorous scientific scrutiny	4.1.3
			10		Long-term impacts cannot be determined over four days	4.1.3
			11	Water management	Use 2005 SCERP research for ditch and other marsh modification impact assessment	4.6.4
			12		SCERP analyzed numerous LI marshes	4.6.4
			13		Research analyzed nutrient runoff (particularly N)	4.6.4
			14		Research analyzed fecal coliform for open and closed ditches	4.6.4
			15		Found that the draining of mosquito ditches accounts for 1200 moles of N per day (25% of the load to the southern portion of the Bay and 10% to the whole Bay)	4.6.4
			16		Plugging of ditches can eliminate this flow	4.6.4
			17		Ditch plugging warranted since the PEP CCMP targets the western estuary for N reductions	4.6.7
			18		OMWM may have similar problems conveying pollutants to the estuary	4.6.4
			19		OMWM is experimental	4.6.8

Table 2-3. Comments from the July 6 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			20		OMWM is not synonymous with restoration	4.6.1
Joseph Barone		BE	1	General	In favor both of spraying and a middle ground	4.1.13
			2		Interested in environmental protection	4.1.4
			3		Interested in protection from the dangers of not spraying	4.1.4
			4		Concerned about tick-borne disease	4.1.10
			5		Concerned about WNV	4.1.4
			6	Mosquito-borne disease	Immigrants may cause malaria here	4.10.6
			7	General	Homeowners have the right to peaceful enjoyment of homes & property	4.10.5
			8		Not possible with masses of mosquitoes	4.10.5
			9		If there is no government protection from mosquitoes, people will take their own measures	4.9.9
			10	Pesticides	Could lead to improper use of impermissible pesticides	4.9.9
			11		Impacts from homeowner actions may be greater than under the Long-Term Plan	4.9.9
Mary Lee	Smith Point Beach Property Owners Association	BF	1	General	Have a lot of mosquitoes (2005, 3800 in a trap over one week)	4.10.5
			2		3-week lag for treatment	4.9.2
			3		Mosquito presence impacts quality of life	4.10.5
			4	Adulticides	SCVC applications less dangerous to someone with chronic obstructive pulmonary disease than applying repellents	4.9.9
			5		No obvious impacts to fauna from past applications	4.9.5
Dominick Licata	Smith Point Beach Property Owners Association	BG	1	General	Thinks has more mosquitoes than Ms. Lee	4.10.5
			2		Biggest problem as a gateway community to the Seashore is mosquitoes	4.10.5
			3		Mosquitoes cause impacts to quality of life	4.10.5
			4		Response time from complaints is poor	4.9.2
Ronald McKenna	Fire Island Pines Property Owners Association	BH	1	General	95% participation in a survey; 91% approved of continuing spraying in the Pines	4.3.6
			2		90% approval of SCVC	4.3.6
			3	Adulticides	No mosquito control was terrible	4.9.8
			4		Once a month adulticiding was terrible	4.9.8
			5		Once a week is satisfactory level of control	4.9.8

Table 2-3. Comments from the July 6 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			6	Water management	Not satisfied with lack of ditch maintenance	4.6.7
			7		Depends on FINS approval	4.6.7
			8	General	Ditch maintenance/adulticiding important to HIV-positive community	4.1.1
Kevin McAllister	Peconic Baykeeper	BI	1	Water management	Have lost 38% of south shore marshes since 1938	4.6.4
			2		Have lost 6.6% since 1974, due mainly to dredging and filling	4.6.4
			3		SCERP report substantiates Baykeeper position (held since 2001)	4.6.4
			4		SCERP report author is Professor Gobler	4.6.4
			5		SCERP found ditches convey nitrogen	4.6.4
			6		SCERP found ditches convey fecal coliform	4.6.4
			7		Plan calls for transition from ditch maintenance to OMWM	4.6.1
			8		OMWM pretends to be wetlands restoration	4.6.1
			9		Lots of means to conduct OMWM	4.6.1
			10		Many techniques warranted on a case-by-case basis	4.6.7
			11		Not warranted to exchange general ditch maintenance for digging holes in the marsh	4.6.4
			12		Cannot lose marshes to dredging	4.6.4
			13		Cannot diminish retention time and increase conveyance	4.6.4
			14		Ponds will export	4.6.4
			15		Sinuous channels will export	4.6.4
			16		Every square inch of peat needed for flood attenuation	4.6.4
			17	Adulticides	Enter surface waters	4.9.7
			18	Larvicides	Intent of methoprene application is to put material directly into water	4.8.3
			19		Horst research not well represented (in DGEIS)	4.8.1
			20		Methoprene has high affinity to particulates	4.8.1
			21		Potential pathway of worm ingestion to crustacea	4.8.1
			22		Manufacturer’s label states may cause long-term adverse impacts in the aquatic environment	4.8.1
			23		Since Bti is available methoprene should not be used	4.8.1
			24		NYC and Westchester prohibited/greatly restricted methoprene use around estuarine waters	4.8.1
			25	General	Development of the Long-Term Plan was not supported by the impact analysis	4.1.9
			26		One reason to not distinguish between nuisance control and health impacts is to gains more State funding	4.1.1

Table 2-3. Comments from the July 6 Hearing Transcript, Organized by Commenter

Name	Organization	ID	Com. #	Topic	Content	Table 2-5 Topic #
			27		Ditching, OMWM, larviciding and adulticiding represent threats to the aquatic environment	4.1.15
			28		Because of other impacts to the aquatic environment, need to look harder at vector control	4.1.15
John Lund	Davis Park	BJ	1	General	Davis Park is predominantly a "local" community	
			2	Adulticiding	No aerial spraying unless WNV is involved	4.9.3
			3		Fire Island applications are by hand-held truck ("fogging")	4.9.7
			4	General	Also fighting ticks as well as mosquitoes	4.1.10
			5	Adulticiding	Need to adulticide for WNV rises so late in season that it is not done	4.9.3
			6	Surveillance	Vegetation on Fire Island makes it difficult to find dead birds	4.4.4
			7	General	One plan for all of Suffolk County may not be appropriate	4.1.4
			8		Tourism is important economically to Suffolk County – Atlantic beaches especially so	4.10.5
			9		Need to ensure there are no ecological impacts to the plan	4.1.15
			10		SCVC responsive to Davis Park needs	4.3.6
			11	Adulticides	Davis Park providing $50 rebate on mosquito magnets	4.9.9
			12		Mosquito magnets are species specific	4.9.9

Table 2-4. Exhibits from the Two Public Hearings

Commenter	Title	Source	ID	Com. #	Topic	Content	Table 2-5 Topic #
	Sign-In Sheet 6-29-06	CEQ	BK			2 pages	
	DGEIS Request Form	CEQ	BL			2 pages	
Keith Romaine	Comment Letter	Edward Romaine	BM			Submitted as Written Comment see C	
Bob McAlevey	Poll Results	CAC	BN	1	Public Education	Risk comparison between WNV and pesticides	4.3.6
				2		Comparison of impacts of wetlands loss and mosquito problems	4.3.6
				3		Comparison between risks from ticks and mosquitoes	4.3.6
				4		Most trusted source of information regarding mosquito control	4.3.6
				5		Most trusted source of information regarding use of pesticides	4.3.6
Bob McAlevey	Agenda Item 3: Poll	CAC	BO			Discussion of poll issues at CAC – not included in testimony; no apparent relevance to DGEIS	
Bob McAlevey	CAC Meeting – April 24, 2006	E-mail from Dominick Ninivaggi	BP	1	General	Tick control always involves pesticides	4.1.10
				2		Tick program would require an EIS	4.1.10
				3		Establishing a tick control program would be very expensive	4.1.10
Bob McAlevey	More Awareness, More Cases	NY Times (no date given but appears to be 2006)	BQ	1	General	Annotations highlight effectiveness of public education program in Hunterdon County, NJ	4.1.10
Bob McAlevey	Spending Money on Consultants	The Independent 6-4-06	BR			Discussion of Town of Southold traffic consultant choices – no direct relevance to DGEIS. Implies that consultant work was a rubberstamp of predetermined policies.	
Bob McAlevey	Request for an Opinion from the Suffolk County Ethics Commission	Letter from Paul Sabatino	BS			Request for an ethics opinion – not relevant to the DGEIS	
Bob McAlevey	Letter	Letter to Paul Sabatino	BT			Ethics review request – not relevant to the DGEIS	
Bob McAlevey	Steering Committee Approval CAC Designated Representative on Technical Advisory Committee	Letter from Linda Mermelstein	BU			Letter to CAC chairs explaining Steering Committee rejection of Kevin McAllister from TAC as the CAC representative – not relevant to DGEIS	

Table 2-4. Exhibits from the Two Public Hearings

Commenter	Title	Source	ID	Com. #	Topic	Content	Table 2-5 Topic #
Bob McAlevey	Mixed Views of Ponds to Control Mosquitoes	NY Times, 12-18-05	BV	1	Water management	Artificial ponds could start appearing in salt marshes under the County plan	4.6.7
				2		Ponds are part of OMWM	4.6.1
				3		OMWM is central to the plan	4.1.13
				4	Wertheim	Showed plan could reduce pesticides and control mosquitoes	4.6.5
				5	General	Exaggerates health benefits of mosquito control	4.1.15
				6		Lacks decision-making specifics	4.9.2
				7	Water management	NYSDEC is interested in restoration programs	4.6.1
				8		Concerned about activities that could degrade wetlands	4.6.4
						Copy of poor quality; issues raised elsewhere, as near as can be determined	
Georgeanne Spates	Text of testimony		BW			See AM	
Eileen Schwinn	Text of testimony, submitted as written comment as well		BX			See B, AN	
Nicole Maher	Text of testimony		BY			See AS	
Lawrence Merryman	Text of testimony (submitted as written testimony with a cover sheet)		BZ			See G, AW	
	Sign-in cards, 7-6-06		CA			5 pages	
Bob McAlevey	Comments on DGEIS Sections 3 and 4		CB	1	Pesticides	pp.97-99 of "Scoping Comments" shows toxicity of pesticides at 1 ppb	4.9.5
				2		pp. 343-485 report concentrations in excess of 1 ppb as benign	4.9.4, 4.9.5
				3	Risk Assessment	Concentrations toxic to fish eggs/larvae must be harmful to human embryos and fetuses	4.9.4
				4	Mosquito-borne Disease	Data show varying populations of bird species (Figure 3-10)	4.10.1
				5		Conclusion associated with WNV declines are not warranted without explaining other population changes	4.10.1
				6		Dead birds tested by NYSDOH before 1999 all contain pesticides	4.10.1

Table 2-4. Exhibits from the Two Public Hearings

Commenter	Title	Source	ID	Com. #	Topic	Content	Table 2-5 Topic #
				7		Birds post-19999 also contain pesticides	4.10.1
				8		Claiming WNV is cause of death unwarranted	4.10.1
				9	Pesticides	Children are acknowledged to be more vulnerable to adults to impacts from pesticides	4.9.4
				10		That embryos and fetuses are more susceptible is not addressed	4.9.4
				11		No mention that pesticides pass through placenta (see march submission to CEQ, not provided)	4.9.4
Bob McAlevey	2nd-hand smoke worse than feared	Newsday 6-28-06	CC	1	Pesticides	Would a study similar to that on 2nd hand smoke find impacts from pesticides?	4.9.4
Bob McAlevey	Babies are larger after ban on 2 pesticides, study finds	NY Times, 3-22-04	CD	1	Pesticides	Newspaper report of a paper in Environmental Health Perspectives, reporting on impacts of reductions in pesticide use	4.9.4
Bob McAlevey	Do airborne particles induce heritable mutagens	Science 304:971-972	CE	1	Pesticides	Airborne pollutants (PAHs from vehicles and industry – primarily power production) can cause mutations in mouse male germ cells damage male somatic cells.	4.9.4
				2		Pregnant women exposed to PAHs have higher risk of delivering low-weight babies	4.9.4
				3		Mutations to male germ lines should be interpreted with caution, do to technical limitations	4.9.4
Bob McAlevey	More ticks More Lyme	The Independent, 6-28-06	CF	1	General	Anecdotal reports of more ticks on the East End	4.1.10
				2	Public Education	Effectiveness of Lyme Disease education is touted	4.1.10
Lawrence Merryman	Text of testimony (submitted as written testimony with a cover sheet)		CG			See G, BC	
Kasey Jacobs	Text of testimony		CH			See BD	
Dominick Licata	Mission Statement of the Smith Point Beach Property Owners Association		CI			Not relevant for DGEIS	
Dominick Licata	Membership Application, Smith Point Beach Property Owners Association		CJ			Not relevant for DGEIS	

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
E	5	4.1.1	Edward Romaine	Suffolk County Legislature	Distinguish nuisance and disease control
H	3	4.1.1	Victoria Russell	Town of Babylon DEC	SCVC has used scientific approach to mosquito control for nuisance and public health reasons
I	24	4.1.1	James King	Town of Southold Town Trustees	Main concern with mosquitoes is mosquito-borne disease
I	29	4.1.1	James King	Town of Southold Town Trustees	Distinguish nuisance and disease control
I	30	4.1.1	James King	Town of Southold Town Trustees	Nuisance does not justify harmful effects of pesticide use
I	31	4.1.1	James King	Town of Southold Town Trustees	Nuisance does not justify marsh impacts
N	14	4.1.1	Matthew Atkinson	Peconic Baykeeper	No distinction between disease and nuisance control
N	20	4.1.1	Matthew Atkinson	Peconic Baykeeper	Westchester County only has a WNV Response Program
P	2	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	There is a clear distinction between nuisance and disease
P	3	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	It is dangerous not to distinguish between nuisance and disease
P	8	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Annual Plans of Work (2000-2004) have distinguished between nuisance control and human health protection
P	10	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Linking all mosquito control to disease control creates false impression all mosquitoes are harmful or potentially deadly.
P	11	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Misapprehension of disease risk leads to greater calls for adulticides use
P	12	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Misapprehension of disease risk leads to increased use of DEET on children
P	13	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Misapprehension of risk leads to overapplication of other dangerous pesticides on children
P	29	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	NYS WNV Response Plan cites specific triggers for adulticiding under health threat conditions; these define difference between nuisance and disease control
P	31	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	FINS has clear distinctions between nuisance control and disease control
P	32	4.1.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	National Wildlife Refuge has clear distinction between nuisance and disease control
R	11	4.1.1	Unidentified	COPOPAW (?)	Distinguish between actions for disease control and those for nuisance control
R	12	4.1.1	Unidentified	COPOPAW (?)	Distinguishing between nuisance and disease characterizes real risks to community from disease
R	13	4.1.1	Unidentified	COPOPAW (?)	Allows public to weigh costs and benefits of mosquito control actions
R	22	4.1.1	Unidentified	COPOPAW (?)	Axiomatic that society will allow more risks for health preservation than nuisance issues
R	23	4.1.1	Unidentified	COPOPAW (?)	Many places manage under two sets of guidelines: one for general mosquito control, and one for confirmed disease presence
R	24	4.1.1	Unidentified	COPOPAW (?)	NYS WNV Response Plan example of separation of disease from general mosquito control

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
S	2	4.1.1	Citizens Campaign for the Environment et al.	COPOPAW	Distinguish between nuisance and disease
S	14	4.1.1	Citizens Campaign for the Environment et al.	COPOPAW	Previous Plans of Work have distinguished between nuisance and public health control
S	27	4.1.1	Citizens Campaign for the Environment et al.	COPOPAW	NYS WNV Response Plan is an example of distinguishing between disease and nuisance control
S	28	4.1.1	Citizens Campaign for the Environment et al.	COPOPAW	FINS has specific triggers based on risk of disease to distinguish between nuisance and disease control
S	29	4.1.1	Citizens Campaign for the Environment et al.	COPOPAW	The National Wildlife Refuge has specific triggers based on risk of disease to distinguish between nuisance and disease control
AK	7	4.1.1	Keith Romaine	Moriches Bay Civic Association	Distinguish nuisance and disease control
AM	8	4.1.1	Georgeanne Spates		Distinguish between nuisance control and control of mosquitoes for health reasons
AR	14	4.1.1	Heather Cusack	Southold Trustees	Doesn't clarify nuisance vs. disease control
AZ	1	4.1.1	Allen Hawkridge		In favor of plan that stops mosquito attacks
BA	1	4.1.1	Adrienne Esposito	Citizens Campaign for the Environment	Needs to distinguish between nuisance and disease control
BA	2	4.1.1	Adrienne Esposito	Citizens Campaign for the Environment	No distinction is dangerous
BA	3	4.1.1	Adrienne Esposito	Citizens Campaign for the Environment	No distinction is misleading to the public
BA	6	4.1.1	Adrienne Esposito	Citizens Campaign for the Environment	Previous Annual Plans of Work have made the distinction
BA	8	4.1.1	Adrienne Esposito	Citizens Campaign for the Environment	Linking of all mosquito control with disease control is not a reflection of disease control
BD	1	4.4.1	Kasey Jacobs	Citizens Campaign for the Environment	Distinguish between nuisance and disease control
BD	2	4.1.1	Kasey Jacobs	Citizens Campaign for the Environment	It is dangerous not to distinguish between nuisance and disease control
BH	8	4.1.1	Ronald McKenna	Fire Island Pines Property Owners Association	Ditch maintenance/adulticiding important to HIV-positive community
BI	26	4.1.1	Kevin McAllister	Peconic Baykeeper	One reason to not distinguish between nuisance control and health impacts is to gains more State funding
D	2	4.1.2	Joseph Conlon	AMCA	Template for future EISs
D	3	4.1.2	Joseph Conlon	AMCA	Glad to see actual use/mitigation strategies addressed
H	14	4.1.2	Victoria Russell	Town of Babylon DEC	No elevated risks to humans or the environment
N	9	4.1.2	Matthew Atkinson	Peconic Baykeeper	Different standards for impacts from mosquito-borne disease and pesticides
R	14	4.1.2	Unidentified	COPOPAW (?)	County is managing health risk on a zero-based risk scale
R	15	4.1.2	Unidentified	COPOPAW (?)	EPA-FDA manage risks differently

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
R	16	4.1.2	Unidentified	COPOPAW (?)	County conflates health and nuisance control ("vector control") because reducing vectors to less-than-significant levels reduces public health risk to zero
R	17	4.1.2	Unidentified	COPOPAW (?)	This zero-based risk posture overstates disease risk
R	18	4.1.2	Unidentified	COPOPAW (?)	County should establish an acceptable disease risk level
R	19	4.1.2	Unidentified	COPOPAW (?)	Failing to differentiate the two leads to suites of management actions based on the presence of mosquitoes
T	1	4.1.2	Peer Reviewer #1		Follows accepted methodologies
T	2	4.1.2	Peer Reviewer #1		Adequately characterizes worst case exposure scenarios
T	4	4.1.2	Peer Reviewer #1		Avoid statements of "no risk"
T	5	4.1.2	Peer Reviewer #1		Give more credit to NYC EIS
T	6	4.1.2	Peer Reviewer #1		Update to include post-2005 work (REDs and primary literature)
T	7	4.1.2	Peer Reviewer #1		Do not include dermal exposures (see Moore et al, 1993, and Peterson, 2006, not USEPA)
T	9	4.1.2	Peer Reviewer #1		Exposure to vector control insecticides much smaller than exposures to insecticides from other sources
T	10	4.1.2	Peer Reviewer #1		Correct characterization of human risk assessment
U	2	4.1.2	Peer Reviewer #2		Overall Plan approach is appropriate
U	5	4.1.2	Peer Reviewer #2		Risk assessment well-organized
U	8	4.1.2	Peer Reviewer #2		Impacts of pesticides should have included life-cycle effects
U	9	4.1.2	Peer Reviewer #2		Efficacy data should have been included (insofar as it might impact derivation of risks)
U	10	4.1.2	Peer Reviewer #2		Explaining efficacy of alternative methods helps explain why tried & true is so often used
U	11	4.1.2	Peer Reviewer #2		Certain effects not addressed – i.e., arguable endocrine effects of pyrethroids
U	12	4.1.2	Peer Reviewer #2		Nuanced impacts might temper blanket statements regarding overall safety
U	13	4.1.2	Peer Reviewer #2		Assessment communication would be stronger using a better means of expressing risks
Z	27	4.1.2	Michael Horst		DeGuise, McElroy, Horst data included?
AA	1	4.1.2	Michael Horst		NYC-Westchester DGEISs ever reviewed for scientific accuracy
AA	3	4.1.2	Michael Horst		Behavior should be included as an impact
AA	4	4.1.2	Michael Horst		Repeated exposures may lead to chronic exposure through bioaccumulation
AA	5	4.1.2	Michael Horst		Nothing new published since 2001 according to the Ecotoxicology Study
AA	11	4.1.2	Michael Horst		Why were other repellents not studied
AA	12	4.1.2	Michael Horst		Why was AGRICOLA data base not included in study?
AO	20	4.1.2	Matthew Atkinson	Peconic Baykeeper	Based on zero risk for disease
AO	21	4.1.2	Matthew Atkinson	Peconic Baykeeper	EPA does not support zero-based risk for disease
AO	22	4.1.2	Matthew Atkinson	Peconic Baykeeper	EPA criteria for ecological and pesticide risks are 1:10,000 to 1:1,000,000
D	5	4.1.3	Joseph Conlon	AMCA	Excellent information of use elsewhere
H	13	4.1.3	Victoria Russell	Town of Babylon DEC	No elevated risks to humans or the environment
P	42	4.1.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Does not determine ecological impacts of adulticiding (confounding factors)
P	43	4.1.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Laboratory results were not sufficient

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	44	4.1.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Not appropriate to determine long-term or sub-lethal impacts
Q	57	4.1.3	Nicole Maher et al	COPOPAW	Limited to no replication
Q	58	4.1.3	Nicole Maher et al	COPOPAW	Short duration
Q	59	4.1.3	Nicole Maher et al	COPOPAW	Excessive background stresses
Q	60	4.1.3	Nicole Maher et al	COPOPAW	Limit study's applicability
S	67	4.1.3	Citizens Campaign for the Environment et al	COPOPAW	Results were inconclusive
V	2	4.1.3	Jake Kritzer	Environmental Defense	Limited utility due to lack of replication
V	3	4.1.3	Jake Kritzer	Environmental Defense	Limited utility due to limited time periods for monitoring for effects
V	4	4.1.3	Jake Kritzer	Environmental Defense	Limited utility due to substantial background stress that clouds detection of pesticide effects
V	5	4.1.3	Jake Kritzer	Environmental Defense	Replication was only the minimum for statistical purposes
V	6	4.1.3	Jake Kritzer	Environmental Defense	9-9 event was not properly replicated
V	7	4.1.3	Jake Kritzer	Environmental Defense	Adulticide events not properly replicated
V	8	4.1.3	Jake Kritzer	Environmental Defense	Tracked impacts over 4-6 days
V	9	4.1.3	Jake Kritzer	Environmental Defense	Suspect this is too short a time period
V	10	4.1.3	Jake Kritzer	Environmental Defense	Growth requires more time to measure impacts
V	11	4.1.3	Jake Kritzer	Environmental Defense	Environmental toxins often have impacts over periods of weeks to years
V	12	4.1.3	Jake Kritzer	Environmental Defense	Study notes low DO as stressor
V	13	4.1.3	Jake Kritzer	Environmental Defense	Food supply, density, caging effects may have affected results
X	1	4.1.3	Michael Horst		Methoprene will bind to plastics and be biologically unavailable
X	2	4.1.3	Michael Horst		Source of shrimp?
X	3	4.1.3	Michael Horst		How many survivors brought back to lab
X	4	4.1.3	Michael Horst		Type of container that collected water
X	5	4.1.3	Michael Horst		Water sampling did not account for water volume and movement
X	6	4.1.3	Michael Horst		Source of unexpected mortality
X	7	4.1.3	Michael Horst		Survivorship in deeper water due to less pesticide or more DO?
X	8	4.1.3	Michael Horst		Test should have been conducted on larval shrimp
X	9	4.1.3	Michael Horst		Discuss DO drops
X	10	4.1.3	Michael Horst		Source for shrimp DO data
X	11	4.1.3	Michael Horst		Mortalities due to combination of stressors?
X	12	4.1.3	Michael Horst		Prey-capture has scientific validity
X	13	4.1.3	Michael Horst		Observations in literature that methoprene causes lethargy in crustaceans
X	14	4.1.3	Michael Horst		Rationale for attributing mortality to low DO
X	16	4.8.1	Michael Horst		Needs increased frequency of sampling
Y	7	4.1.3	Michael Horst		Did not address non-lethal effects
Z	15	4.1.3	Michael Horst		Sublethal impacts may have been missed
AB	12	4.1.3	Michael Horst	University of Maine	Should have tested all major groups before honing in on only two species

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AG	20	4.1.3	John Pavacic	NYSDEC	Not an "extensive" project
AG	27	4.1.3	John Pavacic	NYSDEC	Results may be affected by environmental factors and small number of events
AG	28	4.1.3	John Pavacic	NYSDEC	Not all organisms checked prior to treatment, and so it is not known if mortalities occurred before, during, or after the spray events
AG	29	4.1.3	John Pavacic	NYSDEC	Experiment involved a small number of events and a small number of samples
AP	12	4.1.3	Kevin McAllister	Peconic Baykeeper	Study is limited
BD	6	4.1.3	Kasey Jacobs	Citizens Campaign for the Environment	Appears to be adequate for larvicides
BD	7	4.1.3	Kasey Jacobs	Citizens Campaign for the Environment	Should not be used for adulticides impact on marsh ecology
BD	8	4.1.3	Kasey Jacobs	Citizens Campaign for the Environment	Adulticides at Johns Neck results confounded by low DO
BD	9	4.1.3	Kasey Jacobs	Citizens Campaign for the Environment	Results do not hold up to rigorous scientific scrutiny
BD	10	4.1.3	Kasey Jacobs	Citizens Campaign for the Environment	Long-term impacts cannot be determined over four days
G	2	4.1.4	Lawrence Merryman	Great South Bay Audubon Society	Program for human health purposes?
H	2	4.1.4	Victoria Russell	Town of Babylon DEC	Town of Babylon recognizes need for mosquito control
H	5	4.1.4	Victoria Russell	Town of Babylon DEC	Babylon concurs with overall goals of the Long-Term Plan
I	2	4.1.4	James King	Town of Southold Town Trustees	Support reductions in pesticides
N	26	4.1.4	Matthew Atkinson	Peconic Baykeeper	Baykeeper believes there is a spectrum of mosquito-control activities (control methods, public education, artificial source reduction, surveillance) that would be embraced
P	9	4.1.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Agree there is a need for disease control in Suffolk County
P	34	4.1.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Detection of disease should be trigger for disease control
Q	3	4.1.4	Nicole Maher et al	COPOPAW	Good plan where vector control is consistent with ecological values
Q	4	4.1.4	Nicole Maher et al	COPOPAW	Reducing pesticides good goal
Q	5	4.1.4	Nicole Maher et al	COPOPAW	Improving marsh health good goal
S	30	4.1.4	Citizens Campaign for the Environment et al	COPOPAW	Central tenet is to reduce pesticides through source reduction
S	31	4.1.4	Citizens Campaign for the Environment et al	COPOPAW	Reliance on control of salt marsh breeding habitats
S	53	4.1.4	Citizens Campaign for the Environment et al	COPOPAW	Long-Term Plan primary objectives mosquito control and disease management
S	54	4.1.4	Citizens Campaign for the Environment et al	COPOPAW	Primary objective not ecologically sensitive marsh restoration and management

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
U	22	4.1.4	Peer Reviewer #2		Goals are clear and positive
U	23	4.1.4	Peer Reviewer #2		Goals may not be founded in data/experience
AG	2	4.1.4	John Pavacic	NYSDEC	Conceptual agreement on reduction in pesticides, preservation/increase in wetlands acreage, reductions in Phragmites
AG	12	4.1.4	John Pavacic	NYSDEC	Supports no new ditches policy
AG	13	4.1.4	John Pavacic	NYSDEC	Supports presumptive ditch reversion, with some reservations
AG	21	4.1.4	John Pavacic	NYSDEC	Substitute "preserve-increase acreage, values, and functions" for "Mosaic of biodiversity."
AG	126	4.1.4	John Pavacic	NYSDEC	Why is adulticide reductions not a goal?
AG	136	4.1.4	John Pavacic	NYSDEC	Explain Objective 1, Goal 1 (Wetlands Management Plan)
AH	2	4.1.4	Michael Reynolds	FINS	Commends County for efforts to decrease human health risks, restore wetlands, and reduce pesticide use
AJ	2	4.1.4	Joy Squires	Huntington Conservation Board	There will continue to be a health threat from WNV
AJ	6	4.1.4	Joy Squires	Huntington Conservation Board	Supports a program to reduce disease risks
AR	13	4.1.4	Heather Cusack	Southold Trustees	Supports Phragmites removal
AS	1	4.1.4	Nicole Maher	Nature Conservancy	Applauds plan for notion that vector control should be consistent with ecological values
AS	2	4.1.4	Nicole Maher	Nature Conservancy	Good there is to be reductions in pesticide use and marsh restoration
AT	8	4.1.4	Dominick Licata	Smith Point Beach Property Owners Association	Mosquito not more important than 50,000 people
BA	7	4.1.4	Adrienne Esposito	Citizens Campaign for the Environment	There is a need for disease control in Suffolk County
BA	10	4.1.4	Adrienne Esposito	Citizens Campaign for the Environment	Plan calls for 75% reduction in adulticides
BA	11	4.1.4	Adrienne Esposito	Citizens Campaign for the Environment	Will cause increased application of chemicals
BA	19	4.1.4	Adrienne Esposito	Citizens Campaign for the Environment	Trigger for disease control should be disease detection
BE	2	4.1.4	Joseph Barone		Interested in environmental protection
BE	3	4.1.4	Joseph Barone		Interested in protection from the dangers of not spraying
BE	5	4.1.4	Joseph Barone		Concerned about WNV
BJ	7	4.1.4	John Lund	Davis Park	One plan for all of Suffolk County may not be appropriate
G	6	4.1.5	Lawrence Merryman	Great South Bay Audubon Society	OMWM will cost County taxpayers millions of dollars
H	10	4.1.5	Victoria Russell	Town of Babylon DEC	Plan must receive adequate support
K	7	4.1.5	Jack Mattice		How will resources for development of other larval triggers be found
R	2	4.1.5	Unidentified	COPOPAW (?)	Improvements: three-year workplan
R	38	4.1.5	Unidentified	COPOPAW (?)	Details and commitment of carry out Long-Term Plan
AM	11	4.1.5	Georgeanne Spates		Plan may cost millions of dollars
AV	2	4.1.5	Bob DeLuca	Group for the South Fork	Note there will be a triennial plan update

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AV	3	4.1.5	Bob DeLuca	Group for the South Fork	Concern that assessment means is not well defined
Z	26	4.1.6	Michael Horst		Peer review establishes accuracy of scientific work
AD	9	4.1.6	Enrico Nardone	Seatuck Environmental Association	Little unbiased information – all comes from mosquito control officials
AG	84	4.1.6	John Pavacic	NYSDEC	Many references on OMWM from mosquito-control oriented publications/sources
AO	8	4.1.6	Matthew Atkinson	Peconic Baykeeper	Papers in support of OMWM are written by mosquito control people
C	8	4.1.7	Richard Mendelman		Fill use should be compatible with PEP and SSER policies
D	4	4.1.7	Joseph Conlon	AMCA	Program meets with EPA PESP goals
K	14	4.1.7	Jack Mattice		Can the County ever reduce to Tier I (NYS WNV Response Plan)
P	23	4.1.7	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Onondaga County only has a disease control program
S	9	4.1.7	Citizens Campaign for the Environment et al	COPOPAW	Closely examine other nearby programs
AC	14	4.1.7	David Pimentel	Cornell University	90% control required for determination of success
AG	135	4.1.7	John Pavacic	NYSDEC	Correctly cite PEP ditch maintenance policy
AL	4	4.1.7	Bob McAlevy		Study of the Peconic Estuary disagrees
AL	5	4.1.7	Bob McAlevy		County committed to the PEP CCMP
AL	6	4.1.7	Bob McAlevy		By extension, PEP CCMP applies to all County estuaries
AO	4	4.1.7	Matthew Atkinson	Peconic Baykeeper	County Phase-out Law
AO	5	4.1.7	Matthew Atkinson	Peconic Baykeeper	PEP CCMP seeks to get rid of pesticides in the Peconic Estuary
BB	1	4.1.7	Bob McAlevy		PEP CCMP can be interpreted as saying no spraying in the Peconic Estuary
BB	2	4.1.7	Bob McAlevy		PEP CCMP can be interpreted as saying no ditching in the Peconic Estuary
N	21	4.1.8	Matthew Atkinson	Peconic Baykeeper	No rational alternatives presented
D	1	4.1.9	Joseph Conlon	AMCA	Most comprehensive of its kind
G	19	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that are proven effective based on best available science
G	20	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect habitat
G	21	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations
H	1	4.1.9	Victoria Russell	Town of Babylon DEC	Commend participants
H	4	4.1.9	Victoria Russell	Town of Babylon DEC	Overall project approach was sound
H	9	4.1.9	Victoria Russell	Town of Babylon DEC	Long-Term Plan supports many aspects of current practice and identifies areas for improvement
H	16	4.1.9	Victoria Russell	Town of Babylon DEC	Extensive public outreach provided opportunities for comment
Q	1	4.1.9	Nicole Maher et al	COPOPAW	Improvements made to Plan since October 2005
R	1	4.1.9	Unidentified	COPOPAW (?)	Significantly improved Plan
R	46	4.1.9	Unidentified	COPOPAW (?)	Release peer reviews from TAC-approved peer reviewer
AL	7	4.1.9	Bob McAlevy		PEP prepared by outside agencies compared to Long-Term Plan prepared by County and its consultant

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AO	2	4.1.9	Matthew Atkinson	Peconic Baykeeper	Entities responsible for implementing the Plan crafted it
AO	14	4.1.9	Matthew Atkinson	Peconic Baykeeper	Long-Term Plan calls for expanded program
AO	15	4.1.9	Matthew Atkinson	Peconic Baykeeper	Efficacy of the program is unknown
AP	15	4.1.9	Kevin McAllister	Peconic Baykeeper	Plan was crafted in advance and the process is building a firewall around a flawed plan
AW	12	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that are proven effective based on best available science
AW	13	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect habitat
AW	14	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations
BC	12	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that are proven effective based on best available science
BC	13	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect habitat
BC	14	4.1.9	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York supports vector control methods that do not negatively affect vulnerable bird populations
BI	25	4.1.9	Kevin McAllister	Peconic Baykeeper	Development of the Long-Term Plan was not supported by the impact analysis
AL	8	4.1.9	Bob McAlevy		"Impartial consultants" is an oxymoron
AL	9	4.1.9	Bob McAlevy		Governments decide what to do and get consultants to rubberstamp the plan
AL	14	4.1.10	Bob McAlevy		Deer ticks cause 100 to 200 times the number of illnesses mosquitoes do
AL	15	4.1.10	Bob McAlevy		A county in NJ cut deer tick illness incidence in half through public education
AL	16	4.1.10	Bob McAlevy		Suffolk County should drop this Plan and do a similar program
BE	4	4.1.10	Joseph Barone		Concerned about tick-borne disease
BJ	4	4.1.10	John Lund	Davis Park	Also fighting ticks as well as mosquitoes
BP	1	4.1.10	Bob McAlevy		Tick control always involves pesticides
BP	2	4.1.10	Bob McAlevy		Tick program would require an EIS
BP	3	4.1.10	Bob McAlevy		Establishing a tick control program would be very expensive
BQ	1	4.1.10	Bob McAlevy		Annotations highlight effectiveness of public education program in Hunterdon County, NJ
CF	1	4.1.10	Bob McAlevy		Anecdotal reports of more ticks on the East End
CF	2	4.1.10	Bob McAlevy		Effectiveness of Lyme Disease education is touted
C	1	4.1.12	Richard Mendelman		Swallows prey on mosquitoes
C	2	4.1.12	Richard Mendelman		Purple martin houses would be plentiful if paid for using pesticide monies
C	3	4.1.12	Richard Mendelman		Bat houses should also be given away
I	34	4.1.12	James King	Town of Southold Town Trustees	Natural predators of mosquitoes include bats, birds, frogs, fish
I	44	4.1.12	James King	Town of Southold Town Trustees	Majority of mosquitoes breed in fresh water
I	48	4.1.12	James King	Town of Southold Town Trustees	Bat boxes reduce mosquitoes

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
I	49	4.1.12	James King	Town of Southold Town Trustees	Plantings and habitat enhancement for swallows reduce mosquitoes
I	50	4.1.12	James King	Town of Southold Town Trustees	Plantings and habitat enhancements for dragonflies reduce mosquitoes
S	6	4.1.12	Citizens Campaign for the Environment et al	COPOPAW	More thoroughly explore mosquito dynamics
S	7	4.1.12	Citizens Campaign for the Environment et al	COPOPAW	Examine impact of removal of prey from system
AG	54	4.1.12	John Pavacic	NYSDEC	Improve discussion of natural mosquito dynamics
AG	82	4.1.12	John Pavacic	NYSDEC	Any studies citing mosquito populations in healthy unaltered marshes?
AG	83	4.1.12	John Pavacic	NYSDEC	Any studies citing impacts of reducing mosquito populations?
AM	13	4.1.12	Georgeanne Spates		Effective control of mosquitoes occurs without human intrusion
AS	14	4.1.12	Nicole Maher	Nature Conservancy	Standing water in yards is a breeding ground for freshwater mosquitoes
D	6	4.1.13	Joseph Conlon	AMCA	Will remain an element of Integrated mosquito management for foreseeable future
H	8	4.1.13	Victoria Russell	Town of Babylon DEC	Hierarchical approach proper
I	36	4.1.13	James King	Town of Southold Town Trustees	DGEIS does not specify use of IPM
I	39	4.1.13	James King	Town of Southold Town Trustees	Comply with NYSDEC agricultural standards
R	28	4.1.13	Unidentified	COPOPAW (?)	Commit to certain mosquito control actions in the face of unacceptable risks
R	34	4.1.13	Unidentified	COPOPAW (?)	Long-Term Plan focuses on controlling mosquitoes through chemical, physical, biological methods`
U	3	4.1.13	Peer Reviewer #2		Marsh management plan is a strength
U	4	4.1.13	Peer Reviewer #2		Broad conceptualization of vector control roles/responsibilities is good
AI	27	4.1.13	Roger Wolfe	CT DEP	Without OMWM, mosquito control will rely on pesticides
AI	28	4.1.13	Roger Wolfe	CT DEP	Infilling ditches can create more pesticide use
AJ	7	4.1.13	Joy Squires	Huntington Conservation Board	IPM program is best
AJ	8	4.1.13	Joy Squires	Huntington Conservation Board	Stress education, surveillance, source control in Huntington
AL	3	4.1.13	Bob McAlevy		Plan says it's okay to spray pesticides
AO	1	4.1.13	Matthew Atkinson	Peconic Baykeeper	Plan is an advertisement for IPM
BE	1	4.1.13	Joseph Barone		In favor both of spraying and a middle ground
BV	3	4.1.13	Bob McAlevy		OMWM is central to the plan
K	1	4.1.14	Jack Mattice		Include acronyms with definitions
K	16	4.1.14	Jack Mattice		Define cycling center & amplification area
K	18	4.1.14	Jack Mattice		Relocate application restrictions
K	23	4.1.14	Jack Mattice		Discuss Table ES-10 format
K	24	4.1.14	Jack Mattice		Ensure decision-makers are identified
R	9	4.1.14	Unidentified	COPOPAW	Lack of thresholds for action

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
S	5	4.1.14	Citizens Campaign for the Environment et al	COPOPAW	Include separate NEPA analysis
AG	51	4.1.14	John Pavacic	NYSDEC	Define MIR
AG	52	4.1.14	John Pavacic	NYSDEC	Explicate contradictions between Redfield (1972) and Merrimam (1974)
AG	47	4.1.14	John Pavacic	NYSDEC	Define multivoltine and univoltine
AG	69	4.1.14	John Pavacic	NYSDEC	Amend attendance lists
AG	106	4.1.14	John Pavacic	NYSDEC	No data presented with conclusions
AG	120	4.1.14	John Pavacic	NYSDEC	Plans are poorly referenced
AG	121	4.1.14	John Pavacic	NYSDEC	Long-Term Plan does not include environmental impact assessments
N	5	4.1.15	Matthew Atkinson	Peconic Baykeeper	Benefits of program overstated
N	18	4.1.15	Matthew Atkinson	Peconic Baykeeper	Reject responses that do not acknowledge the controversy over potential harm and benefits of the Long-Term Plan
N	19	4.1.15	Matthew Atkinson	Peconic Baykeeper	Mosquito control is political
N	25	4.1.15	Matthew Atkinson	Peconic Baykeeper	CEQ accept the body of opinion in the scientific community
N	27	4.1.15	Matthew Atkinson	Peconic Baykeeper	Long-Term Plan is too argumentative
P	1	4.1.15	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Technical & professional work in the Plan
P	49	4.1.15	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Risks of mosquito control far outweigh benefits
T	3	4.1.15	Peer Reviewer #1		Revise Executive Summary to avoid conclusions
U	1	4.1.15	Peer Reviewer #2		Rewrite Task 8 Executive Summary
AC	1	4.1.15	David Pimentel	Cornell University	Overall an excellent job
AC	2	4.1.15	David Pimentel	Cornell University	"no risk" vs. "significant risk"
AC	8	4.1.15	David Pimentel	Cornell University	Believes risks from pyrethroids outweigh the benefits
AG	1	4.1.15	John Pavacic	NYSDEC	Ambitious project that has received much effort
AG	4	4.1.15	John Pavacic	NYSDEC	Too conclusory that the Plan is best under all conditions
AG	5	4.1.15	John Pavacic	NYSDEC	Not enough identification of potential conflicts between mosquito control and preservation of wetlands values and functions
AH	1	4.1.15	Michael Reynolds	FINS	Impressed with work and analysis
AI	1	4.1.15	Roger Wolfe	CT DEP	Comprehensive with far reaching implications to all mosquito control agencies
AJ	1	4.1.15	Joy Squires	Huntington Conservation Board	Very thorough, serious
AJ	17	4.1.15	Joy Squires	Huntington Conservation Board	Reasonable means of addressing a difficult problem
AJ	18	4.1.15	Joy Squires	Huntington Conservation Board	Statements, research, presentation persuasive
AO	3	4.1.15	Matthew Atkinson	Peconic Baykeeper	Program will have no impact from pesticides
BI	27	4.1.15	Kevin McAllister	Peconic Baykeeper	Ditching, OMWM, larviciding and adulticiding represent threats to the aquatic environment
BI	28	4.1.15	Kevin McAllister	Peconic Baykeeper	Because of other impacts to the aquatic environment, need to look harder at vector control

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
BJ	9	4.1.15	Kevin McAllister	Peconic Baykeeper	Need to ensure there are no ecological impacts to the plan
BV	5	4.1.15	Bob McAlevy		Exaggerates health benefits of mosquito control
H	17	4.1.16	Victoria Russell	Town of Babylon DEC	Meets requirements of SEQRA
N	6	4.1.16	Matthew Atkinson	Peconic Baykeeper	DGEIS does not provide adequate information for decision-maker
Q	41	4.1.16	Nicole Maher et al		Revise DGEIS to meet comments from peer reviewers
AH	3	4.1.16	Michael Reynolds	FINS	NEPA process necessary for permit to adulticide or larvicide within FINS
AH	4	4.1.16	Michael Reynolds	FINS	Separate plan for FINS needs to be accomplished
AH	5	4.1.16	Michael Reynolds	FINS	Separate plan being produced
AV	1	4.1.16	Bob DeLuca	Group for the South Fork	Don't think the document is complete
AG	19	4.2.1	John Pavacic	NYSDEC	Need for further SEQRA on minor water management projects
AG	67	4.2.1	John Pavacic	NYSDEC	Water management criteria suggested as SEQRA triggers for future action are too vague
AG	163	4.2.1	John Pavacic	NYSDEC	SEQRA reviews of wetlands projects should cite SEQRA regs. regarding DGEIS further reviews
AG	164	4.2.1	John Pavacic	NYSDEC	Issuance of general permits even for GCp activities unlikely.
BA	24	4.2.1	Adrienne Esposito	Citizens Campaign for the Environment	Site specific EIS for each water management project
BA	26	4.2.1	Adrienne Esposito	Citizens Campaign for the Environment	Generic analysis of the DGEIS may not be enough
AG	26	4.2.2	John Pavacic	NYSDEC	Discussion of County and State authority for County right to enter onto other governmental lands for mosquito control is needed
AG	110	4.2.2	John Pavacic	NYSDEC	If SCVC has authority under State law to enter onto all lands, how does that interact with pre-State Constitution rights associated with the Towns
AG	143	4.2.3	John Pavacic	NYSDEC	Federal governments are not exempt from State regulations
AG	73	4.2.4	John Pavacic	NYSDEC	Discuss differences between Federal Minimum Risk classifications and NYSDEC regulations
AG	75	4.2.4	John Pavacic	NYSDEC	Emergency authorizations for adulticide applications near wetlands are made under Article 24, and are not exempt
AG	116	4.2.4	John Pavacic	NYSDEC	Note that although most states do not regulate barrier treatments, New York regulates all mosquitocides
AG	117	4.2.4	John Pavacic	NYSDEC	Note that traps using octenol are regulated by NYSDEC
AG	41	4.2.5	John Pavacic	NYSDEC	Revise compatibility lists for regulations
AG	42	4.2.5	John Pavacic	NYSDEC	Revise Table ES-5 to reflect conformance with any required permits
AG	74	4.2.5	John Pavacic	NYSDEC	Correct citation of Tidal Wetlands regulations
AG	77	4.2.5	John Pavacic	NYSDEC	NYSDEC regulates wetlands that are 12.4 acres (not 12.6 acres) in size
AG	88	4.2.5	John Pavacic	NYSDEC	Correct reference to smaller than 12.4 acre authority for NYSDEC administration
AF	2	4.2.6	Steve Papa	USFWS	If an ACOE permit is needed, a consultation under the Endangered Species Act is required
AF	3	4.2.6	Steve Papa	USFWS	Other activities may require a consultation due to potential impacts to listed species
AG	72	4.2.6	John Pavacic	NYSDEC	Refine Table 3-2 so as to assure it is complete
AG	105	4.2.6	John Pavacic	NYSDEC	Amend Table 105 to reflect all RTE species
E	9	4.3.1	Edward Romaine	Suffolk County Legislature	Stress impacts of pesticides

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ID	**Com. #**	**Topic**	**Speaker**	**Speaker's Organization**	**Content**
P	59	4.3.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Excessive exposure to chemicals can harm humans (especially children)
S	17	4.3.1	Citizens Campaign for the Environment et al	COPOPAW	Viewing all mosquitoes as dangerous leads to more DEET use
S	18	4.3.1	Citizens Campaign for the Environment et al	COPOPAW	Viewing all mosquitoes as dangerous leads to more use of dangerous pesticides on children
U	70	4.3.1	Peer Reviewer #2		Recent DEET information
U	71	4.3.1	Peer Reviewer #2		DEET misuse may rise if increased usage occurs
Y	11	4.3.1	Michael Horst		Citronella + picaridin other options besides DEET
AC	9	4.3.1	David Pimentel	Cornell University	DEET is a pesticide
AC	10	4.3.1	David Pimentel	Cornell University	Extreme caution is urged for DEET use with children
AK	11	4.3.1	Keith Romaine	Moriches Bay Civic Association	Stress impacts of pesticides
BA	12	4.3.1	Adrienne Esposito	Citizens Campaign for the Environment	Will cause increased application of chemicals to children
E	10	4.3.2	Edward Romaine	Suffolk County Legislature	Means of mosquito control
P	55	4.3.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Evaluate the effectiveness of public education in behavior modification
P	56	4.3.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Effective public education can eliminate the need for adulticides
Q	28	4.3.2	Nicole Maher et al	COPOPAW	Informed population more likely to take steps towards mosquito control
R	36	4.3.2	Unidentified	COPOPAW (?)	Aggressive public education can reduce needs for other elements of mosquito control
R	39	4.3.2	Unidentified	COPOPAW (?)	People informed about mosquitoes are more likely to mosquito-proof their home
S	10	4.3.2	Citizens Campaign for the Environment et al	COPOPAW	Examine efficacy of public education in changing behaviors
AK	12	4.3.2	Keith Romaine	Moriches Bay Civic Association	Means of mosquito control
AS	12	4.3.2	Nicole Maher	Nature Conservancy	Inform people about mosquito biology and control measures
AS	13	4.3.2	Nicole Maher	Nature Conservancy	People so informed are more likely to mosquito proof their homes
E	11	4.3.3	Edward Romaine	Suffolk County Legislature	Mosquito tolerance
P	26	4.3.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	CCE understood the Plan would contain a component to increase public tolerance for mosquitoes
P	27	4.3.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Long-Term Plan should contain such a component
P	28	4.3.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Tolerance for mosquitoes conflicts with depiction they are harmful, dangerous, and disease-ridden
P	57	4.3.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Public education focus on mosquito avoidance is improper; should stress mosquito tolerance

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	58	4.3.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Excessive fear of mosquitoes can lead to improper use of chemicals
S	25	4.3.3	Citizens Campaign for the Environment et al	COPOPAW	Expected a component calling for tolerance of mosquitoes as part of life on Long Island
S	26	4.3.3	Citizens Campaign for the Environment et al	COPOPAW	Tolerance of mosquitoes is impossible if they are all described as dangerous
AK	13	4.3.3	Keith Romaine	Moriches Bay Civic Association	Mosquito tolerance
BA	16	4.3.3	Adrienne Esposito	Citizens Campaign for the Environment	Was supposed to contain a component increasing public tolerance of mosquitoes
BA	17	4.3.3	Adrienne Esposito	Citizens Campaign for the Environment	If public is told mosquitoes can kill you or cause disease, increased tolerance will not be possible
F	1	4.3.4	MaryLaura Lamont		CAC brochure misleading
I	43	4.3.4	James King	Town of Southold Town Trustees	Better distribute flyers
P	60	4.3.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Fight the Bite is a bad title
AG	76	4.3.4	John Pavacic	NYSDEC	Pamphlet "Dump the water" needs to be amended to ensure residents do not clear vegetation in a State-regulated wetland
P	61	4.3.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Reporting of efficacy data is good
P	62	4.3.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Use reverse 911 for adulticide application notices
Q	25	4.3.5	Nicole Maher et al	COPOPAW	Long-Term Plan: good start
Q	26	4.3.5	Nicole Maher et al	COPOPAW	Necessary part of mosquito control
Q	27	4.3.5	Nicole Maher et al	COPOPAW	Provide additional details
Q	29	4.3.5	Nicole Maher et al	COPOPAW	Add: PSAs
Q	30	4.3.5	Nicole Maher et al	COPOPAW	Add: elementary education programs
Q	31	4.3.5	Nicole Maher et al	COPOPAW	Add: homeowner association programs
Q	32	4.3.5	Nicole Maher et al	COPOPAW	Add: school property inspections
Q	33	4.3.5	Nicole Maher et al	COPOPAW	Add: Waste tire collection service
Q	34	4.3.5	Nicole Maher et al	COPOPAW	Add: commercial/residential inspections
R	10	4.3.5	Unidentified	COPOPAW (?)	Not enough details provided
R	33	4.3.5	Unidentified	COPOPAW (?)	Key element of mosquito control
R	37	4.3.5	Unidentified	COPOPAW (?)	Precis of Long-Term Plan elements
R	40	4.3.5	Unidentified	COPOPAW (?)	Add: PSAs
R	41	4.3.5	Unidentified	COPOPAW (?)	Add: elementary education programs
R	42	4.3.5	Unidentified	COPOPAW (?)	Add: homeowner association programs
R	43	4.3.5	Unidentified	COPOPAW (?)	Add: school property inspections

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
R	44	4.3.5	Unidentified	COPOPAW (?)	Add: Waste tire collection service
R	45	4.3.5	Unidentified	COPOPAW (?)	Add: commercial/residential inspections
AL	11	4.3.6	Bob McAlevy		Poll found people believe there are about equal risks from mosquitoes, WNV, and Pesticide spraying
AL	12	4.3.6	Bob McAlevy		3:1 in favor of wetlands protection over short-term mosquito
AL	13	4.3.6	Bob McAlevy		2:1 believe the deer tick is a greater health risk than mosquitoes
AU	1	4.3.6	Ron McKenna	Fire Island Pines	95% of the community think SCVC does a good job
BH	1	4.3.6	Ronald McKenna	Fire Island Pines Property Owners Association	95% participation in a survey; 91% approved of continuing spraying in the Pines
BH	2	4.3.6	Ronald McKenna	Fire Island Pines Property Owners Association	90% approval of SCVC
BJ	10	4.3.6	John Lund	Davis Park	SCVC responsive to Davis Park needs
BN	1	4.3.6	Bob McAlevy		Risk comparison between WNV and pesticides
BN	2	4.3.6	Bob McAlevy		Comparison of impacts of wetlands loss and mosquito problems
BN	3	4.3.6	Bob McAlevy		Comparison between risks from ticks and mosquitoes
BN	4	4.3.6	Bob McAlevy		Most trusted source of information regarding mosquito control
BN	5	4.3.6	Bob McAlevy		Most trusted source of information regarding use of pesticides
Q	10	4.4.1	Nicole Maher et al	COPOPAW	Document procedures to be used
Q	11	4.4.1	Nicole Maher et al	COPOPAW	Document staff training
AG	46	4.4.2	John Pavacic	NYSDEC	Discuss establishing larval indexes
K	12	4.4.3	Jack Mattice		More specifics re: QA/QC team membership
Y	9	4.4.3	Michael Horst		Will pre-spray surveillance include non-target organisms
H	11	4.4.4	Victoria Russell	Town of Babylon DEC	County must reduce time taken to identify disease
I	28	4.4.4	James King	Town of Southold Town Trustees	Increase population & disease sampling
K	15	4.4.4	Jack Mattice		When will County determine need for more CDC traps
P	33	4.4.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Suffolk has an excellent surveillance program
Q	52	4.4.4	Nicole Maher et al	COPOPAW	Discuss use of trap data
R	26	4.4.4	Unidentified	COPOPAW (?)	County data sets can determine intolerable health risk
R	27	4.4.4	Unidentified	COPOPAW (?)	Establish level of surveillance necessary to confirm unacceptable risk
BA	18	4.4.4	Adrienne Esposito	Citizens Campaign for the Environment	County has an excellent surveillance program
BJ	6	4.4.4	John Lund	Davis Park	Vegetation on Fire Island makes it difficult to find dead birds
S	8	4.5.1	Citizens Campaign for the Environment et al	COPOPAW	Describe interface between vector control and stormwater management
AG	30	4.5.1	John Pavacic	NYSDEC	Address ecological recharge basins as well as standard recharge basins
AJ	9	4.5.1	Joy Squires	Huntington Conservation Board	Storm water structures can support C. pipiens

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AJ	10	4.5.1	Joy Squires	Huntington Conservation Board	Focus on storm water structure maintenance
AJ	11	4.5.1	Joy Squires	Huntington Conservation Board	Maintaining storm water structures can help water quality in Long Island Sound
I	45	4.5.2	James King	Town of Southold Town Trustees	Time of day watering reduces mosquitoes
I	46	4.5.2	James King	Town of Southold Town Trustees	Avoiding pooled water reduces mosquitoes
I	47	4.5.2	James King	Town of Southold Town Trustees	Fish ponds reduce mosquitoes
AJ	12	4.5.2	Joy Squires	Huntington Conservation Board	Continue inspector response to calls
A	1	4.6.1	Paul Capotosto	Connecticut DEP	Connecticut water management called Integrated Marsh Management
E	12	4.6.1	Edward Romaine	Suffolk County Legislature	17,000 acres in extent
I	3	4.6.1	James King	Town of Southold Town Trustees	Pond construction does not preserve the integrity of the marsh
I	4	4.6.1	James King	Town of Southold Town Trustees	OMWM requires digging ponds in the marsh
N	23	4.6.1	Matthew Atkinson	Peconic Baykeeper	DGEIS: Beneficial water management can be joined with restoration (see CT); not so (Rosza (CT))
O	1	4.6.1	Ron Rosza		OMWM is a series of techniques to control mosquitoes
O	2	4.6.1	Ron Rosza		OMWM is different than ditching: does not attempt to change marsh hydrology
O	4	4.6.1	Ron Rosza		OMWM: pools and non-tidal ditches
O	5	4.6.1	Ron Rosza		OMWM not restoration
O	6	4.6.1	Ron Rosza		Restoration seeks to restore to pre-disturbance
O	15	4.6.1	Ron Rosza		May use these techniques for habitat restoration
O	16	4.6.1	Ron Rosza		Pond restoration does not target mosquito breeding area or use radial or reservoir ditches
P	74	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Central tenet is to reduce pesticides through source reduction
P	75	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Reliance on control of salt marsh breeding habitats
P	76	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Improve management of 17,000 acres of salt marsh
P	77	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	All "progressive water management" is "OMWM"
P	82	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	15 projects will restore 4,000 acres
P	90	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Literature (Lathrop and Cole, 2000) finds OMWM does not recreate unaltered marsh

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	92	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	OMWM is not restoration
P	93	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Restoration means returning marshes to pre-20th C ditching conditions
P	94	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	OMWM does not return marshes to pre-20th C ditching conditions
P	95	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Definition of restoration in DGEIS too vague
P	96	4.6.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	DGEIS restoration definition would allow any alteration of a non-pure marsh
S	11	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Establish a comprehensive water management program in which vector control will be a part
S	32	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Improve management of 17,000 acres of salt marsh
S	33	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	All "progressive water management" is "OMWM"
S	38	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	15 projects will restore 4,000 acres
S	46	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Literature (Lathrop and Cole, 2000) finds OMWM does not recreate unaltered marsh
S	48	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	OMWM is not restoration
S	49	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Restoration means returning marshes to pre-20th C ditching conditions
S	50	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	OMWM does not return marshes to pre-20th C ditching conditions
S	55	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Marshes serve a broad array of functions
S	56	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Nearly all County marshes have been manipulated and need attention
S	57	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Many marshes fail to serve their complete spectrum of functions
S	58	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Many marshes need restoration
S	59	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Plan scope too narrow – only 4,000 acres
S	60	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	9,000 acres will be assessed – too relaxed an approach

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
S	61	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	4,000 acres will not be managed
S	62	4.6.1	Citizens Campaign for the Environment et al	COPOPAW	Marsh restoration to be accomplished for the purpose of vector control, not marsh health
U	21	4.6.1	Peer Reviewer #2		Define "progressive"
Y	3	4.6.1	Michael Horst		Acreages do not add up
AD	1	4.6.1	Enrico Nardone	Seatuck Environmental Association	The grouping of all proposed water management techniques as Progressive Water Management blurs the distinction between mosquito control and marsh restoration
AD	2	4.6.1	Enrico Nardone	Seatuck Environmental Association	OMWM always involves excavation of ponds/channels or other manipulations of the marsh
AD	3	4.6.1	Enrico Nardone	Seatuck Environmental Association	OMWM always involves excavation
AD	4	4.6.1	Enrico Nardone	Seatuck Environmental Association	County's definition is unique in that it allows for inclusion of other techniques
AD	5	4.6.1	Enrico Nardone	Seatuck Environmental Association	Confirmed by use of the term "OMWM proper"+
AD	20	4.6.1	Enrico Nardone	Seatuck Environmental Association	Great majority of university scientists believe OMWM is a mosquito control technique
AE	4	4.6.1	M. Bertness et al		OMWM involves artificial pond creation
AE	5	4.6.1	M. Bertness et al		OMWM involves unnatural creek construction
AE	6	4.6.1	M. Bertness et al		OMWM involves leveling of high marsh terrain by backblading
AE	7	4.6.1	M. Bertness et al		OMWM is mosquito control
AE	8	4.6.1	M. Bertness et al		It is not synonymous with marsh restoration
AE	16	4.6.1	M. Bertness et al		OMWM is no substitute for careful, comprehensive marsh restoration
AG	7	4.6.1	John Pavacic	NYSDEC	OMWM or other manipulation of a good functioning marsh is not "restoration" (it's "alteration")
AG	16	4.6.1	John Pavacic	NYSDEC	Ditched marshes may be functioning well
AG	31	4.6.1	John Pavacic	NYSDEC	NYSDEC evaluation of water management projects to be based on regulation lists of values, which does not include mosquito control
AG	32	4.6.1	John Pavacic	NYSDEC	Habitat creation is not beneficial in all cases
AG	34	4.6.1	John Pavacic	NYSDEC	Water management goals should be broader to match NYSDEC regulation values list
AG	36	4.6.1	John Pavacic	NYSDEC	Activities that eliminate mosquitoes from a good functioning marsh may not be beneficial for the marsh
AG	37	4.6.1	John Pavacic	NYSDEC	4,000 acres of aerially larvicided marshes are candidates for progressive water management
AG	86	4.6.1	John Pavacic	NYSDEC	More details desired on the intent of projects (mosquito control only, or broader goals included)
AG	123	4.6.1	John Pavacic	NYSDEC	Projects need to balance mosquito control needs and marsh health
AH	11	4.6.1	Michael Reynolds	FINS	Ditched marshes will not be altered unless they are shown to have caused significant change in natural wetland functions
AH	12	4.6.1	Michael Reynolds	FINS	Any alteration of ditched marshes must restore lost functions
AH	13	4.6.1	Michael Reynolds	FINS	Envision no water management in a FINS-specific plan
AI	2	4.6.1	Roger Wolfe	CT DEP	Progressive water management seems a reasonable term for wetland restoration + mosquito management

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AI	3	4.6.1	Roger Wolfe	CT DEP	OMWM and Progressive water management are not interchangeable
AI	4	4.6.1	Roger Wolfe	CT DEP	CT uses Integrated marsh management (IMM)
AI	5	4.6.1	Roger Wolfe	CT DEP	IMM like an IPM but with broader wetlands applications
AI	6	4.6.1	Roger Wolfe	CT DEP	IMM not only contains all mosquito management elements but adds Phragmites control, tidal flow restoration, fill removal, habitat enhancement, and education.
AI	7	4.6.1	Roger Wolfe	CT DEP	OMWM a subset of IMM
AI	8	4.6.1	Roger Wolfe	CT DEP	OMWM has become catchphrase for almost all marsh management
AI	9	4.6.1	Roger Wolfe	CT DEP	OMWM technically is a mosquito source reduction technique
AI	10	4.6.1	Roger Wolfe	CT DEP	OMWM by itself is not marsh restoration in the pure sense
AI	11	4.6.1	Roger Wolfe	CT DEP	OMWM usurps ovipositioning sites
AI	12	4.6.1	Roger Wolfe	CT DEP	OMWM provides habitat for larvivorous fishes
AI	13	4.6.1	Roger Wolfe	CT DEP	OMWM therefore reduces larvicide use
AI	14	4.6.1	Roger Wolfe	CT DEP	OMWM can enhance or restore wetlands functions and values
AI	26	4.6.1	Roger Wolfe	CT DEP	Misunderstanding of terms used may be part of the problem
AK	14	4.6.1	Keith Romaine	Moriches Bay Civic Association	17,000 acres in extent
AL	2	4.6.1	Bob McAlevy		Plan says it's okay to dig up marshes
BD	20	4.6.1	Kasey Jacobs	Citizens Campaign for the Environment	OMWM is not synonymous with restoration
BI	7	4.6.1	Kevin McAllister	Peconic Baykeeper	Plan calls for transition from ditch maintenance to OMWM
BI	8	4.6.1	Kevin McAllister	Peconic Baykeeper	OMWM pretends to be wetlands restoration
BI	9	4.6.1	Kevin McAllister	Peconic Baykeeper	Lots of means to conduct OMWM
BV	2	4.6.1	Bob McAlevy		Ponds are part of OMWM
BV	7	4.6.1	Bob McAlevy		NYSDEC is interested in restoration programs
G	16	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	Screening committee is weighted towards governmental entities, not conservationists
G	17	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	15 acres size may lead to loopholes
I	41	4.6.2	James King	Town of Southold Town Trustees	Experts/conservationists on Steering committee
I	42	4.6.2	James King	Town of Southold Town Trustees	Town/Town trustees on committee
J	7	4.6.2	Fred Anders	NYSDOS	Will participate in the wetlands subcommittee
J	8	4.6.2	Fred Anders	NYSDOS	Will participate in the Screening Committee
P	50	4.6.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	All projects reviewed by Screening Committee
P	51	4.6.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	15 acre size criteria not best

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	52	4.6.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Leaves out BMPs 9 and 6
P	53	4.6.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Size criteria could lead to project segmentation to avoid reviews
P	54	4.6.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Change the composition of the Screening Committee (add 2 more environmental NGOs)
Q	12	4.6.2	Nicole Maher et al	COPOPAW	Amend Screening Committee membership (4 environmental non-profits and 3 estuary reps)
Q	15	4.6.2	Nicole Maher et al	COPOPAW	Change in composition will add scientific expertise
Q	16	4.6.2	Nicole Maher et al	COPOPAW	Change in composition will change focus to wetlands health
Q	17	4.6.2	Nicole Maher et al	COPOPAW	Screening Committee should have written notice of all projects
Q	19	4.6.2	Nicole Maher et al	COPOPAW	Screening Committee should evaluate design of all projects
Q	20	4.6.2	Nicole Maher et al	COPOPAW	Screening Committee should evaluate monitoring protocols
Q	21	4.6.2	Nicole Maher et al	COPOPAW	Evaluate projects for ecological restoration
Q	22	4.6.2	Nicole Maher et al	COPOPAW	Evaluate projects for mosquito control effectiveness
Q	23	4.6.2	Nicole Maher et al	COPOPAW	Reject projects that damage marsh health
Q	24	4.6.2	Nicole Maher et al	COPOPAW	Determine which projects require no further review
Q	35	4.6.2	Nicole Maher et al	COPOPAW	County should create a Wetlands Recovery Project
Q	36	4.6.2	Nicole Maher et al	COPOPAW	Set objectives for acquisition, restoration, and enhancement of coastal wetlands
Q	37	4.6.2	Nicole Maher et al	COPOPAW	Secure funding from state, federal, local, or private sectors
Q	38	4.6.2	Nicole Maher et al	COPOPAW	Collaborative, effort with multiple stakeholders
Q	39	4.6.2	Nicole Maher et al	COPOPAW	Use scientific principles, and focus on wetlands health
R	5	4.6.2	Unidentified	COPOPAW (?)	Screening Committee can consider non-vector control projects
R	6	4.6.2	Unidentified	COPOPAW (?)	Screening Committee can refine wetlands planning
R	7	4.6.2	Unidentified	COPOPAW (?)	Screening Committee can reject proposed projects
R	8	4.6.2	Unidentified	COPOPAW (?)	Screening Committee will include 2 non-profit reps, and 3 estuary program reps
AG	68	4.6.1	John Pavacic	NYSDEC	Reduce the acreage threshold for water management projects to 10 acres to match well-established Type I threshold
AG	109	4.6.2	John Pavacic	NYSDEC	NYSDEC to participate on Screening Committee
AG	129	4.6.2	John Pavacic	NYSDEC	Permit holder must be landowner
AG	138	4.6.2	John Pavacic	NYSDEC	Correct Figure 1 (Wetlands Management Plan)
AG	140	4.6.2	John Pavacic	NYSDEC	Screening Committee membership may require permission of the Governor/NYSDEC Commissioner
AG	141	4.6.2	John Pavacic	NYSDEC	Concerns regarding role as regulator will conflict with Steering Committee membership
AG	142	4.6.2	John Pavacic	NYSDEC	Steering Subcommittee to review project monitoring information
AJ	13	4.6.2	Joy Squires	Huntington Conservation Board	Supports a cooperative marsh restoration program for Town marshes
AS	6	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee composition should be changed
AS	7	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee given notice of all projects
AS	8	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee have discretion to concentrate on projects of real concern

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AS	9	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee should evaluate past and on-going studies
AS	10	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee review monitoring protocols
AS	11	4.6.2	Nicole Maher	Nature Conservancy	Screening Committee determine effectiveness of projects for mosquito control and ecological restoration
AS	16	4.6.2	Nicole Maher	Nature Conservancy	Plan currently calls for a comprehensive marsh management plan
AS	17	4.6.2	Nicole Maher	Nature Conservancy	Need something more: a wetlands recovery project
AS	18	4.6.2	Nicole Maher	Nature Conservancy	Wetlands Recovery Project should set goals for acquisition, restoration and enhancement of local wetlands
AS	19	4.6.2	Nicole Maher	Nature Conservancy	Should secure funding
AS	20	4.6.2	Nicole Maher	Nature Conservancy	Be science based, and collaborative
AW	9	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	Screening committee is weighted towards governmental entities, not conservationists
AW	10	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	15 acres size may lead to loopholes
BA	22	4.6.2	Adrienne Esposito	Citizens Campaign for the Environment	Change composition of Screening Committee
BA	23	4.6.2	Adrienne Esposito	Citizens Campaign for the Environment	Site review criteria of 15 acres is arbitrary
BA	27	4.6.2	Adrienne Esposito	Citizens Campaign for the Environment	Screening Committee needs to examine projects case-by-case
BC	9	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	Screening committee is weighted towards governmental entities, not conservationists
BC	10	4.6.2	Lawrence Merryman	Great South Bay Audubon Society	15 acres size may lead to loopholes
C	5	4.6.3	Richard Mendelman		BMP 14 has to define fill
C	6	4.6.3	Richard Mendelman		BMP 15 improperly uses "spoil"
C	7	4.6.3	Richard Mendelman		Fill should not be a liability
Q	18	4.6.3	Nicole Maher et al	COPOPAW	BMPs 6, 7, 9 are controversial
AG	159	4.6.3	John Pavacic	NYSDEC	Reassess impact level of BMPs 7 & 9
AG	172	4.6.3	John Pavacic	NYSDEC	What materials would fill marsh ditches?
AR	7	4.6.3	Heather Cusack	Southold Trustees	Would support marsh restoration projects involving ditch plugging
AR	11	4.6.3	Heather Cusack	Southold Trustees	Enlarging culverts better than pond creation
AR	12	4.6.3	Heather Cusack	Southold Trustees	Natural reversion better than pond creation
A	2	4.6.4	Paul Capotosto	Connecticut DEP	BMPs are good
A	3	4.6.4	Paul Capotosto	Connecticut DEP	Connecticut has been using BMPs for 20 years with negligible impacts
B	1	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Water management (OMWM) plans are not restoration plans but total marsh degradation plans
B	2	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	OMWM will increase salt water in high marsh

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
B	3	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	More salt water will destroy nesting populations of rare and endangered birds, destroy rare plants, increase water levels on adjoining property owners land
B	4	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Salt marshes hold back storm and tidal surges
B	5	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Salt marshes mitigate sea level rise
B	6	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Any interference in salt marshes will affect sea level rise mitigation
B	7	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Physical changes do not increase biodiversity but threaten existing diversity
B	8	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Marshes filter upland pollutants
B	9	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	Less marsh means less filtering
B	10	4.6.4	Eileen Schwinn et al	Eastern Long Island Audubon Society	OMWM will degrade a valuable ecological community
E	13	4.6.4	Edward Romaine	Suffolk County Legislature	Ponds and channels will change marsh hydrology
E	14	4.6.4	Edward Romaine	Suffolk County Legislature	Ponds and channels could have negative ecological effect
E	15	4.6.4	Edward Romaine	Suffolk County Legislature	Mosquito control efficacy unproven
E	16	4.6.4	Edward Romaine	Suffolk County Legislature	Marsh substrate filters pollutants
E	17	4.6.4	Edward Romaine	Suffolk County Legislature	Marshes are sponges, absorb water from rains and road runoff
E	18	4.6.4	Edward Romaine	Suffolk County Legislature	Marshes protect shoreline from storms
E	19	4.6.4	Edward Romaine	Suffolk County Legislature	SSER has lost 35% of its marshes since the 1930s
E	20	4.6.4	Edward Romaine	Suffolk County Legislature	OMWM may reduce marsh filtering capabilities
E	21	4.6.4	Edward Romaine	Suffolk County Legislature	Machines will damage marsh
E	26	4.6.4	Edward Romaine	Suffolk County Legislature	May impact current marsh species
F	8	4.6.4	MaryLaura Lamont		Marshes hold back storms and tides
F	9	4.6.4	MaryLaura Lamont		Marsh management is intended to destroy high marsh
G	3	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Will dig up peat that required centuries to accumulate
G	4	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Salt marshes filter contaminants from run-off
G	5	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Digging holes in the marsh will reduce filtration
G	9	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds restores wetlands
G	13	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
G	14	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Deeply dug ponds cannot promote wading bird use
G	15	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Area of filled ditches does not equal excavated area of ponds & channels
G	22	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Rising sea levels and hurricane activities argue against experimentation in salt marshes
G	23	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Foolhardy to reduce salt marshes
G	25	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM will be damaging
I	5	4.6.4	James King	Town of Southold Town Trustees	Ponds reduce wetlands vegetation
I	6	4.6.4	James King	Town of Southold Town Trustees	Ponds increase construction impacts
I	7	4.6.4	James King	Town of Southold Town Trustees	Marsh disturbances may bring in Phragmites
I	8	4.6.4	James King	Town of Southold Town Trustees	Decrease existing habitat for marsh birds
I	10	4.6.4	James King	Town of Southold Town Trustees	May cause more problems than 1930s ditching
I	11	4.6.4	James King	Town of Southold Town Trustees	Ponds fragment marsh habitat
I	13	4.6.4	James King	Town of Southold Town Trustees	Great deal of marsh loss recently
I	14	4.6.4	James King	Town of Southold Town Trustees	Causes of recent marsh loss is not well known
J	1	4.6.4	Fred Anders	NYSDOS	Baseline data on ecological risks associated with BMP 8 is not presented
J	2	4.6.4	Fred Anders	NYSDOS	Baseline data on Class III BMPs not presented
L	1	4.6.4	William Meredith	Delaware DNREC	OMWM practiced in Delaware since 1979
L	11	4.6.4	William Meredith	Delaware DNREC	Care required to avoid vegetation community impacts
L	12	4.6.4	William Meredith	Delaware DNREC	Open systems can "dewater" marshes
L	13	4.6.4	William Meredith	Delaware DNREC	Excessive spoil deposition can hinder vegetation recovery
L	14	4.6.4	William Meredith	Delaware DNREC	Excessive spoil deposition can raise marsh surface elevation
L	15	4.6.4	William Meredith	Delaware DNREC	Vegetation usually recovers in 1-2 seasons
L	18	4.6.4	William Meredith	Delaware DNREC	OMWM never exacerbates wetland loss due to sea level rise
L	19	4.6.4	William Meredith	Delaware DNREC	Created surface water limited to 3-5% of marsh
L	20	4.6.4	William Meredith	Delaware DNREC	No evidence small ponds contribute to salt marsh erosion
L	21	4.6.4	William Meredith	Delaware DNREC	Installation of ponds not marsh loss, but habitat conversion
L	23	4.6.4	William Meredith	Delaware DNREC	Benefits waterfowl, shorebird, and wading bird populations

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
L	24	4.6.4	William Meredith	Delaware DNREC	Creates good fish and aquatic invertebrate habitat
L	25	4.6.4	William Meredith	Delaware DNREC	Restoration of lost habitat type
L	26	4.6.4	William Meredith	Delaware DNREC	Careful installations natural looking and aesthetically pleasing
L	27	4.6.4	William Meredith	Delaware DNREC	Delaware has treated 7000 acres of marsh, predominantly high marsh
L	28	4.6.4	William Meredith	Delaware DNREC	Variety of property owners – federal, state, private
L	30	4.6.4	William Meredith	Delaware DNREC	Delaware Division of Fish and Wildlife endorses OMWM
N	3	4.6.4	Matthew Atkinson	Peconic Baykeeper	Peer reviews show greater than disclosed impacts
N	4	4.6.4	Matthew Atkinson	Peconic Baykeeper	Previous comments show greater than disclosed impacts
N	24	4.6.4	Matthew Atkinson	Peconic Baykeeper	OMWM presented as a panacea
O	3	4.6.4	Ron Rosza		Ditches change marsh hydrology because they are connected to the estuary, rise and fall with tide, and promote draining of pools and pannes
O	7	4.6.4	Ron Rosza		CT restoration seeks to return pools and ponds lost to ditching
O	8	4.6.4	Ron Rosza		Tidal flow return results in pannes – waiting for pools.
O	9	4.6.4	Ron Rosza		Use historic aerials to determine ponds
O	10	4.6.4	Ron Rosza		Adamowicz studied natural pools in New England
O	11	4.6.4	Ron Rosza		CT. experimenting with pond excavation and filling ditches
O	12	4.6.4	Ron Rosza		Guilford: plugged all ditches – a mistake
O	13	4.6.4	Ron Rosza		Quinnipiac: left every 3rd ditch open
O	14	4.6.4	Ron Rosza		Lower CT River: restore tidal hydrology by ditch plugging to control Phragmites and shift drainage to tidal creek remnants
O	17	4.6.4	Ron Rosza		Will ponds return to restored marshes?
P	63	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Use SCERP research when discussing ditch impacts
P	64	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	SCERP analyzed nutrient runoff (particularly N) in numerous LI marshes
P	65	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	SCERP analyzed FC from open and closed ditches
P	66	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	SCERP analyzed ditches for conduits of N and fecal coliform
P	67	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	SCERP results contradict Cashin Associates results
P	68	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	SCERP research provides site-specific supplement to general literature search
P	69	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Mosquito ditches account for ~25% of N to the southern portion of Flanders Bay, 10% of N to whole Bay
P	83	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Plan may not result in ecological health improvements
P	85	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	No peer-reviewed work citing ecological improvements from OMWM

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	86	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	No long-term studies documenting impact on overall marsh attributes
P	87	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Many professionals refer to OMWM as experimental
P	91	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Literature cites lack of understanding of salt marsh functions
P	97	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	OMWM silver bullet
P	98	4.6.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Large-scale OMWM projects lack scientific support at this time
Q	13	4.6.4	Nicole Maher et al	COPOPAW	Debate among reputable scientists regarding OMWM impacts
S	39	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	Plan may not result in ecological health improvements
S	41	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	No peer-reviewed work citing ecological improvements from OMWM
S	42	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	No long-term studies documenting impact on overall marsh attributes
S	43	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	Many professionals refer to OMWM as experimental
S	47	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	Literature cites lack of understanding of salt marsh functions
S	51	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	OMWM silver bullet
S	52	4.6.4	Citizens Campaign for the Environment et al	COPOPAW	Large-scale OMWM projects lack scientific support at this time
U	73	4.6.4	Peer Reviewer #2		Conceptually: good, but unable to critique it technically
Y	5	4.6.4	Michael Horst		PSA selection query
Y	10	4.6.4	Michael Horst		Blue crabs share habitat with mosquitoes
AD	6	4.6.4	Enrico Nardone	Seatuck Environmental Association	Therefore, impact discussion is blurred by the inclusion of other marsh restoration activities
AD	7	4.6.4	Enrico Nardone	Seatuck Environmental Association	Understand there is little scientific rigor associated with OMWM
AD	8	4.6.4	Enrico Nardone	Seatuck Environmental Association	Therefore, the blending of mosquito control with other techniques hides this lack of information
AD	10	4.6.4	Enrico Nardone	Seatuck Environmental Association	DGEIS refers to restoration studies
AD	11	4.6.4	Enrico Nardone	Seatuck Environmental Association	DGEIS refers to non-peered reviewed articles

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AD	12	4.6.4	Enrico Nardone	Seatuck Environmental Association	DGEIS cites personal inspections of NJ projects
AD	13	4.6.4	Enrico Nardone	Seatuck Environmental Association	Wolfe is a review paper
AD	14	4.6.4	Enrico Nardone	Seatuck Environmental Association	Use of statement from USFWS scientist
AD	15	4.6.4	Enrico Nardone	Seatuck Environmental Association	Lack of citation for bird use of ponds compared to ditches
AD	16	4.6.4	Enrico Nardone	Seatuck Environmental Association	Maryland stopped OMWM due to negative impacts to hydrology
AD	17	4.6.4	Enrico Nardone	Seatuck Environmental Association	MD stopped OMWM due to concerns regarding black rail habitat
AD	21	4.6.4	Enrico Nardone	Seatuck Environmental Association	Great majority believe OMWM is highly praised by mosquito control officials
AD	22	4.6.4	Enrico Nardone	Seatuck Environmental Association	Great majority believe it has not been sufficiently studied
AD	23	4.6.4	Enrico Nardone	Seatuck Environmental Association	A great deal believe it has caused considerable damage to the health of marshes
AE	1	4.6.4	M. Bertness et al		Tidal wetlands are inherently complex systems
AE	2	4.6.4	M. Bertness et al		Often misunderstood hydrological regimes
AE	3	4.6.4	M. Bertness et al		Reliance on OMWM is a concern
AE	9	4.6.4	M. Bertness et al		Very little is known about its long-term impacts
AE	10	4.6.4	M. Bertness et al		Scientific literature contains no comprehensive studies of OMWM
AE	11	4.6.4	M. Bertness et al		USGS/USFWS study had mixed results
AE	12	4.6.4	M. Bertness et al		Based on current understanding of marsh hydrology OMWM does nothing to restore lost ecological functions
AE	13	4.6.4	M. Bertness et al		Based on current understanding of marsh ecology OMWM does nothing to restore lost ecological functions
AE	14	4.6.4	M. Bertness et al		There are concerns that structural changes associated with OMWM lead to unnatural alterations of salt marsh functions
AE	15	4.6.4	M. Bertness et al		OMWM is unproven and experimental
AE	17	4.6.4	M. Bertness et a		OMWM may do more harm than good to Suffolk County marshes
AG	3	4.6.4	John Pavacic	NYSDEC	Tables present information well
AG	6	4.6.4	John Pavacic	NYSDEC	Marshes breeding mosquitoes may be functioning well
AG	35	4.6.4	John Pavacic	NYSDEC	Killifish focus should include other finfish
AG	53	4.6.4	John Pavacic	NYSDEC	Refine explanation of USEPA Phase II
AG	78	4.6.4	John Pavacic	NYSDEC	Expand the background discussion of marsh loss found on pp. 488-489
AG	79	4.6.4	John Pavacic	NYSDEC	Expand discussion of Natural Heritage reference marshes (page 500)
AG	81	4.6.4	John Pavacic	NYSDEC	Matthew Draud (Post) has information on diamondback terrapins (particularly juveniles)

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AG	87	4.6.4	John Pavacic	NYSDEC	Vegetation balance for LI ditch plug sites
AG	89	4.6.4	John Pavacic	NYSDEC	Why is McKay Lake listed as a coastal plain pond
AG	90	4.6.4	John Pavacic	NYSDEC	Add maps and aerials of each PSA and the Wertheim site
AG	91	4.6.4	John Pavacic	NYSDEC	Why no DO data for Captree Island West
AG	92	4.6.4	John Pavacic	NYSDEC	Address discrepancies between data tables for Pepperidge Hall and the text (salinities, DO, temperature)
AG	93	4.6.4	John Pavacic	NYSDEC	Provide aerials with transects for the Wertheim-Seatuck retrospective
AG	94	4.6.4	John Pavacic	NYSDEC	Put data for Wertheim-Seatuck retrospective in tabular form
AG	98	4.6.4	John Pavacic	NYSDEC	Marsh loss in Jamaica Bay has not been sudden
AG	99	4.6.4	John Pavacic	NYSDEC	Water management must not exacerbate marsh loss trends
AG	102	4.6.4	John Pavacic	NYSDEC	BMP 14 should discuss the potential loss of habitat associated with filling ditches
AG	112	4.6.1	John Pavacic	NYSDEC	Expand discussion of impacts to all State functions and values
AG	119	4.6.4	John Pavacic	NYSDEC	OMWM improving fish habitat is speculative/unsupported statement
AG	146	4.6.4	John Pavacic	NYSDEC	How OMWM will enhance fish habitat is not specified
AG	147	4.6.4	John Pavacic	NYSDEC	No studies showing fish population enhancement under OMWM are cited
AG	148	4.6.4	John Pavacic	NYSDEC	Won't reversion allow for fish enhancement
AG	149	4.6.4	John Pavacic	NYSDEC	Marsh loss has been documented by NYSDEC in sites other than Jamaica Bay
AG	150	4.6.4	John Pavacic	NYSDEC	Water management projects possibly may lead to loss of vegetated marsh
AG	154	4.6.4	John Pavacic	NYSDEC	Assessments focus disproportionately on insect-consuming fish
AG	155	4.6.4	John Pavacic	NYSDEC	Expand impact assessment to address other fish utilizing creeks, ditches, marsh fringes
AG	156	4.6.4	John Pavacic	NYSDEC	Expand Fundulus spp. biology discussions
AG	157	4.6.4	John Pavacic	NYSDEC	Impacts on Fundulus trapped on marsh surface
AG	160	4.6.4	John Pavacic	NYSDEC	Spurs & ponds may trap certain larval/juvenile fish on marsh causing mortalities
AG	161	4.6.4	John Pavacic	NYSDEC	Larger ponds may create bad habitat for fish
AG	165	4.6.4	John Pavacic	NYSDEC	That ditching leads to a monoculture appearance should be taken out of the BMP manual
AG	166	4.6.4	John Pavacic	NYSDEC	Low marshes are a monoculture of S. alterniflora
AG	167	4.6.4	John Pavacic	NYSDEC	Spur ditches may create unfavorable habitat for other fish
AG	168	4.6.4	John Pavacic	NYSDEC	Discuss role of potholes and pannes in marsh ecology
AG	169	4.6.4	John Pavacic	NYSDEC	Expand discussion of LI Marsh deficiencies in surface waters
AG	170	4.6.4	John Pavacic	NYSDEC	Ditch plugs do not create optimal fish habitat
AG	171	4.6.4	John Pavacic	NYSDEC	Ditch plugs do not create optimal invertebrate habitat
AI	15	4.6.4	Roger Wolfe	CT DEP	OMWM is not a panacea
AI	23	4.6.4	Roger Wolfe	CT DEP	OMWM sites are being used by water birds
AI	24	4.6.4	Roger Wolfe	CT DEP	OMWM sites are being used by invertebrates
AI	25	4.6.4	Roger Wolfe	CT DEP	OMWM sites are being used by fish
AK	15	4.6.4	Keith Romaine	Moriches Bay Civic Association	Ponds and channels will change marsh hydrology
AK	16	4.6.4	Keith Romaine	Moriches Bay Civic Association	Ponds and channels could have negative ecological effect

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AK	17	4.6.4	Keith Romaine	Moriches Bay Civic Association	Mosquito control efficacy unproven
AK	18	4.6.4	Keith Romaine	Moriches Bay Civic Association	Marsh substrate filters pollutants
AK	19	4.6.4	Keith Romaine	Moriches Bay Civic Association	Marshes are sponges, absorb water from rains and road runoff
AK	20	4.6.4	Keith Romaine	Moriches Bay Civic Association	Marshes protect shoreline from storms
AK	21	4.6.4	Keith Romaine	Moriches Bay Civic Association	SSER has lost 35% of its marshes since the 1930s
AK	22	4.6.4	Keith Romaine	Moriches Bay Civic Association	OMWM may reduce marsh filtering capabilities
AK	23	4.6.4	Keith Romaine	Moriches Bay Civic Association	Machines will damage marsh
AK	28	4.6.4	Keith Romaine	Moriches Bay Civic Association	May impact current marsh species
AM	3	4.6.4	Georgeanne Spates		Dredging in upper marsh will destroy peat
AM	4	4.6.4	Georgeanne Spates		Dredging in upper marsh will destroy grasses
AM	5	4.6.4	Georgeanne Spates		Dredging in upper marsh will destroy ribbed mussels
AM	6	4.6.4	Georgeanne Spates		Peat, grasses, mussels are basis of marsh filtration
AM	7	4.6.4	Georgeanne Spates		Impacts from construction
AM	12	4.6.4	Georgeanne Spates		Plan is flawed since some municipalities have dropped OMWM
AN	1	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Water management (OMWM) plans are not restoration plans but total marsh degradation plans
AN	2	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	OMWM will increase salt water in high marsh
AN	3	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	More salt water will destroy nesting populations of rare and endangered birds, destroy rare plants, increase water levels on adjoining property owners land
AN	4	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Salt marshes hold back storm and tidal surges
AN	5	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Salt marshes mitigate sea level rise
AN	6	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Any interference in salt marshes will affect sea level rise mitigation
AN	7	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Physical changes do not increase biodiversity but threaten existing diversity
AN	8	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Marshes filter upland pollutants
AN	9	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	Less marsh means less filtering
AN	10	4.6.4	Eileen Schwinn	Eastern LI Audubon Society	OMWM will degrade a valuable ecological community
AO	6	4.6.4	Matthew Atkinson	Peconic Baykeeper	Plan states OMWM is a good thing
AO	7	4.6.4	Matthew Atkinson	Peconic Baykeeper	OMWM improves wetlands
AO	9	4.6.4	Matthew Atkinson	Peconic Baykeeper	Papers with peer review and scientific impartiality are ambivalent
AO	10	4.6.4	Matthew Atkinson	Peconic Baykeeper	Papers with peer review and scientific impartiality find it is hard to assess impacts
AO	12	4.6.4	Matthew Atkinson	Peconic Baykeeper	Dug 600 miles of ditches and it didn't work at controlling mosquitoes
AP	1	4.6.4	Kevin McAllister	Peconic Baykeeper	Since 1930s lost 38% of wetlands in SSER

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AP	2	4.6.4	Kevin McAllister	Peconic Baykeeper	Since 1974 lost 7%
AP	3	4.6.4	Kevin McAllister	Peconic Baykeeper	Losses due primarily to dredging and filling
AP	4	4.6.4	Kevin McAllister	Peconic Baykeeper	Grid ditching causes damage to biofiltration
AP	5	4.6.4	Kevin McAllister	Peconic Baykeeper	Grid ditching alters hydrology
AP	6	4.6.4	Kevin McAllister	Peconic Baykeeper	Grid ditching alters habitat type
AP	7	4.6.4	Kevin McAllister	Peconic Baykeeper	Plan calls for removal of 1,000 year old peat
AP	8	4.6.4	Kevin McAllister	Peconic Baykeeper	Plan calls for loss of biomass
AP	9	4.6.4	Kevin McAllister	Peconic Baykeeper	Plan calls for loss of biofiltration
AQ	4	4.6.4	Tom Stock		Dredging large ponds will affect marshes ability to absorb storm energy
AQ	5	4.6.4	Tom Stock		Taking away even one inch impacts people living along the shoreline
AR	2	4.6.4	Heather Cusack	Southold Trustees	Plan will cause a lot of impact to the marshes
AR	3	4.6.4	Heather Cusack	Southold Trustees	Habitat would be destroyed
AR	4	4.6.4	Heather Cusack	Southold Trustees	Marshes would be changed
AR	5	4.6.4	Heather Cusack	Southold Trustees	Ponds would break up marsh
AR	6	4.6.4	Heather Cusack	Southold Trustees	Fragmented marsh decreases habitat for marsh birds
AR	8	4.6.4	Heather Cusack	Southold Trustees	Ditch plugs retain water, do not allow marsh to dry out
AR	10	4.6.4	Heather Cusack	Southold Trustees	Ditch plugs allow for reestablishment of Spartina
AW	2	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds restores wetlands
AW	3	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds controls salt marsh mosquitoes
AW	6	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance
AW	7	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Deeply dug ponds cannot promote wading bird use
AW	8	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Area of filled ditches does not equal excavated area of ponds & channels
AW	15	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Rising sea levels and hurricane activities argue against experimentation in salt marshes
AW	16	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Foolhardy to reduce salt marshes
AW	18	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM will be damaging
BC	2	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds restores wetlands
BC	3	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds controls salt marsh mosquitoes
BC	6	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long Island Audubon believes OMWM ponds do not promote restoration but further marsh disturbance

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
BC	7	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Deeply dug ponds cannot promote wading bird use
BC	8	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Area of filled ditches does not equal excavated area of ponds & channels
BC	15	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Rising sea levels and hurricane activities argue against experimentation in salt marshes
BC	16	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Foolhardy to reduce salt marshes
BC	18	4.6.4	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM will be damaging
BD	11	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	Use 2005 SCERP research for ditch and other marsh modification impact assessment
BD	12	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	SCERP analyzed numerous LI marshes
BD	13	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	Research analyzed nutrient runoff (particularly N)
BD	14	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	Research analyzed fecal coliform for open and closed ditches
BD	15	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	Found that the draining of mosquito ditches accounts for 1200 moles of N per day (25% of the load to the southern portion of the Bay and 10% to the whole Bay)
BD	16	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	Plugging of ditches can eliminate this flow
BD	18	4.6.4	Kasey Jacobs	Citizens Campaign for the Environment	OMWM may have similar problems conveying pollutants to the estuary
BI	1	4.6.4	Kevin McAllister	Peconic Baykeeper	Have lost 38% of south shore marshes since 1938
BI	2	4.6.4	Kevin McAllister	Peconic Baykeeper	Have lost 6.6% since 1974, due mainly to dredging and filling
BI	3	4.6.4	Kevin McAllister	Peconic Baykeeper	SCERP report substantiates Baykeeper position (held since 2001)
BI	4	4.6.4	Kevin McAllister	Peconic Baykeeper	SCERP report author is Professor Gobler
BI	5	4.6.4	Kevin McAllister	Peconic Baykeeper	SCERP found ditches convey nitrogen
BI	6	4.6.4	Kevin McAllister	Peconic Baykeeper	SCERP found ditches convey fecal coliform
BI	11	4.6.4	Kevin McAllister	Peconic Baykeeper	Not warranted to exchange general ditch maintenance for digging holes in the marsh
BI	12	4.6.4	Kevin McAllister	Peconic Baykeeper	Cannot lose marshes to dredging
BI	13	4.6.4	Kevin McAllister	Peconic Baykeeper	Cannot diminish retention time and increase conveyance
BI	14	4.6.4	Kevin McAllister	Peconic Baykeeper	Ponds will export
BI	15	4.6.4	Kevin McAllister	Peconic Baykeeper	Sinuous channels will export
BI	16	4.6.4	Kevin McAllister	Peconic Baykeeper	Every square inch of peat needed for flood attenuation
BV	8	4.6.4	Bob McAlevy		Concerned about activities that could degrade wetlands
M	1	4.6.5	Deborah Long	USFWS	Larval control conducted at Wertheim

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
M	2	4.6.5	Deborah Long	USFWS	USFWS guidance calls for reducing mosquito-associated health threats with IPM, including practical, compatible non-pesticide actions to reduce mosquito production, that give consideration to non-target organisms and communities
M	3	4.6.5	Deborah Long	USFWS	Partner with the County to: restore natural hydrology, reduce the need for pesticides, and increase diversity to benefit fish and wildlife
M	4	4.6.5	Deborah Long	USFWS	Project size = 80 acres; project footprint = 20 acres (including staging areas)
M	5	4.6.5	Deborah Long	USFWS	OMWM included: dredging small ponds in areas of highest mosquito breeding
M	6	4.6.5	Deborah Long	USFWS	OMWM included: constructing sinusoidal creeks to mimic natural creeks and maintain flow to ponds
M	7	4.6.5	Deborah Long	USFWS	OMWM included: filling/grading ditches to restore hydrology
M	8	4.6.5	Deborah Long	USFWS	OMWM included: grading small areas of existing high marsh that was in decline
M	9	4.6.5	Deborah Long	USFWS	County has collected pre- and post-construction data at two sites and two control areas, including mosquito breeding across the Refuge
M	10	4.6.5	Deborah Long	USFWS	Construction in Area 1: March 2005 and March 2006 (minor adjustments); in Area 2: February-March 2006
M	11	4.6.5	Deborah Long	USFWS	Revegetation in all but most disturbed parts
M	12	4.6.5	Deborah Long	USFWS	Plants in construction area are salt marsh and brackish marsh plants
M	13	4.6.5	Deborah Long	USFWS	Phragmites extent greatly reduced (especially in Area 1)
M	14	4.6.5	Deborah Long	USFWS	Larval production reduced
M	15	4.6.5	Deborah Long	USFWS	Need for larvicides reduced
M	16	4.6.5	Deborah Long	USFWS	Mummichogs in large numbers found in sampling and by observation in ponds
M	17	4.6.5	Deborah Long	USFWS	Mummichogs, sheepshead minnows, and silversides in channels
M	18	4.6.5	Deborah Long	USFWS	Numerous shorebird, wading bird, and waterfowl use of Areas 1 and 2 post construction
M	19	4.6.5	Deborah Long	USFWS	RTE species spotted post-construction (black rail, northern harrier, short-eared owl, and black skimmer)
M	20	4.6.5	Deborah Long	USFWS	County has committed to long-term monitoring of the site
M	21	4.6.5	Deborah Long	USFWS	Monitoring should provide information on long-term effects
P	88	4.6.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Useful to demonstrate SCVC technical/logistical abilities
P	89	4.6.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Too early to draw any conclusions
S	44	4.6.5	Citizens Campaign for the Environment et al	COPOPAW	Useful to demonstrate SCVC technical/logistical abilities
S	45	4.6.5	Citizens Campaign for the Environment et al	COPOPAW	Too early to draw any conclusions
AG	17	4.6.5	John Pavacic	NYSDEC	Premature to say action was a "restoration."
AG	23	4.6.5	John Pavacic	NYSDEC	"Jury still out" as to whether Wertheim alterations have long-term benefits
AG	38	4.6.5	John Pavacic	NYSDEC	Broader discussion of project design history needed
AG	95	4.6.5	John Pavacic	NYSDEC	Premature to say natural resource values have improved
AG	96	4.6.5	John Pavacic	NYSDEC	Construction of ponds constitutes an alteration not restoration
AG	97	4.6.5	John Pavacic	NYSDEC	Increased surface water on marsh is not necessarily beneficial

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AG	113	4.6.5	John Pavacic	NYSDEC	Expand discussion of the project redesign and permit acquisition at Wertheim
AG	127	4.6.5	John Pavacic	NYSDEC	References to Wertheim as a progressive and holistic approach to water management are inappropriate
AG	128	4.6.5	John Pavacic	NYSDEC	Complete post-project data needed before assessing project
AG	130	4.6.5	John Pavacic	NYSDEC	Scope of monitoring
BV	4	4.6.5	Bob McAlevy		Showed plan could reduce pesticides and control mosquitoes
J	6	4.6.6	Fred Anders	NYSDOS	No substantive details regarding project monitoring except will be in Annual Strategy Plans
AG	14	4.6.6	John Pavacic	NYSDEC	Remote sensing good tool if used frequently enough
AG	15	4.6.6	John Pavacic	NYSDEC	Remote sensing needs field verification
AG	18	4.6.6	John Pavacic	NYSDEC	Remote sensing has not been shown to be effective yet
AG	24	4.6.6	John Pavacic	NYSDEC	Major water management actions require monitoring
AG	39	4.6.6	John Pavacic	NYSDEC	No data received on past projects, hindering ability to determine effectiveness of past projects, and to limit monitoring needs for future projects
AG	40	4.6.6	John Pavacic	NYSDEC	Accumulation of project information may lead to streamlined project review process
AG	80	4.6.6	John Pavacic	NYSDEC	Proposed marsh health indices should only be understood to be a starting point for discussion
AG	85	4.6.6	John Pavacic	NYSDEC	More details desired on project monitoring
AG	100	4.6.6	John Pavacic	NYSDEC	NYSDEC will not participate in project monitoring
AG	104	4.6.6	John Pavacic	NYSDEC	All reversion sites need to be closely monitored
AG	131	4.6.6	John Pavacic	NYSDEC	Scope of monitoring
AG	137	4.6.6	John Pavacic	NYSDEC	Monitoring of projects sufficient to ensure project success is necessary
AG	139	4.6.6	John Pavacic	NYSDEC	Suffolk County also always has monitoring responsibility?
AG	144	4.6.6	John Pavacic	NYSDEC	Include more specific discussion of remote sensing
AG	145	4.6.6	John Pavacic	NYSDEC	Fish other than killifish should be monitored for
AG	162	4.6.6	John Pavacic	NYSDEC	Pre-project monitoring should include surveys of fish & wildlife, especially for RTE species
AO	13	4.6.6	Matthew Atkinson	Peconic Baykeeper	Program should be based on conducting small projects with 5 years pre-project study and 5 years post project study
C	9	4.6.7	Richard Mendelman		Urges use of modeling for projects
E	7	4.6.7	Edward Romaine	Suffolk County Legislature	Modifications to wetlands only to fix past ditching projects
E	8	4.6.7	Edward Romaine	Suffolk County Legislature	Only to restore marsh health
F	6	4.6.7	MaryLaura Lamont		Mosquito management is not appropriate reason for salt marsh management
F	7	4.6.7	MaryLaura Lamont		Nuisance management not appropriate reason for salt marsh management
I	1	4.6.7	James King	Town of Southold Town Trustees	Support restoration of ditched marshes
I	12	4.6.7	James King	Town of Southold Town Trustees	Ponds inappropriate for Southold marshes
I	15	4.6.7	James King	Town of Southold Town Trustees	Reductions in mosquito habitat not justified because of changes to marsh
I	16	4.6.7	James King	Town of Southold Town Trustees	Reductions in mosquito habitat not justified because of potential damage to marsh

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
I	17	4.6.7	James King	Town of Southold Town Trustees	Follow successful East Hampton model for marsh restoration
I	18	4.6.7	James King	Town of Southold Town Trustees	Use ditch plugging
I	19	4.6.7	James King	Town of Southold Town Trustees	Enlarge culverts
I	20	4.6.7	James King	Town of Southold Town Trustees	Remove dredge spoil along ditches
I	21	4.6.7	James King	Town of Southold Town Trustees	Remove dredge spoil on marshes
I	22	4.6.7	James King	Town of Southold Town Trustees	Allow reversion of ditches
I	23	4.6.7	James King	Town of Southold Town Trustees	Remove Phragmites
J	3	4.6.7	Fred Anders	NYSDOS	No substantive details regarding project consideration except will be in Annual Strategy Plans
J	4	4.6.7	Fred Anders	NYSDOS	No substantive details regarding project design except will be in Annual Strategy Plans
J	5	4.6.7	Fred Anders	NYSDOS	No substantive details regarding project implementation except will be in Annual Strategy Plans
L	29	4.6.7	William Meredith	Delaware DNREC	Bombay Hook NWR exclusion from OMWM (never grid-ditched); implies USFWS endorsement of larviciding
N	12	4.6.7	Matthew Atkinson	Peconic Baykeeper	Emphasis on salt marsh mosquito control
N	22	4.6.7	Matthew Atkinson	Peconic Baykeeper	Water management choices are given as: no water management; maintenance of all ditches; selective ditch maintenance
P	71	4.6.7	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Ditch plugging is warranted in western Peconic Estuary
P	81	4.6.7	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Reservations concerning large scale projects for primary purpose of mosquito control
Q	40	4.6.7	Nicole Maher et al	COPOPAW	Managed by SCDEE
R	3	4.6.7	Unidentified	COPOPAW (?)	Continuing & expanded regional wetlands planning
R	4	4.6.7	Unidentified	COPOPAW (?)	Reducing mosquitoes not paramount project goal, exclusive of biodiversity and wetlands health
S	12	4.6.7	Citizens Campaign for the Environment et al	COPOPAW	Establish clear standards for action
S	37	4.6.7	Citizens Campaign for the Environment et al	COPOPAW	Reservations concerning large scale projects for primary purpose of mosquito control
S	63	4.6.7	Citizens Campaign for the Environment et al	COPOPAW	Marsh management administered by another agency, not SCVC, with a specific mandate towards County biodiversity and ecological health
AG	8	4.6.7	John Pavacic	NYSDEC	Least amount of alteration to control mosquitoes should be preferred course of action in well-functioning marshes
AG	9	4.6.7	John Pavacic	NYSDEC	Need to preserve marsh may outweigh any public health benefits
AG	10	4.6.7	John Pavacic	NYSDEC	Projects weighed on: minimal impacts; sufficient monitoring to ensure goals are met

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AG	11	4.6.7	John Pavacic	NYSDEC	All projects evaluated case-by-case
AG	22	4.6.7	John Pavacic	NYSDEC	Creation of new habitat may be most appropriate, especially in substantially degraded marshes that are breeding mosquitoes
AG	101	4.6.7	John Pavacic	NYSDEC	Restoration of tidal flows is supported
AG	122	4.6.7	John Pavacic	NYSDEC	Project scope dependent on landowner
AG	124	4.6.7	John Pavacic	NYSDEC	Landowner must be involved in all aspects of project development
AG	125	4.6.7	John Pavacic	NYSDEC	Estimate ownership of salt marshes
AG	134	4.6.7	John Pavacic	NYSDEC	When inspecting marshes, report failing structures
AG	151	4.6.7	John Pavacic	NYSDEC	Projects will need to demonstrate that they will not impact finfish diversity or productivity
AG	152	4.6.7	John Pavacic	NYSDEC	NYSDEC is willing to discuss streamlining project reviews that do not result in the generation of insufficient information to properly assess project success or failure
AG	153	4.6.7	John Pavacic	NYSDEC	NYSDEC believes current permit and review system is adequate
AI	16	4.6.7	Roger Wolfe	CT DEP	OMWM cannot be used in every situation
AK	9	4.6.7	Keith Romaine	Moriches Bay Civic Association	Modifications to wetlands only to fix past ditching projects
AK	10	4.6.7	Keith Romaine	Moriches Bay Civic Association	Only to restore marsh health
AR	9	4.6.4	Heather Cusack	Southold Trustees	Done in other Towns in conjunction with dredge spoil removal
AS	21	4.6.7	Nicole Maher	Nature Conservancy	Should be directed by SCDEE
AU	2	4.6.7	Ron McKenna	Fire Island Pines	Would like 3 ditches cleaned
AU	3	4.6.7	Ron McKenna	Fire Island Pines	Apparently depends on a FINS survey
BA	25	4.6.7	Adrienne Esposito	Citizens Campaign for the Environment	Each wetlands system is different
BD	17	4.6.7	Kasey Jacobs	Citizens Campaign for the Environment	Ditch plugging warranted since the PEP CCMP targets the western estuary for N reductions
BH	6	4.6.7	Ronald McKenna	Fire Island Pines Property Owners Association	Not satisfied with lack of ditch maintenance
BH	7	4.6.7	Ronald McKenna	Fire Island Pines Property Owners Association	Depends on FINS approval
BI	10	4.6.7	Kevin McAllister	Peconic Baykeeper	Many techniques warranted on a case-by-case basis
BV	1	4.6.7	Bob McAlevy		Artificial ponds could start appearing in salt marshes under the County plan
A	4	4.6.8	Paul Capotosto	Connecticut DEP	BMPs reduce mosquito populations while minimizing environmental change or enhancing natural resource values
E	22	4.6.8	Edward Romaine	Suffolk County Legislature	No compelling evidence that OMWM will be an effective restoration technique
E	23	4.6.8	Edward Romaine	Suffolk County Legislature	No compelling evidence that OMWM will be effective at absorbing pollutants
E	24	4.6.8	Edward Romaine	Suffolk County Legislature	No compelling evidence that OMWM will be effective at absorbing stormwater
E	25	4.6.8	Edward Romaine	Suffolk County Legislature	No compelling evidence that OMWM will control mosquitoes
F	3	4.6.8	MaryLaura Lamont		Not true that water management necessary to prevent WNV and EEE

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
G	7	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	OMWM efficacy at controlling mosquitoes is unknown
G	10	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	No scientific evidence digging ponds controls salt marsh mosquitoes
G	11	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Wertheim visit – no difference between treated-untreated areas (no mosquitoes)
G	12	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	All mosquito reduction data anecdotal
G	18	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York: water management plan has not been proven effective
G	24	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM are unproven
I	9	4.6.8	James King	Town of Southold Town Trustees	Not enough hard evidence that ponds lead to mosquito control
L	2	4.6.8	William Meredith	Delaware DNREC	OMWM most effective salt marsh mosquito control (based on science and qualitative observations)
L	3	4.6.8	William Meredith	Delaware DNREC	Mosquito control efficacy ~ 95%
L	4	4.6.8	William Meredith	Delaware DNREC	Effective for 15 to 25 years
L	5	4.6.8	William Meredith	Delaware DNREC	OMWM typically lasts 15-25 years
L	6	4.6.8	William Meredith	Delaware DNREC	OMWM removes breeding sites and promotes habitat for larvae-consuming fish
L	7	4.6.8	William Meredith	Delaware DNREC	OMWM eliminates nearly all need for larvicides
L	8	4.6.8	William Meredith	Delaware DNREC	OMWM reduced need for adulticides to nearly 0
L	9	4.6.8	William Meredith	Delaware DNREC	Effects are nearly instantaneous
L	10	4.6.8	William Meredith	Delaware DNREC	OMWM cost effective
L	22	4.6.8	William Meredith	Delaware DNREC	Ponds effective on grid-ditched marshes where ditches dewatered marsh
L	31	4.6.8	William Meredith	Delaware DNREC	OMWM reduces threat of mosquito-borne disease
P	70	4.6.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Plugging ditches can eliminate ditch flow
P	78	4.6.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Long-Term Plan: OMWM will reduce pesticides use
P	79	4.6.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Long-Term Plan: OMWM will restore County marshes
P	80	4.6.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Individual techniques and practices may indeed restore marsh health
P	84	4.6.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	OMWM success in NJ, CT, RI for mosquito control
Q	14	4.6.8	Nicole Maher et al	COPOPAW	Debate among scientists regarding OMWM mosquito control efficacy
S	13	4.6.8	Citizens Campaign for the Environment et al.	COPOPAW	Discuss efficacy of all water management actions

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
S	34	4.6.8	Citizens Campaign for the Environment et al.	COPOPAW	Long-Term Plan: OMWM will reduce pesticides use
S	35	4.6.8	Citizens Campaign for the Environment et al.	COPOPAW	Long-Term Plan: OMWM will restore County marshes
S	36	4.6.8	Citizens Campaign for the Environment et al.	COPOPAW	Individual techniques and practices may indeed restore marsh health
S	40	4.6.8	Citizens Campaign for the Environment et al.	COPOPAW	OMWM success in NJ, CT, RI for mosquito control
U	17	4.6.8	Peer Reviewer #2		Proposed plan is likely to further reduce disease risk based on results in CT and other NE states, although results are not likely to be completely the same
U	18	4.6.8	Peer Reviewer #2		Proposed Plan is likely to reduce salt marsh mosquito populations based on results in CT and other NE states, although results are not likely to be exactly the same
U	24	4.6.8	Peer Reviewer #2		Basis for 75% reduction?
U	74	4.6.8	Peer Reviewer #2		More explanation for the 75% larvicide reduction goal is needed
AD	18	4.6.8	Enrico Nardone	Seatuck Environmental Association	CT program experimental
AD	19	4.6.8	Enrico Nardone	Seatuck Environmental Association	DE would like to conduct long-term studies on impacts
AG	133	4.6.8	John Pavacic	NYSDEC	Citation for truism that mosquitoes are not found where killifish are found
AG	158	4.6.8	John Pavacic	NYSDEC	Discuss increase in mosquito populations at Seatuck
AI	17	4.6.8	Roger Wolfe	CT DEP	Provides effective long-term mosquito control
AI	18	4.6.8	Roger Wolfe	CT DEP	CT has used OMWM for 20 years
AI	19	4.6.8	Roger Wolfe	CT DEP	Eliminated the need to larvicide 2000 acres
AI	20	4.6.8	Roger Wolfe	CT DEP	OMWM in CT still reduces mosquito populations
AI	21	4.6.8	Roger Wolfe	CT DEP	OMWM has reduced pesticide use
AI	22	4.6.8	Roger Wolfe	CT DEP	OMWM has saved money
AK	24	4.6.8	Keith Romaine	Moriches Bay Civic Association	No compelling evidence that OMWM will be an effective restoration technique
AK	25	4.6.8	Keith Romaine	Moriches Bay Civic Association	No compelling evidence that OMWM will be effective at absorbing pollutants
AK	26	4.6.8	Keith Romaine	Moriches Bay Civic Association	No compelling evidence that OMWM will be effective at absorbing stormwater
AK	27	4.6.8	Keith Romaine	Moriches Bay Civic Association	No compelling evidence that OMWM will control mosquitoes
AO	11	4.6.8	Matthew Atkinson	Peconic Baykeeper	Papers with peer review and scientific impartiality find it is impossible to predict mosquito control
AR	1	4.6.8	Heather Cusack	Southold Trustees	No evidence the Plan will decrease mosquitoes
AW	4	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Wertheim visit – no difference between treated-untreated areas (no mosquitoes)

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AW	5	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	All mosquito reduction data anecdotal
AW	11	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York: water management plan has not been proven effective
AW	17	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM are unproven
BD	19	4.6.8	Kasey Jacobs	Citizens Campaign for the Environment	OMWM is experimental
BC	4	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Wertheim visit – no difference between treated-untreated areas (no mosquitoes)
BC	5	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	All mosquito reduction data anecdotal
BC	11	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Audubon New York: water management plan has not been proven effective
BC	17	4.6.8	Lawrence Merryman	Great South Bay Audubon Society	Long-Term Plan OMWM are unproven
L	16	4.6.9	William Meredith	Delaware DNREC	Training allows for identification of problems
L	17	4.6.9	William Meredith	Delaware DNREC	Mitigation of mistakes possible
AG	25	4.6.9	John Pavacic	NYSDEC	Major water management projects may require maintenance (see Seatuck)
AG	33	4.6.9	John Pavacic	NYSDEC	Identify mitigation of project failures
AG	103	4.6.9	John Pavacic	NYSDEC	Agree reversion can be "undone"
K	2	4.7.1	Jack Mattice		Explain conditions when fish may be introduced
K	3	4.7.2	Jack Mattice		Are the species considered "invasive"
K	4	4.7.2	Jack Mattice		Are the proposed fish widespread
AG	43	4.7.2	John Pavacic	NYSDEC	Provide reference for fathead minnows ubiquity in Long Island fresh water systems
AG	111	4.7.2	John Pavacic	NYSDEC	Use of fathead minnow seems reasonable and acceptable
AH	9	4.7.2	Michael Reynolds	FINS	Native species may be acceptable if of same stock and will not impact existing conditions
AG	44	4.7.3	John Pavacic	NYSDEC	Why not use control using native species
AG	45	4.7.3	John Pavacic	NYSDEC	More information needed on predacious copepods
AG	114	4.7.3	John Pavacic	NYSDEC	Mentions of potential biocontrols need to indicate whether species are native or not (Long-Term Plan)
AH	8	4.7.3	Michael Reynolds	FINS	Non-native species are forbidden
I	32	4.8.1	James King	Town of Southold Town Trustees	Primary pesticide is methoprene
I	33	4.8.1	James King	Town of Southold Town Trustees	Methoprene has non-target impacts (other insects, mosquito predators, beetles, ladybugs, crabs, grass shrimp)
I	35	4.8.1	James King	Town of Southold Town Trustees	Affect development of frogs
N	2	4.8.1	Matthew Atkinson	Peconic Baykeeper	Previous comments show greater than disclosed impacts

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	72	4.8.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Methoprene use warrants caution as it may have impacts to the marine environment
Q	55	4.8.1	Nicole Maher et al	COPOPAW	Inadequate discussion of methoprene impacts on crustaceans
Q	56	4.8.1	Nicole Maher et al	COPOPAW	Inadequate discussion of methoprene on non-target organisms
S	3	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	More fully characterize methoprene
S	4	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Include work from the Long Island Sound Study
S	64	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Methoprene routinely applied to Suffolk marshes
S	65	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Methoprene found to have no impacts to estuarine non-target organisms at environmental concentrations
S	66	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Methoprene review was deficient
S	68	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Book 7 of Literature Search did not include 16 studies finding adverse impacts from methoprene
S	69	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Book 7 excessively relies on Antunes-Kenyon and Kennedy, 2001 for crustacean results.
S	70	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Book 7 ignores negative reports in Antunes-Kenyon and Kennedy, 2001
S	71	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	LIS Lobster Initiative Research ignored in Book 7
S	72	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Methoprene MSDS identifies it as toxic to aquatic organisms; may cause long-term adverse impacts in the aquatic environment
S	73	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Found no impacts from methoprene
S	74	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	USGS sampling found concentrations considered to be lethal/sublethal to larval crustaceans
S	75	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	Do not account for impacts to juvenile crustaceans
S	76	4.8.1	Citizens Campaign for the Environment et al	COPOPAW	NYC EIS found adverse effects for methoprene
T	20	4.8.1	Peer Reviewer #1		General discussion (Risk Assessment page 3-8) does not include time-release formulations
T	22	4.8.1	Peer Reviewer #1		Bs may affect non-target dipterans
T	40	4.8.1	Peer Reviewer #1		Refine discussion of Minnesota larvicides studies
U	46	4.8.1	Peer Reviewer #2		Bacillus compounds have applicator human risks
U	61	4.8.1	Peer Reviewer #2		Found low water column concentrations below those needed to cause toxic effects in lab
X	15	4.8.1	Michael Horst		30 minute methoprene concentration meets LD50 for Stage III lobster larvae
X	17	4.8.1	Michael Horst		Report methoprene concentration in sediments

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
X	18	4.8.1	Michael Horst		Why will methoprene sink?
X	19	4.8.1	Michael Horst		Half-life in sediments long enough to affect lobsters
X	20	4.8.1	Michael Horst		Worms may consume detrital methoprene
Y	8	4.8.1	Michael Horst		Define biorational
Y	12	4.8.1	Michael Horst		Bacillus incorrectly identified
Y	13	4.8.1	Michael Horst		Methoprene incorrectly identified
Y	14	4.8.1	Michael Horst		Methoprene not specific to insects
Z	1	4.8.1	Michael Horst		Methoprene briquets can last 1-3 months, releasing pesticide all the while
Z	2	4.8.1	Michael Horst		Methoprene has the potential to affect all arthropods
Z	3	4.8.1	Michael Horst		Methoprene is not safe: impacts honey bees
Z	6	4.8.1	Michael Horst		Methoprene has been shown to be toxic to many organisms
Z	7	4.8.1	Michael Horst		Methoprene persistence in ponds is long enough to cause toxic effects
Z	8	4.8.1	Michael Horst		A combination of larvicides is better than one alone
Z	9	4.8.1	Michael Horst		Methoprene use in every storm drain, followed by heavy rainfall, would wash significant pesticides into the nearby estuary and WLIS
Z	10	4.8.1	Michael Horst		Correct terminology associated with juvenile hormone
Z	11	4.8.1	Michael Horst		Duration of methoprene effect depends on the formulation
Z	12	4.8.1	Michael Horst		Breakdown of methoprene produces methoprenic acid
Z	13	4.8.1	Michael Horst		Methoprenic acid has not had acute toxicity testing in arthropods
Z	14	4.8.1	Michael Horst		Methoprene impacts grass shrimps, mud crabs, and lobsters (Stage III larval LD50 = 3 ppb)
Z	16	4.8.1	Michael Horst		Use of methoprene in a salt marsh will lead to significant effects of crab and shrimp
Z	17	4.8.1	Michael Horst		It is not really true that methoprene use has no impacts on aquatic life
Z	18	4.8.1	Michael Horst		Slow release of methoprene can result in concentrations of 15 ppb
Z	19	4.8.1	Michael Horst		15 ppb could cause significant mortality to crab and shrimp
Z	20	4.8.1	Michael Horst		How will wash-out of briquets into the estuary be prevented
Z	21	4.8.1	Michael Horst		Majority of pesticide use is in summer when shellfish molt, increasing metabolic stress
Z	22	4.8.1	Michael Horst		Methoprene adheres to plastics; if sampled in plastic, may be lost from water
AA	6	4.8.1	Michael Horst		Refine discussion of the mode of action of methoprene
AA	7	4.8.1	Michael Horst		Methoprene generally degrades quickly in the environment is misleading
AA	8	4.8.1	Michael Horst		Methoprene may bioaccumulate 250-fold in non-target organisms (lobsters)
AA	9	4.8.1	Michael Horst		Lit search did not overlook bioaccumulation with permethrin
AA	18	4.8.1	Michael Horst		Refine discussion of the mode of action of Bacillus
AA	19	4.8.1	Michael Horst		Work should be based on published accounts
AA	20	4.8.1	Michael Horst		Floyd washed methoprene out of storm drains
AA	21	4.8.1	Michael Horst		Oversimplification to state relatively rapid degradation makes use in estuaries of no concern
AA	22	4.8.1	Michael Horst		Discuss expected environmental concentrations of methoprene
AA	23	4.8.1	Michael Horst		Recognize the two isomers of methoprene
AA	24	4.8.1	Michael Horst		Define biomarker

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AA	25	4.8.1	Michael Horst		Although permethrin bioconcentration factors are cited, 2005 work by DeGuise and Walker on methoprene is not, making work suspect
AB	1	4.8.1	Michael Horst		Testing methoprene under environmental conditions is not sufficient
AB	2	4.8.1	Michael Horst		JSR issue on lobsters available
AB	3	4.8.1	Michael Horst		Concentrations lethal to mosquitoes may impact non-target invertebrates
AB	4	4.8.1	Michael Horst		Antunes-Kenyon and Kennedy not peer-reviewed and so may not be accepted in the scientific community
AB	5	4.8.1	Michael Horst		Found 3 ppb 72 hr LD50 for Stage III lobsters
AB	6	4.8.1	Michael Horst		Suggests crabs and shrimp will also be affected
AB	7	4.8.1	Michael Horst		Estuary important breeding ground for members of the food chain
AB	8	4.8.1	Michael Horst		Report found fast degradation times for methoprene
AB	9	4.8.1	Michael Horst		Methoprene bioaccumulates in lobsters up to 250 fold (over 24 hours)
AB	10	4.8.1	Michael Horst		May remain stable in the lobster for days
AB	11	4.8.1	Michael Horst		Mode of action of methoprene on lobsters
AB	13	4.8.1	Michael Horst		Synergy between environmental stress and pesticides inadequately addressed
AB	14	4.8.1	Michael Horst		Methoprene not only mimics JH III but also methyl farnesoate
AB	15	4.8.1	Michael Horst		Mode of action of methoprene
AB	16	4.8.1	Michael Horst		Because methoprene affects organisms hormones, must be identified as a different kind of environmental impact
AB	17	4.8.1	Michael Horst		The Kow of methoprene means that it is difficult to control experimentally
AB	18	4.8.1	Michael Horst		Because methoprene is particle-attracted it enters the detrital food path and enters the food chain in a fashion not considered in the analysis
AB	19	4.8.1	Michael Horst		Briquets may wash out into nearby streams and estuaries
AG	55	4.8.1	John Pavacic	NYSDEC	Claims regarding selectivity of Bti and Bs
AG	56	4.8.1	John Pavacic	NYSDEC	Bti and Bs affect non-target dipterans
AG	57	4.8.1	John Pavacic	NYSDEC	Hershey et al. showed Bti can have impacts on the food web
AG	58	4.8.1	John Pavacic	NYSDEC	Hershey et al changed predator-prey dynamics
AG	59	4.8.1	John Pavacic	NYSDEC	Discuss methoprene breakdown products
AG	70	4.8.1	John Pavacic	NYSDEC	Documentation regarding the methoprene decision in New York City
AG	71	4.8.1	John Pavacic	NYSDEC	NYC DEIS documents impacts of methoprene to support decision
AG	107	4.8.1	John Pavacic	NYSDEC	Reconsider discussion of papers recounting methoprene impacts (Table 7-4)
AG	115	4.8.1	John Pavacic	NYSDEC	Impact of methoprene degradation products, especially to amphibians
AP	10	4.8.1	Kevin McAllister	Peconic Baykeeper	Horst found impacts on crustaceans at levels as low as 1ppb
AP	11	4.8.1	Kevin McAllister	Peconic Baykeeper	Antunes-Kennedy report found application rate is 5-10 ppb
AP	13	4.8.1	Kevin McAllister	Peconic Baykeeper	NYC and Westchester abandoned methoprene use in estuarine waters
AP	14	4.8.1	Kevin McAllister	Peconic Baykeeper	Methoprene MSDS says it may cause long-term adverse impacts in the aquatic environment
AR	17	4.8.1	Heather Cusack	Southold Trustees	Not enough information on hormone inhibitor non-target effects
BB	3	4.8.1	Bob McAlevy		No basis for saying methoprene poses no threat to human health

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
BB	4	4.8.1	Bob McAlevy		No basis for saying methoprene has little to no ecological impact
BI	19	4.8.1	Kevin McAllister	Peconic Baykeeper	Horst research not well represented (in DGEIS)
BI	20	4.8.1	Kevin McAllister	Peconic Baykeeper	Methoprene has high affinity to particulates
BI	21	4.8.1	Kevin McAllister	Peconic Baykeeper	Potential pathway of worm ingestion to crustacea
BI	22	4.8.1	Kevin McAllister	Peconic Baykeeper	Manufacturer's label states may cause long-term adverse impacts in the aquatic environment
BI	23	4.8.1	Kevin McAllister	Peconic Baykeeper	Since Bti is available methoprene should not be used
BI	24	4.8.1	Kevin McAllister	Peconic Baykeeper	NYC and Westchester prohibited/greatly restricted methoprene use around estuarine waters
K	5	4.8.2	Jack Mattice		Triggers are too generic
K	6	4.8.2	Jack Mattice		How will larval triggers beyond presence-absence be developed
N	10	4.8.2	Matthew Atkinson	Peconic Baykeeper	Emphasis on salt marsh mosquito control
Q	9	4.8.2	Nicole Maher et al	COPOPAW	Clarify criteria for use
AH	10	4.8.2	Michael Reynolds	FINS	Criteria and triggers may be different for FINS
AF	1	4.8.3	Steve Papa	USFWS	Use of low flying helicopters could impact Federally-listed species
AG	108	4.8.3	John Pavacic	NYSDEC	Impacts from application methods on nesting birds not accurate
BI	18	4.8.3	Kevin McAllister	Peconic Baykeeper	Intent of methoprene application is to put material directly into water
P	73	4.8.1	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Alternatives to methoprene need to be aggressively pursued
Y	1	4.8.4	Michael Horst		Why not use neem?
Y	16	4.8.4	Michael Horst		Clove oil is alternative
Z	4	4.8.1	Michael Horst		Alternative is Neem
Z	5	4.8.1	Michael Horst		Literature shows neem has been safely used for hundreds of years
Z	23	4.8.4	Michael Horst		Neem is an alternative
AG	66	4.8.4	John Pavacic	NYSDEC	Why are monomolecular films not selected for use in Suffolk County
Z	24	4.8.5	Michael Horst		Was Suffolk County methoprene data published
Z	25	4.8.5	Michael Horst		Was it published in a peer reviewed journal
E	1	4.9.1	Edward Romaine	Suffolk County Legislature	Negative impacts on health
E	3	4.9.1	Edward Romaine	Suffolk County Legislature	Not considered safe by USEPA
E	4	4.9.1	Edward Romaine	Suffolk County Legislature	NYSDOH finds risk to human health
H	15	4.9.1	Victoria Russell	Town of Babylon DEC	EIS allays fears associated with program pesticide use
Q	44	4.9.1	Nicole Maher et al	COPOPAW	Downplayed risks with pesticide exposure
R	20	4.9.1	Unidentified	COPOPAW (?)	Pesticides have health risks
U	19	4.9.1	Peer Reviewer #2		Prefer another means of characterizing risk. Pesticide use is not risk-free
U	20	4.9.1	Peer Reviewer #2		Risks from mosquito control pesticides are very low because of low exposures to the pesticides
U	43	4.9.1	Peer Reviewer #2		GRAS status of garlic oil does not make it safe
U	44	4.9.1	Peer Reviewer #2		Garlic oil lacks efficacy data
AC	3	4.9.1	David Pimentel	Cornell University	No pesticide is entirely safe
AC	27	4.9.1	David Pimentel	Cornell University	Wide area applications lead to serious public health and environmental problems

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AJ	14	4.9.1	Joy Squires	Huntington Conservation Board	Regrets continued use of pesticides
AJ	15	4.9.1	Joy Squires	Huntington Conservation Board	Minimizing pesticide use will result in long-term health and environmental benefits
AK	3	4.9.1	Keith Romaine	Moriches Bay Civic Association	Negative impacts on health
AK	5	4.9.1	Keith Romaine	Moriches Bay Civic Association	Not considered safe by USEPA
AK	6	4.9.1	Keith Romaine	Moriches Bay Civic Association	NYSDOH finds risk to human health
H	6	4.9.2	Victoria Russell	Town of Babylon DEC	Least preferable option
H	7	4.9.2	Victoria Russell	Town of Babylon DEC	Signal failure in earlier control efforts
K	8	4.9.2	Jack Mattice		Who conducts the risk determination
K	9	4.9.2	Jack Mattice		Provide more specifics on the risk determination
K	10	4.9.2	Jack Mattice		How does community preference factor in
N	11	4.9.2	Matthew Atkinson	Peconic Baykeeper	Emphasis on salt marsh mosquito control
P	4	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Blurred distinction between nuisance and disease leads to more adulticide applications
P	30	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Long-Term Plan should use similar language as in WNV Response Plan for adulticiding criteria
P	35	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Precise triggers should be set for adulticide applications (current Plan is too vague)
P	36	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Specify species in traps and landing rate counts
P	37	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Specify landing rate procedures better
P	38	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Clarify landing rate count discrepancy (Long-Term Plan)
P	40	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Follow CT adulticiding model
P	45	4.9.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	"Must be used in residential areas" is untrue statement
Q	2	4.9.2	Nicole Maher et al	COPOPAW	Addition of numeric criteria good
Q	6	4.9.2	Nicole Maher et al	COPOPAW	Clarify thresholds and criteria for use
Q	7	4.9.2	Nicole Maher et al	COPOPAW	Clarify availability of trap data
Q	8	4.9.2	Nicole Maher et al	COPOPAW	Clarify landing rate trigger
R	29	4.9.2	Unidentified	COPOPAW (?)	Criteria are caricatured
R	30	4.9.2	Unidentified	COPOPAW (?)	Criteria allow responses at almost any mosquito density
R	31	4.9.2	Unidentified	COPOPAW (?)	Criteria do not balance risks and benefits

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
S	1	4.9.2	Citizens Campaign for the Environment et al	COPOPAW	Add specific criteria and thresholds
S	16	4.9.2	Citizens Campaign for the Environment et al	COPOPAW	Viewing all mosquitoes as dangerous leads to more calls for adulticide use
AC	15	4.9.2	David Pimentel	Cornell University	CDC advises a focus on larval control not adulticiding
AC	16	4.9.2	David Pimentel	Cornell University	Set traps out 5 days ahead of treatments
AC	17	4.9.2	David Pimentel	Cornell University	Provide 72 hours warning to homeowners
AC	18	4.9.2	David Pimentel	Cornell University	WNV positive birds and relatively abundant mosquitoes mean an adulticide treatment
AG	48	4.9.2	John Pavacic	NYSDEC	Include weather criteria in decision-making
AH	6	4.9.2	Michael Reynolds	FINS	Concern regarding complaints as a trigger for adulticiding
AO	23	4.9.2	Matthew Atkinson	Peconic Baykeeper	One trigger is 1-5 mosquitoes landing rate per minute
AS	3	4.9.2	Nicole Maher	Nature Conservancy	Clarify triggers
AS	4	4.9.2	Nicole Maher	Nature Conservancy	Trap criteria should be used
AS	5	4.9.2	Nicole Maher	Nature Conservancy	Quantitative data collected at all locations prior to spraying
BA	4	4.9.2	Adrienne Esposito	Citizens Campaign for the Environment	No distinction will cause more spraying to be needed
BA	5	4.9.2	Adrienne Esposito	Citizens Campaign for the Environment	No distinction will cause more spraying to occur
BA	9	4.9.2	Adrienne Esposito	Citizens Campaign for the Environment	Will cause increased demand for adulticides
BA	20	4.9.2	Adrienne Esposito	Citizens Campaign for the Environment	Specific triggers for adulticide applications
BA	21	4.9.2	Adrienne Esposito	Citizens Campaign for the Environment	Vagueness in guidelines to allow for management decisions, but needs more science and less political concerns
BD	5	4.9.2	Kasey Jacobs	Citizens Campaign for the Environment	Refine criteria to reflect which mosquitoes are being counted
BF	2	4.9.2	Mary Lee	Smith Point Beach Property Owners Association	3-week lag for treatment
BG	4	4.9.2	Dominick Licata	Smith Point Beach Property Owners Association	Response time from complaints is poor
BV	6	4.9.2	Bob McAlevy		Lacks decision-making specifics
E	6	4.9.3	Edward Romaine	Suffolk County Legislature	Only used when evidence of disease
P	24	4.9.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Onondaga County sprays when mosquito pools test positive for EEE
P	25	4.9.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Suffolk County should only adulticide in a limited targeted way when disease is discovered
P	39	4.9.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Chemicals only used when disease is uncovered

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
P	47	4.9.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Inappropriate for nuisance control
R	25	4.9.3	Unidentified	COPOPAW (?)	Used only when risk of disease is intolerably high
R	32	4.9.3	Unidentified	COPOPAW (?)	Should only be used in the face of imminent disease threat
AH	7	4.9.3	Michael Reynolds	FINS	NPS policies do not allow for control of pests without specific disease threats
AK	8	4.9.3	Keith Romaine	Moriches Bay Civic Association	Only used when evidence of disease
AR	16	4.9.3	Heather Cusack	Southold Trustees	Nuisance control is not a justification for the harmful effects of pesticides
BD	3	4.9.3	Kasey Jacobs	Citizens Campaign for the Environment	Only used for disease control
BD	4	4.9.3	Kasey Jacobs	Citizens Campaign for the Environment	Only conduct adulticides use for disease control in a limited, targeted fashion
BJ	2	4.9.3	John Lund	Davis Park	No aerial spraying unless WNV is involved
BJ	5	4.9.3	John Lund	Davis Park	Need to adulticide for WNV rises so late in season that it is not done
P	5	4.9.4	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Applications have adverse impacts on humans
Q	42	4.9.4	Nicole Maher et al	COPOPAW	No dermal exposure
R	21	4.9.4	Unidentified	COPOPAW (?)	Health risks are not recognized in the Risk Assessment
T	8	4.9.4	Peer Reviewer #1		Risks from background exposure are not serious and do not exceed levels of concern
T	13	4.9.4	Peer Reviewer #1		Enhance discussion of community gardener
T	14	4.9.4	Peer Reviewer #1		Provide basis for pyrethrum evaluation
T	15	4.9.4	Peer Reviewer #1		Define straw man plan
T	16	4.9.4	Peer Reviewer #1		Explain choice of agents
T	17	4.9.4	Peer Reviewer #1		Explain scenario selection
T	18	4.9.4	Peer Reviewer #1		Specify application rates
T	19	4.9.4	Peer Reviewer #1		Reviewer prefers specific product evaluations
T	21	4.9.4	Peer Reviewer #1		Biomagnification discussion of malathion is confusing
T	23	4.9.4	Peer Reviewer #1		Should have included irrigated croplands
T	24	4.9.4	Peer Reviewer #1		Identify surrogate for salamanders
T	25	4.9.4	Peer Reviewer #1		Turtles considered terrestrial or aquatic
T	26	4.9.4	Peer Reviewer #1		Birth to 6 too broad an age grouping
T	27	4.9.4	Peer Reviewer #1		Incomplete pathway used
T	28	4.9.4	Peer Reviewer #1		Why was a fractional intake used in Tier 1?
T	29	4.9.4	Peer Reviewer #1		Modeling approach must be made more transparent
T	30	4.9.4	Peer Reviewer #1		Maximum point estimate too conservative
T	31	4.9.4	Peer Reviewer #1		Assumptions for worst case are too conservative
T	32	4.9.4	Peer Reviewer #1		LOAEL to NOAEL calculation is too cavalier
T	33	4.9.4	Peer Reviewer #1		Adding PBO & pyrethroid risks, because is synergistic, is not necessarily conservative

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
T	34	4.9.4	Peer Reviewer #1		Malathion risks are overstated
T	35	4.9.4	Peer Reviewer #1		Insecticides "stack" against a building
T	36	4.9.4	Peer Reviewer #1		Update sumithrin (use 2000 reference)
T	37	4.9.4	Peer Reviewer #1		Dermal exposure may need to be considered
T	39	4.9.4	Peer Reviewer #1		Buffer area too large
T	41	4.9.4	Peer Reviewer #1		Discuss acute exposure scenarios
T	42	4.9.4	Peer Reviewer #1		Discuss very small child exposure considerations
U	7	4.9.4	Peer Reviewer #2		Should have evaluated a higher than normal use
U	41	4.9.4	Peer Reviewer #2		Impact of malathion degradates would strengthen the assessment
U	45	4.9.4	Peer Reviewer #2		Degradation rates should be lower in urban environments
U	47	4.9.4	Peer Reviewer #2		How is prenatal exposure addressed?
U	52	4.9.4	Peer Reviewer #2		Potential link to Parkinson's Disease
U	53	4.9.4	Peer Reviewer #2		No asthma impact in NYC (malathion and resmethrin)
U	54	4.9.4	Peer Reviewer #2		Avian good surrogate for reptiles?
Y	6	4.9.4	Michael Horst		Impacts do not propagate up the food chain: what is source
Y	15	4.9.4	Michael Horst		Did not include annelids
AA	2	4.9.4	Michael Horst		Annelids were not included
AA	10	4.9.4	Michael Horst		Toxicity to bees mentioned but not followed up
AA	13	4.9.4	Michael Horst		Why were nematodes not included
AA	14	4.9.4	Michael Horst		Define hormesis
AA	15	4.9.4	Michael Horst		Implies inconsistency regarding "acute" conditions
AA	16	4.9.4	Michael Horst		Distinguish between "lethality" and LD72
AA	17	4.9.4	Michael Horst		Suggests for crustaceans, absorption through digestive tract may be more important route of exposure than aqueous exposure
AG	60	4.9.4	John Pavacic	NYSDEC	Terrestrial amphibians not accounted for
AG	61	4.9.4	John Pavacic	NYSDEC	Does not discuss long-term stress to the organisms
AG	62	4.9.4	John Pavacic	NYSDEC	Does not discuss how long-term stress may lead to reduced survivorship
AG	63	4.9.4	John Pavacic	NYSDEC	Does not discuss how long-term stress may reduce fecundity
AG	64	4.9.4	John Pavacic	NYSDEC	Does not discuss synergistic effects with other stressors
AG	65	4.9.4	John Pavacic	NYSDEC	Does not discuss the toxicity of breakdown products
BB	5	4.9.4	Bob McAlevy		On page 1310, women and fetuses were not directly assessed
BB	6	4.9.4	Bob McAlevy		At 1 ppb, shellfish and finfish eggs are killed (according to scoping documents) (not addressed in DGEIS)
BB	7	4.9.4	Bob McAlevy		Applications lead to 5 ppb being applied
BB	12	4.9.4	Bob McAlevy		Embryos and fetuses must more vulnerable than children
BB	13	4.9.4	Bob McAlevy		The pesticides that pregnant women are exposed to pass through the placenta
BB	14	4.9.4	Bob McAlevy		Study fails to adequately address impact on human health
CB	2	4.9.4	Bob McAlevy		pp. 343-485 report concentrations in excess of 1 ppb as benign

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
CB	3	4.9.4	Bob McAlevy		Concentrations toxic to fish eggs/larvae must be harmful to human embryos and fetuses
CB	9	4.9.4	Bob McAlevy		Children are acknowledged to be more vulnerable to adults to impacts from pesticides
CB	10	4.9.4	Bob McAlevy		That embryos and fetuses are more susceptible is not addressed
CB	11	4.9.4	Bob McAlevy		No mention that pesticides pass through placenta (see March 2006 submission to CEQ, not provided)
CC	1	4.9.4	Bob McAlevy		Would a study similar to that on 2nd hand smoke find impacts from pesticides?
CD	1	4.9.4	Bob McAlevy		Newspaper report of a paper in Environmental Health Perspectives, reporting on impacts of reductions in pesticide use
CE	1	4.9.4	Bob McAlevy		Airborne pollutants (PAHs from vehicles and industry – primarily power production) can cause mutations in mouse male germ cells damage male somatic cells.
CE	2	4.9.4	Bob McAlevy		Pregnant women exposed to PAHs have higher risk of delivering low-weight babies
CE	3	4.9.4	Bob McAlevy		Mutations to male germ lines should be interpreted with caution, do to technical limitations
E	2	4.9.5	Edward Romaine	Suffolk County Legislature	Negative impacts on the ecology of LI
N	1	4.9.5	Matthew Atkinson	Peconic Baykeeper	Peer reviews show greater than disclosed impacts
N	8	4.9.5	Matthew Atkinson	Peconic Baykeeper	DGEIS: no adverse impacts; Pimental and Reviewer #2 say differently
P	6	4.9.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Applications have adverse impacts on wildlife
P	7	4.9.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Applications have adverse impacts on the environment
P	41	4.9.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Ecological impacts not well researched
Q	49	4.9.5	Nicole Maher et al	COPOPAW	Understate non-target insect impacts
Q	50	4.9.5	Nicole Maher et al	COPOPAW	Address toxicity of pyrethroids to fish
Q	51	4.9.5	Nicole Maher et al	COPOPAW	Address toxicity of pyrethroids to fish with weekly applications
T	38	4.9.5	Peer Reviewer #1		Rework non-target flying insect impact section
U	42	4.9.5	Peer Reviewer #2		Malathion poses greater risks to bees because it is not a repellent
U	55	4.9.5	Peer Reviewer #2		Use qualitative information and judgment for non-target flying insect impacts.
U	56	4.9.5	Peer Reviewer #2		Insects other than honeybees may not return after pyrethroid repellent effect
AC	4	4.9.5	David Pimentel	Cornell University	Honey bees are not good surrogates for non-target insects
AC	5	4.9.5	David Pimentel	Cornell University	Most insects are beneficial (only 1% are pests)
AC	6	4.9.5	David Pimentel	Cornell University	High toxicity of pyrethroids to fish is not mentioned
AC	7	4.9.5	David Pimentel	Cornell University	Disagrees that pyrethroids do not pose unacceptable risks
AC	11	4.9.5	David Pimentel	Cornell University	Impossible to eliminate risks to non-target insects
AK	4	4.9.5	Keith Romaine	Moriches Bay Civic Association	Negative impacts on the ecology of LI
AM	2	4.9.5	Georgeanne Spates		Disregarding manufacturers' warnings regarding toxicity
AQ	1	4.9.5	Tom Stock		Decline in bees due to mite and pesticides
AQ	2	4.9.5	Tom Stock		Application aerosols land on plants in the high marsh and along edges of tidal wetlands – bees are impacted
AQ	3	4.9.5	Tom Stock		Many farmers now hiring beekeepers to pollinate crops

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
BF	5	4.9.5	Mary Lee	Smith Point Beach Property Owners Association	No obvious impacts to fauna from past applications
BB	15	4.9.5	Bob McAlevy		Study fails to adequately address impact on ecology, especially estuarine ecology (finfish and shellfish)
CB	1	4.9.5	Bob McAlevy		pp.97-99 of "Scoping Comments" shows toxicity of pesticides at 1 ppb
CB	2	4.9.5	Bob McAlevy		pp. 343-485 report concentrations in excess of 1 ppb as benign
Q	45	4.9.6	Nicole Maher et al	COPOPAW	Include permethrin cancer information
Q	46	4.9.6	Nicole Maher et al	COPOPAW	Include resmethrin cancer information
Q	47	4.9.6	Nicole Maher et al	COPOPAW	Pyrethroid-Parkinson's disease links
U	14	4.9.6	Peer Reviewer #2		Public unaware of small role played by mosquito control pesticides in overall pesticide risks
U	15	4.9.6	Peer Reviewer #2		CDC work (2005) documenting insignificant increases in pesticide metabolites in urine important point of discussion
U	48	4.9.6	Peer Reviewer #2		Uncertainties regarding mode of action of pyrethroids
U	49	4.9.6	Peer Reviewer #2		Environmental measurements have not been set by regulators
U	50	4.9.6	Peer Reviewer #2		Low concentration exposures seem to result in very complex reactions
U	51	4.9.6	Peer Reviewer #2		EPA has classified permethrin as potential carcinogen via oral route
U	57	4.9.6	Peer Reviewer #2		Pyrethroids may be found more in sediments than in the water column
U	58	4.9.6	Peer Reviewer #2		CA testing found pyrethroids above levels of concern in sediments
U	59	4.9.6	Peer Reviewer #2		Mosquito control pesticides were not detected in the CA study
U	60	4.9.6	Peer Reviewer #2		High concentrations appear to be a function of high irrigation flows (thus, high residues in CA but not in TN)
U	62	4.9.6	Peer Reviewer #2		DeLorenzo et al found very low concentrations of permethrin affected larval shrimp development
U	63	4.9.6	Peer Reviewer #2		Presence of sediment ameliorated effects
U	64	4.9.6	Peer Reviewer #2		Hunter et al. found only dissolved pyrethroids were bioavailable
U	65	4.9.6	Peer Reviewer #2		USEPA concerned about pyrethroids, including mosquito control uses, because sediment bound pesticides may be bioavailable
U	66	4.9.6	Peer Reviewer #2		Pyrethroid residues widely found in CA stream sediments
U	67	4.9.6	Peer Reviewer #2		Residue concentrations could be reach levels to cause organism toxicity
U	68	4.9.6	Peer Reviewer #2		Mosquito control pesticides not found
U	69	4.9.6	Peer Reviewer #2		JSR discussed mosquito control pesticide contributions to the WLIS die off
H	12	4.9.7	Victoria Russell	Town of Babylon DEC	Wetland buffer areas should be reduced
I	38	4.9.7	James King	Town of Southold Town Trustees	Specify amount used for each application
I	40	4.9.7	James King	Town of Southold Town Trustees	NYSDEC agricultural standards demonstrate resistance
K	11	4.9.7	Jack Mattice		Can one communities preferences affects risks of another
K	13	4.9.7	Jack Mattice		QA/QC team role in decision-making
K	17	4.9.7	Jack Mattice		Malathion use conditions
K	19	4.9.7	Jack Mattice		Discuss role of applicator judgment more thoroughly

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
K	20	4.9.7	Jack Mattice		Identify decision-maker for canopy-dwelling mosquito approach
K	21	4.9.7	Jack Mattice		Identify decision-maker for pre-dawn application
K	22	4.9.7	Jack Mattice		Map areas where pesticides applications are impractical
Y	2	4.9.7	Michael Horst		Explain more about Adapco Wingman
AC	22	4.9.7	David Pimentel	Cornell University	Aerial applications a little better
AC	25	4.9.7	David Pimentel	Cornell University	Aerial applications cover more ground
AC	26	4.9.7	David Pimentel	Cornell University	Aerial applications cost more
AG	49	4.9.7	John Pavacic	NYSDEC	Refine discussion of Health Emergency Authorizations
AG	50	4.9.7	John Pavacic	NYSDEC	Correct wetlands buffer
AG	118	4.9.7	John Pavacic	NYSDEC	Refine discussion of applicator educational requirements
AJ	16	4.9.7	Joy Squires	Huntington Conservation Board	Will work with County to identify sensitive sites across the Town
AX	3	4.9.7	Frank Lombardo		Vector control maintains some control over use
BI	17	4.9.7	Kevin McAllister	Peconic Baykeeper	Enter surface waters
BJ	3	4.9.7	John Lund	Davis Park	Fire Island applications are by hand-held truck ("fogging")
I	37	4.9.8	James King	Town of Southold Town Trustees	Specify effectiveness
N	7	4.9.8	Matthew Atkinson	Peconic Baykeeper	DGEIS says efficacy is 90%+; Pimental says less than half that for trucks
P	46	4.9.8	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Adulticide use cannot stop mosquito biting
Q	53	4.9.8	Nicole Maher et al	COPOPAW	Include efficacy data
Q	54	4.9.8	Nicole Maher et al	COPOPAW	Disagree with presented efficacy data
AC	12	4.9.8	David Pimentel	Cornell University	Proposed trap counts/landing rates are positives
AC	13	4.9.8	David Pimentel	Cornell University	How extensive are they
AC	19	4.9.8	David Pimentel	Cornell University	Discussion of ULV effectiveness, especially with regard to upwind-downwind
AC	20	4.9.8	David Pimentel	Cornell University	Only a few reliable efficacy studies have been conducted
AC	21	4.9.8	David Pimentel	Cornell University	Results tend to be poor
AC	23	4.9.8	David Pimentel	Cornell University	Aerial efficacy discussion
AC	24	4.9.8	David Pimentel	Cornell University	Most aerial applications drift from the target area
AT	9	4.9.8	Dominick Licata	Smith Point Beach Property Owners Association	Applications seem to make problem worse
BH	3	4.9.8	Ronald McKenna	Fire Island Pines Property Owners Association	No mosquito control was terrible
BH	4	4.9.8	Ronald McKenna	Fire Island Pines Property Owners Association	Once a month adulticiding was terrible
BH	5	4.9.8	Ronald McKenna	Fire Island Pines Property Owners Association	Once a week is satisfactory level of control
C	4	4.9.9	Richard Mendelman		Lemon Joy in a white plate is an alternative

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AT	7	4.9.9	Dominick Licata	Smith Point Beach Property Owners Association	Buy chemicals to prevent impacts
AX	2	4.9.9	Frank Lombardo		Individuals can buy any pesticide in Home Depot
BJ	11	4.9.9	John Lund	Davis Park	Davis Park providing $50 rebate on mosquito magnets
BJ	12	4.9.9	John Lund	Davis Park	Mosquito magnets are species specific
BF	4	4.9.9	Mary Lee	Smith Point Beach Property Owners Association	SCVC applications less dangerous to someone with chronic obstructive pulmonary disease than applying repellents
BE	9	4.9.9	Joseph Barone		If there is no government protection from mosquitoes, people will take their own measures
BE	10	4.9.9	Joseph Barone		Could lead to improper use of impermissible pesticides
BE	11	4.9.9	Joseph Barone		Impacts from homeowner actions may be greater than under the Long-Term Plan
I	27	4.10.1	James King	Town of Southold Town Trustees	WNV incidence has been decreasing over the past several years
Q	43	4.10.1	Nicole Maher et al	COPOPAW	Exaggerated risks for WNV (Busch et al., 2006)
U	6	4.10.1	Peer Reviewer #2		Mosquito-borne disease section contains correctable errors
U	16	4.10.1	Peer Reviewer #2		Modeling approach useful
U	26	4.10.1	Peer Reviewer #2		Disease risk discussion is incomplete
U	30	4.10.1	Peer Reviewer #2		Reconsider disease risks in light of Busch et al (2006)
U	31	4.10.1	Peer Reviewer #2		WNV penetrates US population more quickly than thought (higher immune rates)
U	32	4.10.1	Peer Reviewer #2		Infection rate is > 2%
U	33	4.10.1	Peer Reviewer #2		Neuro-invasive disease cases may be being misdiagnosed
U	34	4.10.1	Peer Reviewer #2		Ensure changing diagnoses of WNV are accounted for
U	35	4.10.1	Peer Reviewer #2		"Less serious" WNV is now recognized as having longer and more deleterious effects
U	36	4.10.1	Peer Reviewer #2		Exposed populations sum of zip codes?
U	37	4.10.1	Peer Reviewer #2		Exposure only at residence? Bad assumption.
U	38	4.10.1	Peer Reviewer #2		2% infection rate resulted in 1.5% infected population? How?
U	39	4.10.1	Peer Reviewer #2		Risks may be lower than stated (if Busch et al. is used)
U	40	4.10.1	Peer Reviewer #2		Add discussion of predictive models of WNV incidence
Y	4	4.10.1	Michael Horst		Influenza more important
AJ	3	4.10.1	Joy Squires	Huntington Conservation Board	Current program reduces disease risks
AJ	4	4.10.1	Joy Squires	Huntington Conservation Board	Long-Term Plan reduces risks further
AO	19	4.10.1	Matthew Atkinson	Peconic Baykeeper	WNV is a serious disease
BB	8	4.10.1	Bob McAlevy		Natural fluctuations in bird populations exceed mortality effects attributed to WNV
BB	9	4.10.1	Bob McAlevy		Necropsies of birds show pesticides
BB	10	4.10.1	Bob McAlevy		Especially necropsies of raptors
BB	11	4.10.1	Bob McAlevy		Therefore although birds were WNV positive, pesticides caused their deaths
CB	4	4.10.1	Bob McAlevy		Data show varying populations of bird species (Figure 3-10)

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ID	Com. #	Topic	Speaker	Speaker's Organization	Content
CB	5	4.10.1	Bob McAlevy		Conclusion associated with WNV declines are not warranted without explaining other population changes
CB	6	4.10.1	Bob McAlevy		Dead birds tested by NYSDOH before 1999 all contain pesticides
CB	7	4.10.1	Bob McAlevy		Birds post-19999 also contain pesticides
CB	8	4.10.1	Bob McAlevy		Claiming WNV is cause of death unwarranted
F	2	4.10.2	MaryLaura Lamont		Not true all mosquitoes carry EEE and WNV
F	4	4.10.2	MaryLaura Lamont		Fresh water mosquitoes vectors
F	5	4.10.2	MaryLaura Lamont		Salt marsh mosquitoes not vectors
F	10	4.10.2	MaryLaura Lamont		Distinguish between nuisance and illness causing mosquitoes
G	1	4.10.2	Lawrence Merryman	Great South Bay Audubon Society	No to little evidence salt marsh mosquitoes spread WNV
I	25	4.10.2	James King	Town of Southold Town Trustees	No cases of WNV in salt marsh mosquitoes
I	26	4.10.2	James King	Town of Southold Town Trustees	WNV is a fresh water mosquito disease
N	13	4.10.2	Matthew Atkinson	Peconic Baykeeper	Salt marsh mosquitoes represent small disease risk
N	15	4.10.2	Matthew Atkinson	Peconic Baykeeper	Primary amplification vector: container breeding Culex (according to S. Campbell)
N	16	4.10.2	Matthew Atkinson	Peconic Baykeeper	Primary transmission vector: container breeding Culex (according to S. Campbell)
P	14	4.10.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Untrue that reducing salt water mosquito populations decreases WNV risks
P	15	4.10.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Salt water mosquitoes are not carriers of WNV in Suffolk County
P	16	4.10.2	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Salt water mosquitoes are not good vectors of WNV in Suffolk County
Q	48	4.10.2	Nicole Maher et al	COPOPAW	Distinguish between known disease vectors, suspected disease vectors, and aggressive salt marsh mosquitoes
R	35	4.10.2	Unidentified	COPOPAW (?)	Tidal marshes are unlikely source of WNV vectors
S	15	4.10.2	Citizens Campaign for the Environment et al	COPOPAW	Lack of distinction leads the public to view all mosquitoes as harmful or possibly deadly.
S	19	4.10.2	Citizens Campaign for the Environment et al	COPOPAW	Reducing salt water mosquito populations does not reduce disease risk
S	20	4.10.2	Citizens Campaign for the Environment et al	COPOPAW	Salt water mosquitoes are not carriers of WNV in Suffolk County
S	21	4.10.2	Citizens Campaign for the Environment et al	COPOPAW	Salt marsh mosquitoes are not good vectors of WNV in Suffolk County
U	29	4.10.2	Peer Reviewer #2		More detailed discussion of local vector species needed
U	72	4.10.2	Peer Reviewer #2		Culex feed preferentially on robins?
AM	9	4.10.2	Georgeanne Spates		Plan links WNV with water management
AM	10	4.10.2	Georgeanne Spates		Freshwater mosquitoes are known vector of WNV

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AR	15	4.10.2	Heather Cusack	Southold Trustees	Nuisance control is not a justification for the harmful effects of marsh alteration
AS	15	4.10.2	Nicole Maher	Nature Conservancy	Fresh water mosquitoes are more potent vectors than salt marsh mosquitoes
BA	13	4.10.2	Adrienne Esposito	Citizens Campaign for the Environment	Plan claims reducing salt marsh mosquitoes will reduce incidence of WNV
BA	14	4.10.2	Adrienne Esposito	Citizens Campaign for the Environment	Science has not said salt marsh mosquitoes are good vectors of WNV
BA	15	4.10.2	Adrienne Esposito	Citizens Campaign for the Environment	Science has not said salt marsh mosquitoes are competent vectors of WNV
P	17	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Primary function of the program is to reduce risks from EEE
P	18	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Only NY cases of EEE in Onondaga County (since 1960)
P	19	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Never a case of EEE in Suffolk County
P	20	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	It's false that EEE is carried by salt water mosquitoes
P	21	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	It's false that EEE is carried by fresh water mosquitoes
P	22	4.10.3	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	It's false that it is an acute threat
S	22	4.10.3	Citizens Campaign for the Environment et al	COPOPAW	Primary function of the program is to reduce risks from EEE
S	23	4.10.3	Citizens Campaign for the Environment et al	COPOPAW	Only NY cases of EEE in Onondaga County (since 1960)
S	24	4.10.3	Citizens Campaign for the Environment et al	COPOPAW	It's false that EEE is a serious threat
AO	16	4.10.3	Matthew Atkinson	Peconic Baykeeper	EEE is highlighted in the report
AO	17	4.10.3	Matthew Atkinson	Peconic Baykeeper	Never a case of EEE in the County
P	48	4.10.5	Adrienne Esposito and Kasey Jacobs	Citizens Campaign for the Environment	Mosquito bites are itchy annoyance
U	27	4.10.5	Peer Reviewer #2		Add indirect health effects that stem from limited outdoor time
AG	132	4.10.5	John Pavacic	NYSDEC	Citation regarding Oc. sollicitans effect on development
AT	1	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Smith Point property owners suffer from mosquitoes every year
AT	2	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	They challenge quality of life for 50,000 visitors to FINS
AT	3	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	They challenge public safety for 50,000 visitors to FINS

Table 2.5. FGEIS Potentially Significant Comments, Organized by Topic

ID	Com. #	Topic	Speaker	Speaker's Organization	Content
AT	4	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Campers ask for money back
AT	5	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Could present liability issues
AT	6	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Impacts children
AX	1	4.10.5	Frank Lombardo		3 kids in Smith point cannot let out of the house after 4
AX	4	4.10.5	Frank Lombardo		Quality of life impacted by out-of-control mosquito population
AY	1	4.10.5	Robert Dean		Mosquitoes are a problem – make you a prisoner in your own home
AZ	2	4.10.5	Allen Hawkridge		Worse at Smith Point than ever had experienced in 83 years
BE	7	4.10.5	Joseph Barone		Homeowners have the right to peaceful enjoyment of homes & property
BE	8	4.10.5	Joseph Barone		Not possible with masses of mosquitoes
BF	1	4.10.5	Mary Lee	Smith Point Beach Property Owners Association	Have a lot of mosquitoes (2005, 3800 in a trap over one week)
BF	3	4.10.5	Mary Lee	Smith Point Beach Property Owners Association	Mosquito presence impacts quality of life
BG	1	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Thinks has more mosquitoes than Ms. Lee
BG	2	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Biggest problem as a gateway community to the Seashore is mosquitoes
BG	3	4.10.5	Dominick Licata	Smith Point Beach Property Owners Association	Mosquitoes cause impacts to quality of life
BJ	8	4.10.5	John Lund	Davis Park	Tourism is important economically to Suffolk County – Atlantic beaches especially so
N	17	4.10.6	Matthew Atkinson	Peconic Baykeeper	Risks from other mosquito-borne diseases are trivial
T	11	4.10.6	Peer Reviewer #1		Don't speculate about when exotic disease will be introduced to Suffolk County
T	12	4.10.6	Peer Reviewer #1		Discuss effectiveness of yellow fever vaccine
U	25	4.10.6	Peer Reviewer #2		Diseases of greatest concern?
U	28	4.10.6	Peer Reviewer #2		Correct technical discussion of diseases
AJ	5	4.10.6	Joy Squires	Huntington Conservation Board	In-place control program should reduce risks associated with a novel disease
AO	18	4.10.6	Matthew Atkinson	Peconic Baykeeper	Should be concerned about diseases that have never appeared in the County
BE	6	4.10.6	Joseph Barone		Immigrants may cause malaria here

3 General Responses to Major Public Concerns

It is clear from Section 2 that many comments were received following the release of the DGEIS. The County identified four particular areas where concerns were received most commonly and that appeared to be most import in clearly and carefully outlining the overall County response. The four topics so identified were:

- Human health risks associated with mosquito-borne disease

  One principle reason for providing a general response was the implication in Peer Reviewer #2 comments that the County model of West Nile virus (WNV) infection overestimated potential impacts from WNV. The response in Section 3.1 will review the concerns raised in those comments. Specific responses to specific comments are presented in Section 4, (primarily in Section 4.10 for the comments on the WNV model). In addition, there were many comments received regarding the County's determination that nearly all vector control activities serve to reduce disease risks, and that there is no practical distinction in the County program between "nuisance" and "disease" control. Specific comments on this issue are addressed in Section 4.1, below.

- The potential for ecological impacts associated with water management and pesticides use

  Many comments were received that suggested there was no basis for the claims made by the County regarding the potential for ecological benefits from implementing water management. The County will review the papers, studies, and reports that led it to this determination. In addition, Michael Horst (Mercer University) closely reviewed many aspects of the County evaluation of methoprene, and disputed findings by the County that this pesticide posed little to no ecological risks when applied as called for in the Long-Term Plan. This section will summarize the comments made by Dr. Horst and others regarding larvicide use, and provide an overall justification for the position taken in the DGEIS. Certain aspects of adulticide usage that were raised in comments will also be addressed.

Specific responses to specific comments will be made in Section 4 (primarily, Section 4.6 for water management, Section 4.8 for methoprene, and Section 4.9 for adulticides).

- Overall procedures and policies associated with potential water management project development, assessment, and implementation

  In addition to receiving many comments regarding ecological impacts associated with water management, many comments were received regarding the proposed process by which these projects would be considered and implemented. These comments led to major revisions of the procedures and policies as presented in the April 2006 Long-Term Plan and its associated Wetlands Management Plan (also dated April 2006). This section will present the revisions to the Long-Term Plan and Wetlands Management Plan. Responses to specific comments can be found in Section 4 (primarily in Section 4.6). The Revised Long-Term Plan is included as Appendix 5 to this FGEIS, the Revised Wetlands Management Plan is presented as Appendix 6 to this FGEIS, and the Revised BMP Manual is presented as Appendix 7 to this FGEIS.

- Suggested modifications to the education program

  Public education and outreach is a very important element of the Long-Term Plan. However, it is one that some critics have suggested that the County slights. Specific recommendations were made regarding potential improvements to the Long-Term Plan education program, and the County determined it was important to recognize these comments in this summary section.

3.1 Human Health Risks Due to Mosquito-borne Disease

Peer Reviewer #2 cited a paper, Busch et al. (2006), as a source of information that might cause significant changes to the DGEIS assessment of WNV impacts in the absence of mosquito control. A simple model, based on serosurvey data from four different locations in three years (Douglaston, Queens, in 1999, Staten Island in 2000, Cuyahoga County, Ohio, in 2002, and South Oakville, Ontario, in 2002) was used to predict infection rates, serious illnesses, deaths, and immunity rates for the County for 2000 to 2025 in the DGEIS. The model found that hundreds of people might become sick (experiencing serious neurological effects) and more than

10 might die each year, and, despite increasing immunity rates with time, the numbers would only decline by approximately one-third after 25 years.

Busch et al. (2006) calculated infection rates for each state based on blood bank sampling, assuming that blood donors were representative populations for each state. The comparison of infection rates to numbers of serious illnesses lead Busch et al. to conclude that the commonly cited ratio of approximately 1 in 150 infections resulting in serious illnesses was an overestimate. Busch et al. instead calculated that the national rate was more in line with a 1 in 256 ratio. Comments were made that this difference in serious illness rates might reduce the estimate of serious illnesses that might be experienced in Suffolk County in the absence of mosquito control.

However, that is logically flawed. The ultimate driver of illness is the infection rate (the number of people to whom mosquitoes transmitted WNV). The County had used a very conservative 2 percent infection rate, in the absence of mosquito control. This was based on infection rates of 2.6 percent, 1.9 percent, and 3.1 percent for Queens, Ohio, and Ontario (respectively) (the Staten Island data were collected with an active New York City control program underway). The number of serious illnesses associated with these infection rates was determined based on hospitalization numbers (59, 144, and 6 serious cases, respectively), resulting in estimates of the "undiagnosed" case rate as 140, 170, and 160 to 1, respectively. If the serosurvey data were flawed, so that the true undiagnosed case rate were approximately 260, that would make the infection rates more like 4.8 percent, 2.9 percent, and 5.0 percent (respectively). Table 3-1 summarizes these issues.

Table 3-1. Serosurvey data adjusted by Busch et al. (2006) data sets

Site	Serosurvey Infection Rate	Hospitalizations	Undiagnosed Case Rate (per Hospitalization)	Infection Rate Based on Undiagnosed Case rate of 260 per Hospitalization
Queens	2.6	59	140	4.9
Ohio	1.9	144	170	2.9
Ontario	3.1	6	160	5.0

Such local infection rates are in line with the blood bank maximal estimates (state-wide) between 4.0 and 4.9 percent for four midwestern states presented in Busch et al. Therefore, the model was put through several different iterations, testing if infection rates of 3, 4 or 5 percent with a serious illness rate of 1 to 260 resulted in major changes to the predicted impacts. As discussed below in Section 10 and shown in Table 3-2, the predicted impacts did not decline notably for any iteration, and actually increased for some scenarios. Higher infection rates did increase the immunity rate over time, but a 5 percent infection rate with 85 percent of the County's population immune to WNV still results in 48 serious illnesses County-wide, and potentially leads to 5 deaths (such immunity rates would not be achieved until approximately 2070, even if the population is capped at 2010 levels – 2010 was selected as a date of "build-out" to prevent otherwise ever increasing populations from influencing the results). In a sense, this is because the model really links the number of people exposed to the disease and the number of serious illnesses recorded in the area. Changing the infection rate in conjunction with changing the ratio of undiagnosed illnesses still maintains the essential linkage of the overall exposed population and the number of serious illnesses, although approximations lead to some variability in the model iterations. However, the untested supposition that use of the Busch et al. ratios would lead to different approximations of illness rates was not generally supported.

Table 3-2. Two Comparisons among the Serosurvey and Busch et al. (2006) Suffolk County Infection Models

Model Basis	Year	Infection Rate	Exposed Population	Illnesses Expected	Deaths Expected	Resultant Immunity Rate
Serosurveys	2000	2%	1,135,878	152	15	1.5%
Busch et al.	2000	3%	1,135,878			2.3%
Busch et al.	2000	4%	1,135,878	175	18	3.0%
Busch et al.	2000	5%	1,135,878			3.8%
Serosurveys	2025	2%	1,558,775	138	14	31.7%
Busch et al.	2025	3%	1,558,775	95	9	47.9%
Busch et al.	2025	4%	1,558,775	106	11	57.9%
Busch et al.	2025	5%	1,558,775	105	11	65.9%

Notes: 2000 exposed population = ~75% of entire County based on positive dead birds and positive mosquito pools by zip code. 2025 exposed population = 100% of projected population (based on 2010 build-out).

Many comments were received regarding the County position that the mosquito program as a whole reduced overall disease risks, regardless of the kinds of mosquito control instituted. Many of the comments suggested that, instead, the County should distinguish between "nuisance" control and "disease" control.

Prior to the outbreak of WNV in 1999, there was a general distinction in the control efforts made by the County. The disease of greatest concern was Eastern equine encephalitis (EEE). EEE is a geographically limited disease, in many ways, as its amplification depends on *Culiseta melanura*, a mosquito that only breeds in red maple or Atlantic white cedar swamps. The

County conducted disease surveillance designed to detect the mergence of EEE in these habitats. Transmission of EEE to people or horses requires other mosquito species (bridge vectors). Control of those species of bridge vectors (primarily *Ochlerotatus sollicitans*, the Eastern salt marsh mosquito, and *Aedes vexans*, the inland flood water mosquito) reduces the risk of EEE transmission by reducing the pool of available bridge vectors. While the County generally acknowledged that an important purpose of the mosquito control program was to reduce impacts to quality of life caused by large numbers of human-biting mosquitoes, it was also pointed out in previous Annual Plans of Work that reducing the number of bridge vectors, even prior to the detection of EEE, provided a "margin of safety" should the virus appear or go undetected.

The occurrence and reoccurrence of WNV, across nearly all the County in most years, and the potential for nearly all human-biting mosquitoes found in the County to transmit WNV, changes the program definition. Source reduction, water management, and larval control efforts are intended to prevent the generation of adult mosquitoes. Since female adult mosquitoes that have fed at least once are the only mosquitoes that carry WNV, the application of these techniques necessarily occurs prior to the mosquitoes becoming infected. However, implementing these control measures clearly reduces the potential for infection by reducing the pool of mosquitoes that can transmit disease. This preventative approach has long been recognized as sound public health policy as well as the most effective way to control mosquitoes. The County believes that WNV impacts in the County are much less than they might be expected to be in the absence of such control measures. It is quite probable that other factors, such as the composition of the County's mosquito population, also impacts the infection rate here. However, the control program also has a role in shaping the mosquito population, so that again it is difficult to separate out clearly the impact of the control program from other factors. Those who argue that the control program should be abandoned would have us believe that the resulting order of magnitude or of increase in mosquito populations would have no impact on disease transmission.

It might be more plausibly argued that the adult control program has an explicit divide between nuisance and disease control. The terminology used for certain applications of adulticide is "Health Emergency" applications, after all. These are situations where the Commissioner of the Suffolk County Department of Health Services (SCDHS), acting under authority granted by the New York State Department of Health, has determined that immediate risks to human health need to be reduced by applying adulticide, and reducing adult mosquito populations in a certain area is necessary because, in that area, there is a particularly high risk of human transmission. The implication is that other applications are not made to reduce health risks, and so constitute nuisance control. However, the County has instead chosen to call these applications “Vector Control” applications (i.e., control vectors with potential to adversely affect public health, prior to detection of WNV or other pathogens). The terminology is intended to underline the status of all human-biting mosquitoes in the County as potential vectors of WNV, and that the reduction of large numbers of these mosquitoes will reduce risks that they become vectors of disease. This indirect, but clear connection between the reduction of large numbers of human-biting mosquitoes and decreases in disease risk is the reason that all aspects of the County control program, particularly in the age of WNV, are seen to be part of an overall disease control effort. It is true that alleviation of impacts to quality of life does result from these efforts as well, and the County does recognize that as an important ancillary benefit of the program. However, all of the efforts are inextricably intertwined with disease risk reductions, and so making a distinction between nuisance and disease control no longer has meaning for the Suffolk County mosquito control program. There were also many comments to the effect that severe infestations that result in large numbers of mosquito bites are clearly not a “healthy” situation, even if no specific disease is transmitted. This viewpoint is reflected in State and County Public Health Law, which declare conditions leading to mosquito infestations as a “public health nuisance” regardless of whether or not pathogens have been detected. This point of view is consistent with the way other public health pests are viewed. A public health nuisance is, by definition, a condition that adversely affects public health (irrespective of whether it causes fatal disease or some sublethal impacts). For instance, head lice and bedbugs do not transmit any disease in the United States, but no one would argue that an infestation of these insects is a mere “nuisance” that can be ignored.

3.2 Ecological Impacts Associated with Water Management and Proposed Pesticide Use

Many comments were received regarding the potential for ecological impacts from the proposed Long-Term Plan. The comments primarily focused on impacts associated with water management and the larvicide methoprene, although some concerns regarding other larvicides and the use of adulticides were also raised. The following outlines the general response to these concerns.

Water management has the potential to cause impacts to coastal marsh systems because it involves alterations of the hydrological systems of the marshes. This is true for the Best Management Practices (BMPs) identified in the BMP Manual. However, the experiences of other jurisdictions in employing these techniques, documented in peer-reviewed scientific journals (i.e., Wolfe, 1996, and Dale and Hulsman, 1990, as review articles), in "gray literature" (such as published professional meeting proceedings, project reports, or implementation manuals), and in the professional testimonials of technically-adept and scientifically trained public servants, all show that careful implementation of these techniques do not lead to unacceptable environmental conditions. Mosquito control agencies in New Jersey have been conducting this kind of work for approximately 40 years; other jurisdictions such as Delaware and Connecticut also have 20 years or so of experience. Impacts to the marsh tend to be short-term, and to be the result of construction activities rather than structural changes to the marsh environment. Changes to marsh ecology tend to be favorable, in the views of documenting marsh professionals, resulting in more fish use of the marsh, greater use of the marsh by aquatic birds of all kinds, and no major changes in marsh vegetation (except where tidal circulation has intentionally been greatly expanded, in which case halophytes often expand their extent at the expense of fresh or brackish water species).

Previous documentation of many of the projects, especially for long-term effects, is not extensive. This is foreseeable, given that meaningful long-term monitoring is labor-intensive and expensive. Also, it can be difficult to generate good, scientifically useful data sets, because of interannual variability associated with weather and other uncontrollable events, confounding and correlated factors, etc. However, it is also true that the lack of documentation of long-term effects also means that the burgeoning field of scientific research on marsh ecological issues has not identified water management practices as causes of marsh degradation, either. This is because the suite of techniques used in more modern water management is more sensitive to marsh processes and functions than was the more coarsely-applied technique of grid-ditching. Some claims have been made that these techniques will cause impacts, but the claims are largely based on analogies to other settings or situations, and are not based on direct determinations of negative impacts. For instance, the State of Maryland, which is the only jurisdiction to employ extensive marsh management as mosquito source reduction and then abandon the practice, had concerns that the techniques might be reducing the ability of marshes to serve as black rail habitat (see Maryland Department of Agriculture, undated). Suffolk County and its consultants have not found any documentation that this was the case, and some officials in other jurisdictions have suggested that there may have been no concrete evidence this was occurring. Similarly, because different guilds of birds have different habitat needs, concerns have been expressed that changing the high marsh through marsh management will reduce the use of that part of the marsh by birds that currently make the most use of the habitat as it is. There is a reasonable hypothesis; however, it is certainly an untested one. There are a very few, short-term monitoring programs of bird use of altered marshes. Those few examples appear to show continued use of the wetland by marsh and upland guilds (for instance, this is the case over the first two years at the Wertheim National Wildlife Refuge project sites). This could be because the changes to the physical fabric of the marsh, for most water management projects, are relatively small in overall extent (surface water extent on the marsh may change by 1 to 5 percent, for instance, for the largest projects).

The County intends to mitigate the potential for impacts from its water management program through extensive oversight and project review. New York State Department of Environmental Conservation (NYSDEC) has strongly expressed its intention to conduct required regulatory reviews of potential projects, to ensure that all projects meet the requirements of statute and regulation. In addition, the County has established a review process involving a suite of interested and involved parties (see Section 3.3, below). The County has committed to having the Wetlands Stewardship Committee develop a definition of marsh health, and to create an overall marsh management framework that extends far beyond the concerns of mosquito control. This will allow projects to be considered and evaluated so as to ensure the protection and preservation of functions, values, and the health of the County's remaining coastal marsh systems, and also to allow the County to conduct source reduction of mosquitoes so as to control mosquitoes while reducing its use of pesticides.

It is important to emphasize that the County is not proposing major marsh restoration projects over the next three years (other than the potential for more work at the Wertheim National Wildlife Refuge). The Wetlands Stewardship Committee is charged with refining indicators of wetlands health and developing strategies to address management needs of all wetlands County-wide. The result of the Wetlands Stewardship Committee's work will be incorporated into the first Triennial Report.

Comments regarding methoprene focused on two issues, primarily. One was that the DGEIS analysis did not include recent research, mostly with lobsters, that is said to show methoprene has impacts to organisms at concentrations at or below those caused by mosquito control applications. Secondly, comments suggested that the DGEIS did not weight the results of research in Minnesota (Hershey et al., 1997) enough – research that is said to have found ecological impacts to non-target organisms that propagate up and down the food chain. Specific aspects of these comments are discussed in detail in Section 4.8, below. The presentation here will focus on the general issues raised by the comments with regard to methoprene (and larvicides proposed for use in the Long-Term Plan, in general).

In summary, as discussed in detail below, the Horst work does not change the outcome of the DGEIS, because it is fundamentally questionable (problems with control organisms; confounding factors, such as cannibalism; use of concentrations of methoprene far higher than typical environmental exposures, etc.). Also, Horst results were not verified by other researchers.

Similarly, the Hershey results are not helpful, in that other confounding factors (e.g., meteorological variations) may have been the root of impacts on midges. Impacts were apparently anomalous, as variations in midge populations occurred only in later years of the study, with no apparent causal explanation. Hershey's results were also not reproduced in subsequent studies and years (i.e., no impacts, despite continuing pesticide use).

It was perceptively noted that methoprene has a different means of killing mosquito larvae (and certain other organisms). It is not immediately toxic to the organism, as many pesticides are (they tend to interfere with necessary functions, such as nerve signal transmissions, or basic digestive or circulatory processes). Rather, methoprene interferes with the hormonal signaling of the organism. This results in the organism not completing its maturation process, which does not allow an adult mosquito to be formed, and also leads to death of the larvae. The endocrine system is very complex; chemicals that have one effect in one organisms may have a different impact on the hormones (and processes controlled by the hormones) in other organisms. Therefore, it was suggested that it is necessary to look at these kinds of pesticides differently than more straightforwardly toxic substances.

Michael Horst, a researcher at Mercer University, believes that he has found endocrine system impacts in lobsters when they are exposed to methoprene. For instance, at very low concentrations Stage 4 lobster larvae were reported to have reduced molting frequency. Lobster cells have different gene expression when exposed to methoprene. Protein expression seems to be diminished for certain organs of lobsters with exposure to methoprene, and methoprene appears to be accumulated in those organs by lobsters when they have methoprene uptake from the environment (see Walker et al., 2005a and Walker et al., 2005b).

On the other hand, Dr. Horst also has emphasized data and information that may not support the emphasis he has place on it. For instance, he stresses increased toxicity to Stage II lobsters at either 1 ppb (Walker et al., 2005a) or 2 ppb (Walker et al., 2005b), reporting that 30 percent of the organisms died. He does not stress that 15 percent of the control organisms also died over the same time period, nor does he report that these organisms are notoriously difficult to get reliable results with, because they are cannibalistic (as reported by Zulkowsky et al., 2005) (eating each other skews the toxicity data). Dr. Horst has been chastised for being very creative in his determination of typical environmental concentrations for methoprene (using values that are orders of magnitude greater than others have calculated or measured) (see Antunes-Kenyon and Kennedy, 2001). He reports concern for crabs exposed to methoprene in salt marshes. His research did find impacts to crab larvae, but the stages he worked with are not found in salt marshes, but in the offshore ocean, or migrating in estuarine waters towards areas where adults live from offshore areas (Horst and Walker, 1999). The concentrations he exposes his treatments to (cells and organisms) are generally far above the concentrations that occur in the environment. That is a common toxicological practice, as to induce effects that may be rare in small test populations, exposures are often much higher than might actually occur (this leads to criticisms of studies along the lines of "someone would need to eat 50 hot dogs a day all their lives to receive such a dose"). However, in most of his later studies, Dr. Horst is not trying to make a population effect, but rather trying to determine if organism systems function differently when exposed to methoprene. It may be fair to ask if the effect would occur at environmentally realistic concentrations, rather than the higher exposures used in these studies.

Dr. Horst's toxicity findings for methoprene with larval lobsters (Walker et al, 2005a; Walker et al., 2005b) were not verified by other researchers (Zulkowsky et al., 2005). His other findings, at best, support hypotheses (that require verification) that non-toxic impacts to shellfish may occur with methoprene exposure (although it is not clear if they occur at environmental concentrations). His comments and theories are provocative, but at this time they do not provide a basis for asserting that methoprene, at the concentrations measured or calculated to occur following applications, has non-target effects.

A long-term study was conducted in Minnesota to test for impacts from methoprene and *Bacillus thuringiensis var. israelensis* (Bti). The study found effects from methoprene to non-target organisms in the second year of applications, and in the third year from both methoprene and Bti (Hershey et al., 1997). Section 4.8 (below) discusses extensively that follow-up studies at the same sites (with continuing pesticide applications) found that the impacts were no longer detectable (Balcer et al., 1999). That alone raises extensive doubts regarding the findings of ecological impacts from methoprene. However, another interesting aspect associated with the study is the delay in impact, which was noted by the researchers as somewhat curious. Chironomids (midges), the organisms most affected by methoprene, have multiple generations in a year (commonly two, but as many as seven) (Armitage et al., 1995). The impact was not merely "not statistically significant" the first year (or the second year, for Bti), but impacts were not detectable. There were no differences in the populations exposed to the pesticides in the first year for methoprene, and for the first two years with Bti. It is hard to find a plausible mechanism for an effect that takes several generations to occur, and then that disappears although exposure to the agent is continuing. This tends to make the claim that the impact is not linked to methoprene exposure, or that methoprene is not the primary agent causing the effects, seem to be a more reasonable conclusion to draw from the study, rather than to assert methoprene was the cause of measured impacts. The experimental design appears sound and creative, and was designed to eliminate as many confounding factors as is possible to do with environmental sampling. However, lapses over several generations appear to be an unlikely biological mechanism. Hershey et al. (1997) suggest that this curious pattern provides a rationale for conducting testing over multiple years to determine if impacts will occur. It also provides a rationale for repeating the experiment to determine if the results were strictly anomalous. The repeat sampling of the sites several years later that found no impacts despite continuing pesticide applications suggests that other factors that were not measured or accounted for may have been the cause of the impact, rather than it strictly being pesticide use.

Comments were received regarding adulticide impacts to the environment, but most were general in nature. The most specific comments were not found to be very relevant to the pesticides proposed for use in the Long-Term Plan (see Section 4.9, below, for specifics). Dr. Pimentel (Cornell University) submitted comments with a paper of his for support – but the paper (Pimentel, accepted) discussed the effects of wide-area agricultural pesticide use. Agricultural pesticide applications are very different from mosquito control applications, both in terms of the way they are applied, but also in terms of the kinds of products used. Peer Reviewer #2, who submitted many comments regarding recent findings on pyrethroids (some of which were discussed in the DGEIS), explicitly stated that most of the findings were not very relevant to the analysis, because the pesticides were used for different reasons than for mosquito control, and also were entirely different compounds. It is true that pyrethroids are under increasing regulatory scrutiny; however, recent USEPA reviews of mosquito control pyrethroids did not result in any significant alterations to USEPA's former findings regarding potential ecological impacts (USEPA, 2006a; USEPA, 2006c, USEPA, 2006d).

The sum of the comments regarding water management and pesticides did not lead the County to change any of its conclusions regarding these practices' potential impacts to the environment. Water management, as implemented according to the Revised Wetlands Management Plan, is not expected to cause environmental harm, but rather to enhance certain ecological functions in marshes. Use of larvicides is not expected to increase risks for ecological impacts. Adulticide use may have some impacts to night-flying insects, which are expected to be transitory. Permethrin and malathion appear to have a potential for some non-target impacts to aquatic organisms (primarily larval insects and crustaceans) under certain conditions, but close analysis seems to show that the effects will not be prolonged, and are unlikely to be persistent enough so as to be measurable from one mosquito control season to the next. The preferred adulticides under the Long-Term Plan, resmethrin and sumithrin, do not appear to increase risks for impacts to non-target aquatic resources.

3.3 Water Management Component of the Proposed Long-Term Plan

Comments were received regarding the water management component of the Long-Term Plan that led to alterations in this part of the Plan. The County has responded to issues raised in specific comments in Section 4.6 (below). This section is intended to explain how projects will be identified, designed, reviewed, and implemented under the Long-Term Plan.

Project Identification

The County has identified 46 specific marshes in the Wetlands Management Plan that are priority sites for water management projects because they receive aerial larvicide applications. In conjunction with the landowner-land manager of particular marshes, SCVC will try to identify particular marshes where the interests of the landowner include potential alteration of the marsh. It is likely that the first projects undertaken by the County will either be owned by Suffolk County itself, or managed by US Fish and Wildlife Service (USFWS) (USFWS believes that the preliminary results at Wertheim National Wildlife Refuge indicate that marsh management can be designed and constructed in such a way as to achieve mosquito control and ecological restoration goals conjointly). Initial projects will most probably be selected to provide a variety of types of projects – different scopes, different techniques – as the County investigates the best means of implementing such projects over the wide range of marshes in the County.

In addition, some landowners may have identified a need for marsh management at its marshes for purposes that are not oriented towards mosquito control. The Town of East Hampton has conducted a number of projects to try to improve estuarine water quality, for instance. All three estuary programs have identified marshes where various water management techniques, such as restoring tidal flows, might be appropriate to achieve ecological goals. It is anticipated that some of these projects may be brought to the County, as the County currently has the most technical resources to undertake marsh projects.

In addition, other projects may be developed in which County participation is either unnecessary or not unwanted. However, gaining approval by the Stewardship Committee may be perceived as a benefit, for instance—it might be useful in terms of permit processes, or in garnering support for grants or other funding opportunities. These "private party" projects will need to follow at least some of the processes that the County-involved projects do, in order that the Stewardship Committee can properly consider them. For all projects, these considerations will need to include conformance with the Stewardship Committee's marsh management plan, and to ensure that the project will support the marsh health definitions determined by the Stewardship Committee.

Once a potential project site is identified, the purpose of the project needs to be formally defined. This will require the identification of project goals, and objectives that need to be met in order to reach the goals.

An initial project design will be developed. In some cases, this may be a fairly detailed plan, but for simpler projects the initial design may not be very involved. At this point, the County will involve Town resource agency personnel to ensure that important local concerns are included or addressed, if such involvement has not previously been obtained.

A monitoring scope, including duration, selected parameters and means of measurement, and cost, along with some identification of the parties to be responsible for conducting the work, will be developed.

At this point, an approximate project timescale can be developed, and the project (if being carried out using County resources) can be tentatively slotted into the County project planning considerations.

Project Design

Project design entails a host of considerations. For most projects, it is likely to be a collaborative process. Landowner concerns and needs, SCVC mosquito control concerns and needs, Town resource department considerations, conformance with the Stewardship Committee marsh management plan, regulatory issues, and the need to support marsh health (as defined by the Stewardship Committee) will all play into the selection of particular BMPs. The BMP Manual began a process of defining advantages and disadvantages for each BMP, something that will continue as projects are considered and refined, and so the BMP Manual and its extensions will also need to be used in the design considerations. For the simplest projects, the small scale of the project will make this process less arduous than it will be for larger projects. Larger projects may require meetings between stakeholders to try to resolve the kinds of issues that are often in dispute for projects like this (wildlife-fish-vegetation balances, appropriate means of controlling or entraining tidal energies or flows, aesthetics, scope-scale concerns). For some projects, preliminary designs may be scrapped or changed considerably following various reviews.

The County anticipates that the former Wetlands Subcommittee (an informal group comprised of County, Town, academic, and NGO technical specialists) will continue to meet. This group would be very important in assessing projects as they proceed through the design phase. Creating a design that, at a minimum, considers the concerns and issues brought forward by the Wetlands Subcommittee would ensure that it is a robust and thoughtful project.

Simple, straightforward projects requiring minimum reviews that are on fast tracks for various reasons are unlikely to need much design work or review. Issues are much more likely to arise with larger, more ambitious projects, due to the potential to have different perspectives regarding conformance between the project particulars and broader definitions of the marsh management plan.

Project Review

Projects will be reviewed in different ways according to the scope of the project and the techniques proposed to implement it. All projects will entail consultation with the home Town natural resource department (and, potentially, with Town Trustees). All projects will need to be reviewed (and, in most cases, permitted) by NYSDEC. The former is likely to be informal in nature, for most projects, while the latter process is governed by State regulations.

The Wetlands Stewardship Committee will be involved in some form of review of most projects, as well. For BMPs 3 and 4, the Committee will be informed about the projects. BMPs 5 to 9 will require notification of the Committee about the project, a more detailed information process. In either case, should 5 or more members of the Committee determine that more review is required, then the project will undergo formal review by the Wetlands Stewardship Committee. For BMPs 10 to 15, all projects will undergo formal Wetlands Stewardship Committee review.

Formal review entails review and approval of all aspects of the project, form the goals and objectives, to design details, to the monitoring program. The diverse nature of the Wetlands Stewardship Committee is intended to ensure that projects that are reviewed will have little likelihood of having any significant negative environmental impacts. However, one of the Wetlands Stewardship Committee's responsibilities is to consider this possibility carefully, and make a recommendation regarding the need for further environmental reviews, per SEQRA.

Marsh management projects, because they may require SEQRA determinations, will also be reviewed by CEQ. CEQ will determine if the Generic EIS provided sufficient information to evaluate the proposed project's potential impacts, or if additional information is warranted. If additional information is warranted, the level of detail required will also be specified by CEQ. Section 5 of the FGEIS outlines the initial analysis of the need for additional SEQRA analysis for water management projects. This may be modified over time by the Wetlands Stewardship Committee and CEQ, either formally or through a series of precedents, so that the scope of water management projects requiring additional SEQRA review is established akin to "common law."

Project review will also require review by NYSDEC. In some cases, permits may need to be issued; in others, NYSDEC may determine that the project is in conformance with the Wetlands Land Use Regulations, and therefore does not need a permit. NYSDEC will also need to satisfy SEQRA with regard to its decision-making; presumably, if the County review of the project extends to a coordinated review step, then the NYSDEC SEQRA requirements may be satisfied by the County process (and NYSDEC's participation in that process).

The formal holder of any permit will be the property owner; where Suffolk County has played a substantial role in design and implementation of the project, the County will also be substantially involved in permit acquisition. The County notes that, in addition to NYSDEC permit decisions, federal and potentially local regulatory processes may need to be addressed. The County welcomes the technical expertise of NYSDEC as it addresses complex issues relating to coastal marsh management.

The review of large and complex projects, or those that use novel or otherwise not well-established techniques, may be iterative through each of these review phases. Changes that develop in the design may require a return to one or more reviewers to regain approvals. The proposed process is not designed so much to streamline project review as to ensure that the potential for negative environmental impacts is minimized by a thorough and wide-ranging review of each project. The County recognizes that may interest groups fear that the proposed water management component will damage important aspects of existing salt marshes in the County. The County believes that many of these concerns develop because of communication failures, so that stakeholders are not convinced that concerns have either been addressed or considered in the design process. This very complete review process should remove many of those issues. The County also understands that some concerns regarding the water management program also arise from differences in basic perceptions regarding marsh management; those concerns will not be alleviated by any review process, no matter how complete or thorough the process.

It needs to be emphasized that projects that are implemented under the Integrated Marsh Management program (and all projects undergoing this review process) are intended to have maintenance or enhancement of marsh health as the paramount consideration. Mosquito control will continue to be an element that is addressed, if required, in the marsh management process. Projects may even be initiated for mosquito control reasons, but they will need to ensure that marsh health is the dominant project concern.

Project Implementation

Project implementation is more than construction. Implementation of these projects will also require the collection of adequate information to ensure project success or failure can be determined. Therefore, implementing projects requires addressing monitoring needs.

Development of complete project goals and objectives is essential for the determination of a good monitoring protocol. Coastal marshes are complex systems that are intertwined with equally complex upland and estuarine systems. The complexity (and the ecological and environmental importance) of the elements of the systems often makes it seem necessary to measure everything that is possible to ensure that impacts are understood and accounted for. However, the County is proposing that the development of project goals and objectives serves to resolve some of the issues associated with project monitoring. Agreement among stakeholders, project sponsors, and regulators regarding the ways that the project intends to modify the system, and determining parameters that would therefore be affected by the modifications, will help to limit the potentially overwhelming effort associated with project monitoring.

Associated with the selection of parameters will be the determination of measures that will indicate whether or not the objectives for the project have been met. In some cases, the objectives may be absolute (per one of the examples given for objectives above, either an osprey will nest, or it will not). This may remove the need for extensive pre-project monitoring or to use control sites in conjunction with particular aspects of the project. For other objectives, there may be a need for determining pre-project conditions, or to make comparative measures at control sites. For instance, a project may have a goal to increase avian use of the marsh. Good objectives associated with this goal might be to increase the number of species of water fowl at the marsh in winter, and to maintain the number of red-winged blackbirds that currently forage on the marsh (among several possible objectives). Testing these objectives would seem to require either pre-project monitoring or use of good, representative control sites – or both.

All monitoring plans should include timetables for reporting results. Another aspect of the reporting should be continued review of the project into the indefinite future to ensure that repairs and needed reconstruction occur.

All construction efforts will include the production of "as-builts" – plans and reports that indicate exactly how well the project complied with the project design. Field conditions may result in necessary deviations from the initial plan, but major changes from approved plans will not require that permit issues be addressed, but also may require that other oversight bodies be informed. One of the purposes of the Annual Reports will be to inform all involved parties of the implementation of approved projects; however, in certain situations the County may need to bring a project before the Stewardship Committee in its altered state and undergo a more formal review. Mitigation of changes made during construction may ensue.

Generally, the County realizes that projects may require maintenance and modification over time. Coastal marshes are dynamic systems (albeit, systems that are also apparently stable in may aspects for decades as well), and so management of the systems is not likely to be completed by conducting a construction project over one winter. The County anticipates that much of the necessary oversight of the marshes can be addressed though general or "surrogate" approaches. These would include remote sensing of vegetation patterns and extent, continued surveillance for mosquitoes (which will also send trained personnel out onto to the marshes to make qualitative observations), and estuarine monitoring and sampling (changes in associated water quality or biota signal a need to investigate the management of any associated marshes).

Summary

The County, therefore, will only conduct work in the marshes on the basis of great preparation and review, and will continue to be stewards of its efforts. These efforts are to be undertaken in the context of stakeholder determinations of marsh health, and the establishment of an overarching marsh management plan. Thus, while the immediate concern of the Wetlands Management Plan is management of the County's coastal wetlands to reduce the impacts of mosquitoes and decrease pesticide usage, the County also is seeking to place this program in a larger context of Integrated Marsh Management (as is the case in Connecticut, for instance).

The following figures (Figure 3-1 to 3-6) summarize the review process described above.

Figure 3-1. Overall Hierarchy of Proposed Best Management Practices

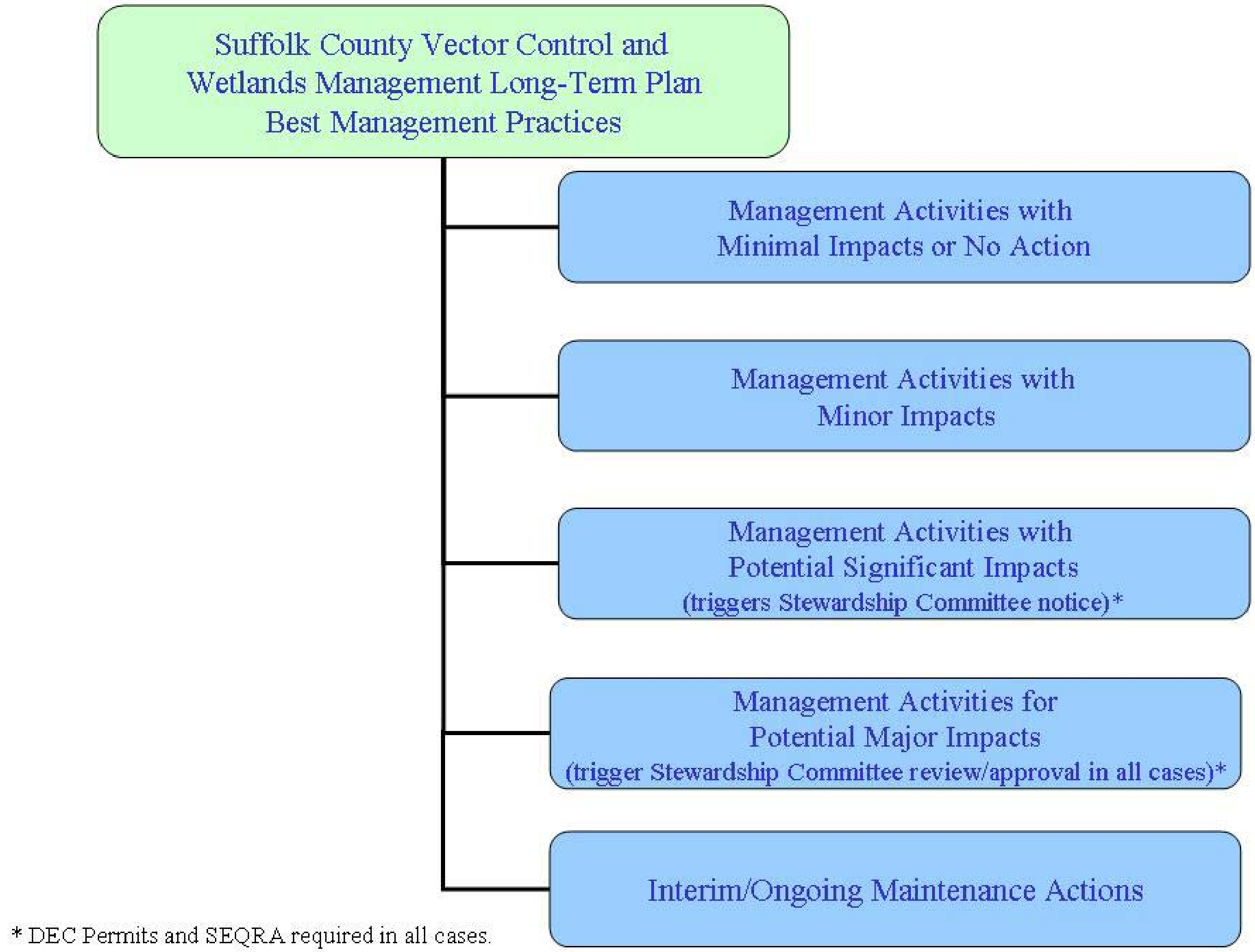


Figure 3-2. Review Process for Management Activities with No or Minimal Impacts

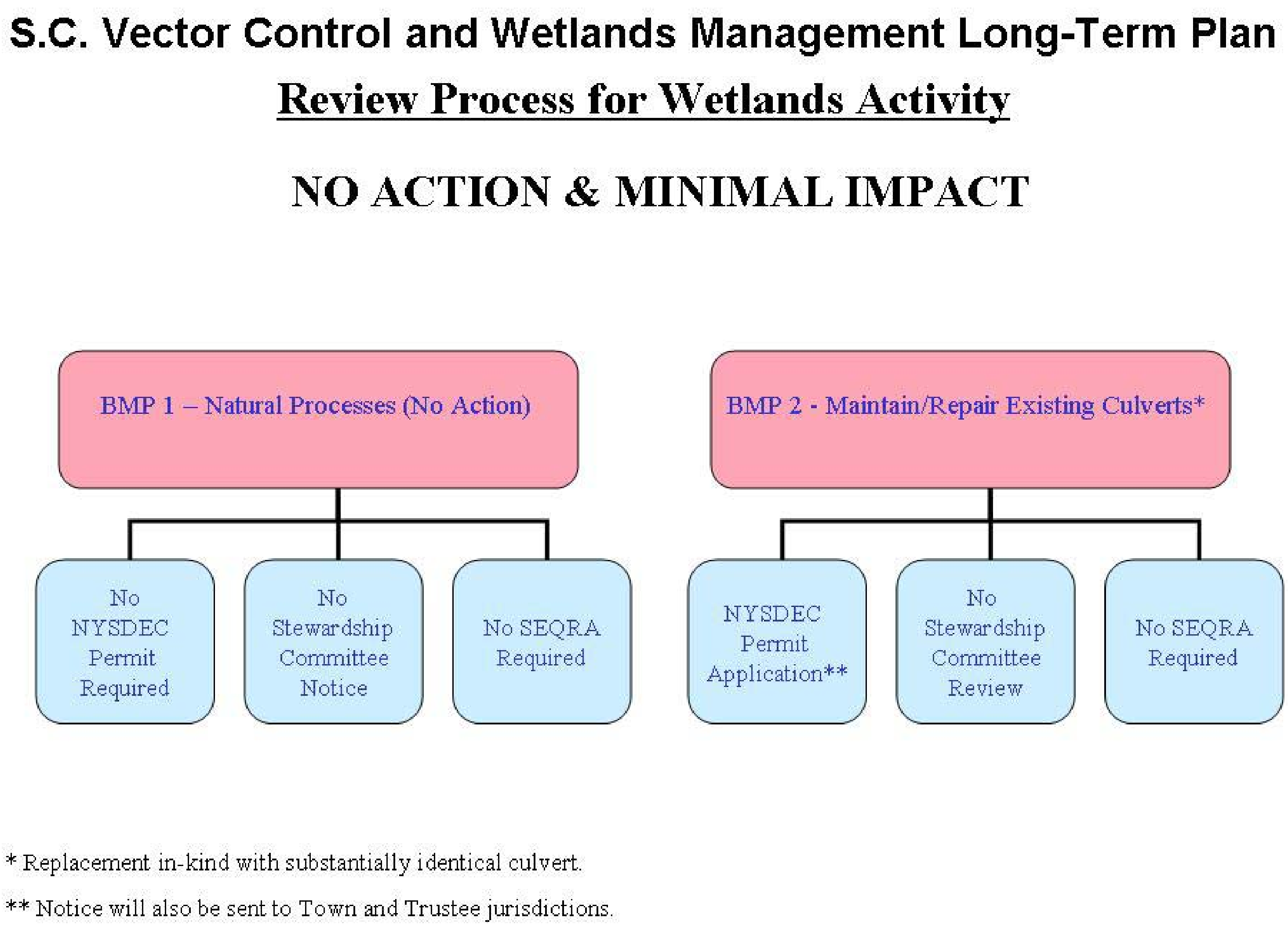


Figure 3-3. Review Process for Management Activities with Minor Impacts

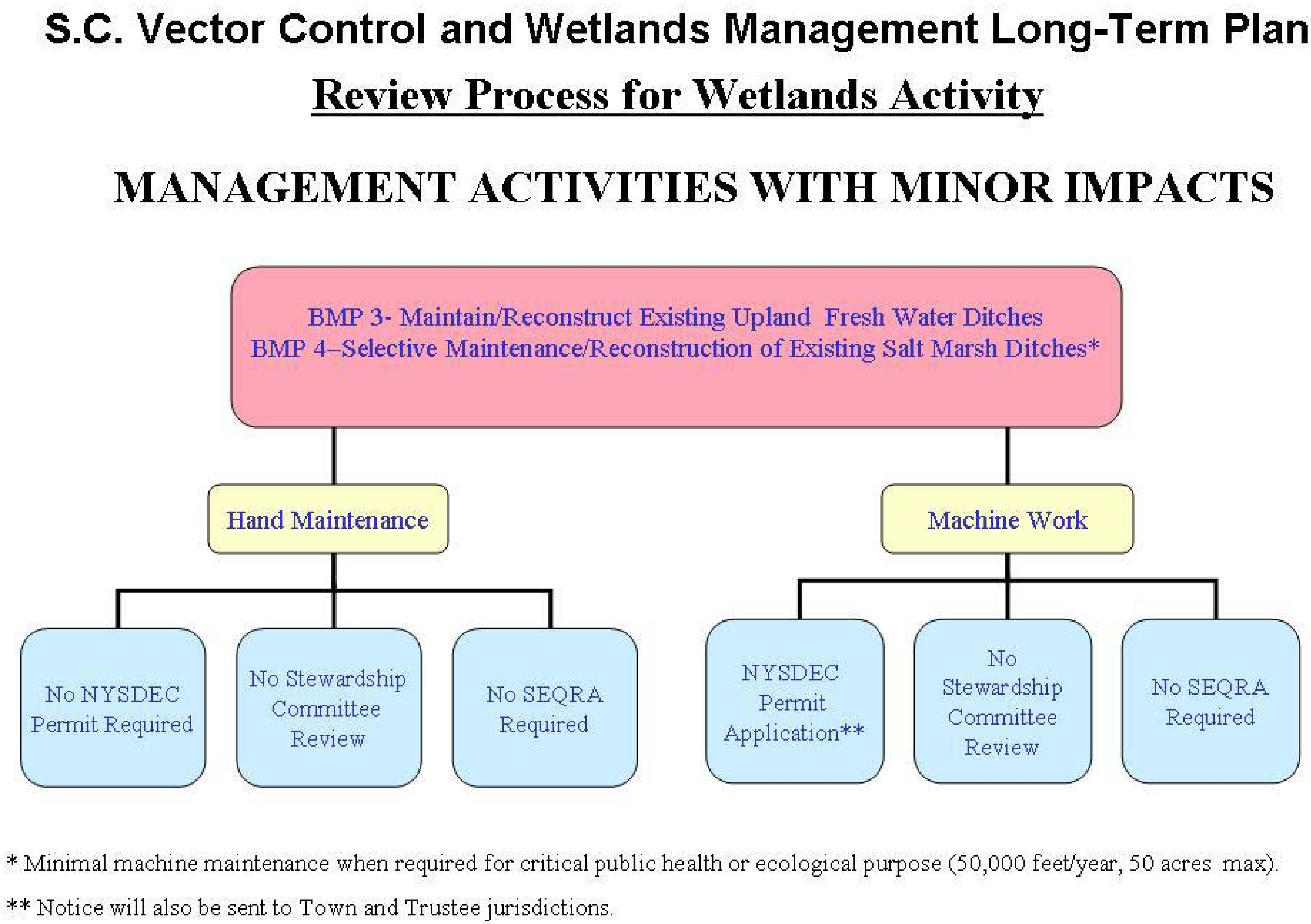
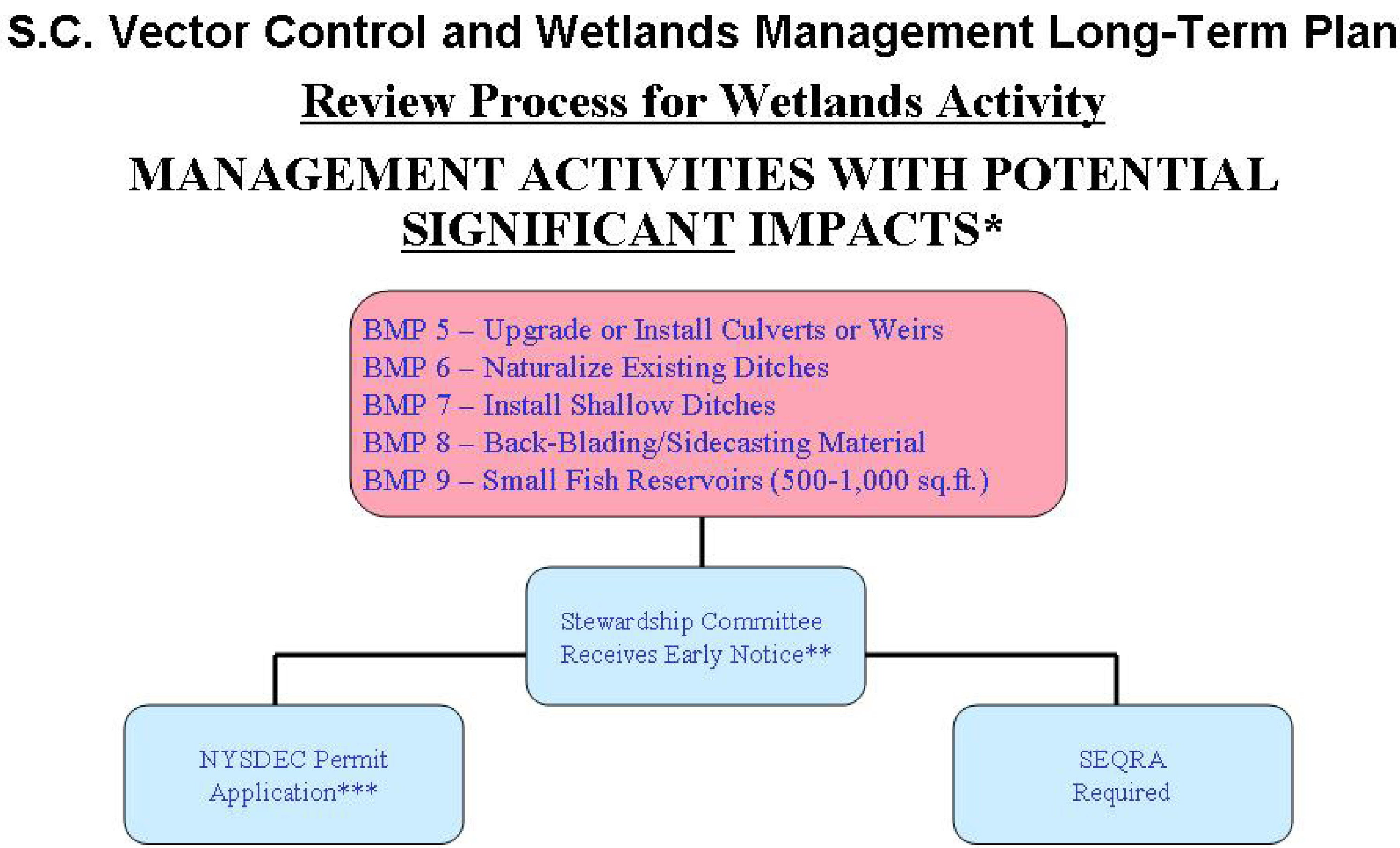


Figure 3-4. Review Process for Management Activities with the Potential for Significant Impacts



* In former plan drafts, BMP's 5-9 were designated "minor impacts" unless they affect 15 or more acres. In the current plan all are presumed to have "potential significant impacts," irrespective of size.

** Stewardship Committee can submit comments to project sponsor and/or SEQRA lead agency prior to project approval. Stewardship Committee meetings can also occur, as needed.

*** Notice will also be sent to Town and Trustee jurisdictions.

Figure 3-5. Review Process for Management Activities with the Potential for Major Impacts

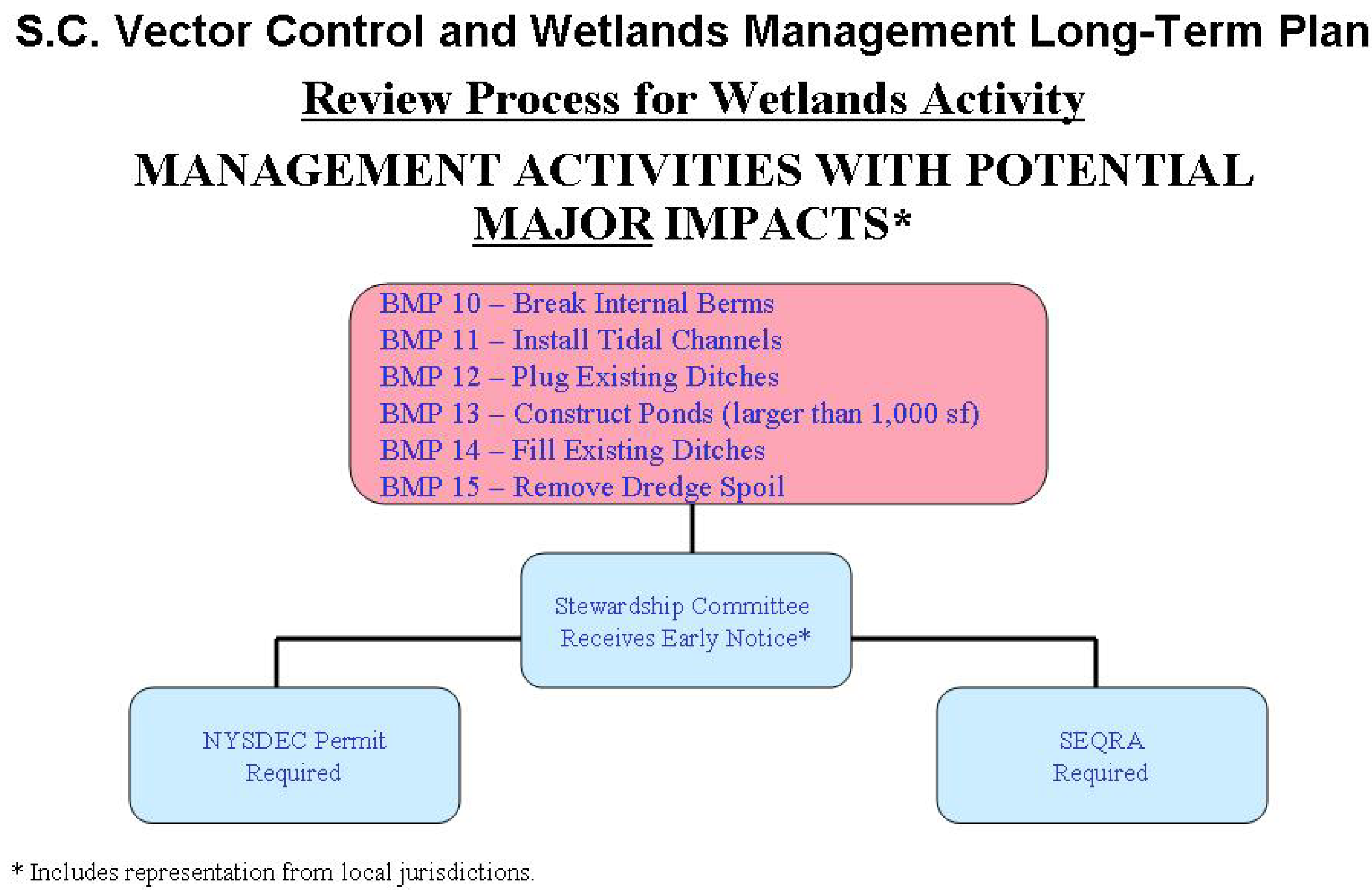
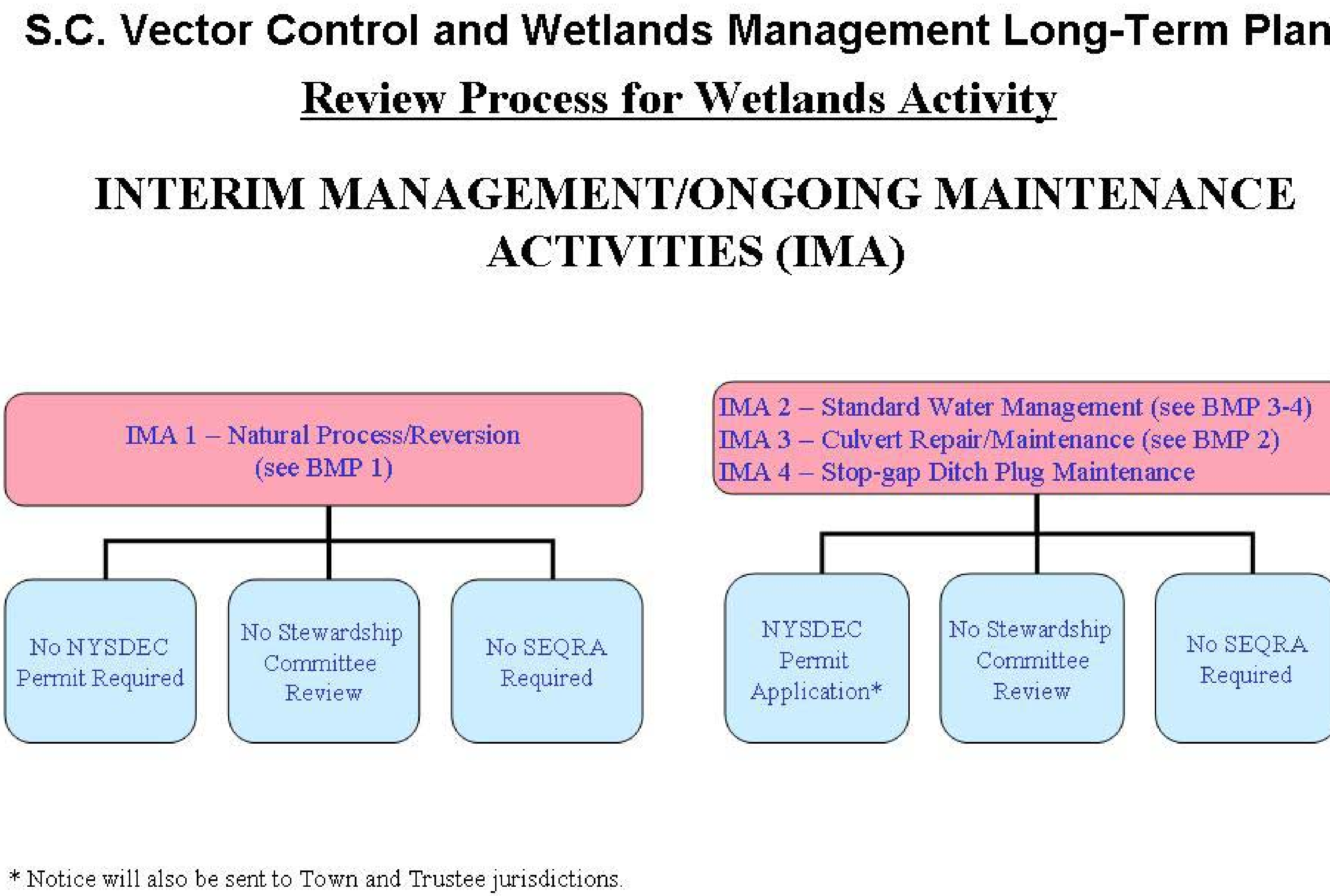


Figure 3-6. Review Process for Interim Management/Ongoing Maintenance Activities



3.4 Education and Public Outreach Program

Suffolk County remains committed to an aggressive and effective public education and outreach program. The pillars of the program are:

- Dissemination of traditional written materials (brochures, etc.) to the public
- Enhancement of County websites with materials generated in the Long-Term Plan process
- Production of important reports measuring the extent and effectiveness of the mosquito control program
- Education efforts by two SCDHS public educators, mostly to small groups and schools
- Individual education efforts by SCVC inspectors with homeowners
- Institutional education efforts (such as outreach regarding storm water system maintenance or tire management)

Operations and reporting by the vector control program are increasingly intended to be more open to the public, and to result in greater information sharing.

Several good, targeted comments were made regarding potential means to improve the Long-Term Plan outreach program. They included:

- Use PSAs
- Conduct elementary school education programs
- Conduct homeowner association education programs
- Target school properties for inspections
- Focus on waste tire removal
- Conduct residential and commercial property audits

The County notes that its proposed education and outreach program through SCDHS health educators includes potential school and homeowner association education efforts. SCVC inspection programs are almost always in response to complaints. The County acknowledges that prophylactic inspections could be fruitful. However, with over 100 school districts (almost all having many more than one school) in Suffolk County, and untold numbers of commercial properties, such an inspection program is well beyond available resources.

The County acknowledges in the Long-Term Plan that waste tires are a material of concern. Waste management is not a County function in Suffolk County. Various County departments are responsible for litter as part of their associated responsibilities in parks or road maintenance, for instance. SCVC will increase its outreach efforts through SCDPW resources, and through SCDHS education and outreach programs, to increase awareness that removal of littered tires not only is an aesthetic issue, and potentially a fire safety issue, but is clearly a health issue because of their potential to serve as mosquito breeding habitat.

The County has found that, very generally speaking, Public Service Announcements (PSAs) are ineffective means of reaching target audiences. They are costly (if professionally produced). If not professionally produced, they can be unattractive for media outlets to use. Their use is totally at the whim of the outlet, and so there is no control for the County to ensure that the messages are made at times when their use would be productive or not. Nonetheless, the County is not adverse to using PSAs. However, in a setting of limited resource availability, producing PSAs does not seem to be the most productive activity the County should consider. The County will seek to optimize its opportunities to produce PSAs through leveraged or donated resources, as is possible.

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4 Specific Responses to Substantive Public Comments

4.1 General Concerns

4.1.1 "Nuisance vs. Disease"

Many comments were received regarding the overall topic of "nuisance vs. disease." The 41 comments fell into five major categories:

(1) Scoping called for a differentiation between mosquito control for nuisance or disease control purposes (E-5, H-3, I-29, N-24, P-2, R-11, S-2, AK-7, AM-8, AR-14, BA-1, BD-1)

The comment is accurate in that this issue was raised in Scoping, and the response to Scoping comments was that the County would "make every effort" to differentiate the two (CA-CE, 2002).

This issue was discussed in the DGEIS (see pp. 140 to 144). However, recognizing that several comments do not accept the County position as presented in the DGEIS, the County will present its position in a slightly different manner in the FGEIS.

WNV has been present in Suffolk County since 1999 (Mostashari et al., 2001a). Mapping of the incidences of WNV-positive birds and mosquito pools from 2000 to 2004, presented in the DGEIS in Section 7 (see DGEIS Figures 7-12 to 7-16, pp. 1148-1152) cumulatively found that all but four of the County's zip codes had such evidence of WNV infection at one time or another over that period. This indicates that essentially no part of the County can be considered as exempt from concern regarding WNV.

CDC guidance regarding an area "anticipating WNV epizootic based on previous WNV activity in the region" (Risk Category 1) advises conducting surveillance, initiating source reduction, and using larvicides in areas identified by surveillance as hosting potential amplification and bridge vectors (CDC, 2003). Section 2.4 of the DGEIS (pp. 76-96) discussed the mosquitoes found in Suffolk County, with an emphasis on 15 species of greatest concern – the mosquitoes which are the targets of control efforts. These 15 species were classified in terms of their potential to spread WNV by Turrell et al. (2005). This classification, presented in Table 2-14 of the DGEIS, found that 12 of the species had some potential to transmit WNV. The three species that were not classified as potential WNV vectors were the two *Anopheles* species (these are potential malaria vectors) and *Culiseta melanura*, which is the amplification vector for EEE. Therefore, the 12 species capable of transmitting WNV should be, according to CDC guidelines, subjected to source reduction and larviciding, as indicated by surveillance information, for the purpose of reducing WNV risks, whenever there is thought to be the potential for reoccurrence of the virus. This appears to be the case across Suffolk County.

This, in brief, is the County's argument that mosquito control to reduce disease risks and/or to lessen quality of life impacts cannot be differentiated. The CDC guidelines are based on the notion that, if pathogen presence in local mosquitoes is probable, waiting for the pathogen to appear means that the most effective means of mosquito control (source reduction and larval control) cannot be optimally employed. The County's public education, surveillance, source reduction (including water management efforts primarily targeting salt marsh mosquito species), and larval control (biocontrols and larvicides) program components all clearly fall under the joint purposes of reducing disease and public welfare impacts by preventing infestations of biting, vector mosquitoes.

One program component does maintain some kind of distinctions regarding the purpose of control. This is adult control, which is accomplished using pesticides. The County Long-Term Plan bifurcates the effort into two distinct efforts. One is clearly intended to address an immediate threat to public health from the presence of pathogens and is described as "Public Health Emergency" applications. These are only made following a declaration of a Public Health Emergency by the State Health Commissioner, and a subsequent risk analysis of local, immediate conditions by the County Health Commissioner that determines risks from mosquito-borne disease need to be reduced. The second condition under which the County undertakes adult control is described as "Vector Control" in the Long-Term Plan. The triggers for Vector Control include the identification of populations of target mosquitoes (those on the list of potential vectors, Table 2-14 in the DGEIS) above certain population levels. The proximate cause for action is when mosquito population levels reach the point where people cannot conduct their normal lives without numerous mosquito bites; a condition usually caused by high numbers of *Ochlerotatus sollicitans*. Under such conditions, the usual measures to avoid being bitten by infected mosquitoes, such as avoidance of peak biting times, screens, and the use of repellents, become ineffective. While the immediate benefit to the public is an improved quality of life,, there are human health impacts associated with mosquito bites (allergic reactions and various parasitic effects (Harwood and James, 1979), and, as identified by Peer Reviewer #2 of the Risk Assessment in comment U-27, restrictions on outdoor activities can lead to indirect human health impacts through exercise or outside play avoidance. In addition, reducing large populations of potential vectors even prior to the detection of pathogens reduces the numbers available to acquire pathogens when they do appear. Given that WNV seems likely to appear every year for the foreseeable future, it is a prudent public health measure to reduce the numbers of vectors available to transmit the disease prior to its actual detection. For single brood (univoltine) species, eliminating any adult mosquitoes means those mosquitoes cannot be replaced until the following season, and so adult control clearly impacts that year's population for the remainder of the year and sometimes for subsequent years. The County recognizes that there are degrees of disease risk associated with infestations of adult mosquitoes, depending on whether or not pathogen has been detected and the degree of pathogen activity. In recognition of these degrees of risk, the County has set more stringent criteria for adult control when pathogens have not yet been detected. However, the time of the year when mosquitoes create the greatest "nuisance" is also the time of year when viral transmission occurs. For any given infestation, it is not possible to be sure whether or not the mosquitoes are infected at the time treatment decisions must be made, because there are considerable time delays between when mosquitoes appear and when samples can be acquired and tested. It would be imprudent to ignore high numbers of biting mosquitoes under conditions where disease transmission is likely simply because the pathogen has not yet been detected. By the time the presence of pathogens is confirmed, human transmission may already be well underway, and the opportunity to prevent serious disease may have been lost. Therefore, the County has asserted and continues to assert, even non-Health Emergency adulticide applications can result in reduced disease risk for County residents. In sum, all aspects of the County program focus on reducing disease risks.

Therefore, making distinctions between nuisance and disease control under conditions where mosquito-borne disease is ubiquitous and almost all major human-biting species are vectors, is an academic exercise of no utility, and would only serve to artificially distinguish activities that cannot be practically separated. Most of Suffolk County's mosquito control activities serve a dual purpose in that reducing the number of mosquitoes that bite people necessarily reduces quality of life impacts, and because these mosquitoes are capable of spreading disease to people, the control measures also reduce public health risks.

It should be noted that the establishment of distinct triggers and conditions for vector control adulticide operations (distinct from human health triggers) is in line with the potential results identified in the Response to Scoping if a distinction between nuisance and disease control were to be made (CA-CE, 2002).

(2) The distinction has been made previously or by others (N-20, P-8, P-29, P-31, P-32, R-23, R-24, S-14, S-27, S-28, BA-6)

Several commenters indicated that other jurisdictions have made a distinction between nuisance and disease control by establishing West Nile Virus Response Plans and / or only conducting mosquito control in response to public health threats. The most important point to remember about the approaches taken by other jurisdictions is that these programs are responding to local conditions that may be very different from those of Suffolk County. However, as CDC guidelines suggest (CDC, 2003), even a "West Nile Virus Response Program" such as the Westchester County program should conduct source control and larval control programs to prevent mosquito populations from reaching numbers that have been evaluated as causing serious health threats. The DGEIS (pp. 61-76) discusses several local and two "exotic" WNV Response Programs, illustrating the different ways that these overall guidelines have been implemented. Some are remarkably similar to Suffolk County's approach, and others differ. Suffolk County's approach is tailored to the unique conditions found in the County. Because the major human-biting species in Suffolk County have been shown to be potential WNV vectors (per Turrell et al., 2005), in Suffolk County control of all human-biting mosquitoes provides human health risk reductions.

The apparent distinction may also arise because several jurisdictions did not have active mosquito control programs prior to the introduction of WNV. New York City and Westchester County, for instance, did not have extant programs until 2000 (and filed DGEISs on the programs in 2001, see NYCDOH, 2001, and Westchester County 2001.) Therefore, the WNV programs are perceived as having no connection with quality of life impact reductions. For

Suffolk County, where the existing program pre-1999 focused on alleviation of quality of life impairments and surveillance for amplifying EEE, it seems credible to assume that WNV control efforts are something distinct from these earlier efforts.

Indeed, in places the Annual Plans of Work may have preserved some of the language distinctions from pre-1999 programs. These were noted in several comments, where the SCVC goals were accurately quoted as:

1. Protect the public from mosquito-borne disease.
2. Reduce mosquito infestations to alleviate social or economic impact to the public.

Because these goals are listed separately (and sequentially), it is easy to perceive that they describe distinct activities. This is not true, as other portions of these Plans of Work make clear. As stated in the 2001 Plan of Work, "[t]he appearance of WNV in so many common mosquito species further demonstrates the futility of trying to clearly distinguish between mosquito control for nuisance control and control for disease prevention" (SCVC, 2001).

Therefore, a **clear** distinction between nuisance and disease control is not accomplished by the creation of separate WNV Response Plans, nor did Annual Plans of Work filed from 2000 to 2004 make such a distinction. The County has long recognized the near-complete overlap between "pest" species and "vector" species.

(3) The primary concern of the program should be (only) mosquito-borne disease (1-24, P-10, P-11, P-12, P-13, R-22, BA-8)

The County agrees that the prevention of mosquito-borne disease is the overriding rationale for current mosquito control efforts. However, prevention of non-disease impacts to people, such as the diminution of quality of life (see comment AT-1, for instance), potential economic impacts due to loss of tourism (see comment BJ-8), even health impacts associated with mosquito bites that do not lead directly to disease (comment U-27) were also identified as concerns for the County to consider.

(4) Mosquito nuisance does not justify control (I-30, I-31)

The County, as discussed immediately above, does not believe that its control program is predicated on nuisance control. Suffolk County has determined that all aspects of its program contribute towards the reduction of overall disease risks. However, whether or not improvement in quality of life through mosquito control is justified is largely a value judgment that varies a great deal from person to person and may largely depend on the degree to which that person's quality of life is impacted by mosquitoes. As is discussed extensively throughout this FGEIS, there were many comments about the evaluation of potential impacts associated with mosquito control measures, especially compared to the benefits that might be accrued. This FGEIS will attempt to justify the decisions in this regard that have been made by the County, and to showcase decision-making processes that will allow for continuing evaluations of the cost-benefit aspects of mosquito control.

(5) Not distinguishing between nuisance and disease causes dangers/problems (P-3, R-12, R-13, BA-2, BA-3, BD-2)

These comments focus on the potential for increased demand for control if mosquito control for nuisance is not distinguished from health control measures. Unfortunately, the reality of Suffolk County in 2006 is that it is rarely, if ever, possible to assure the public that the mosquitoes that are biting them are free of disease. The County agrees that the general public probably perceives greater need for mosquito control with reoccurring WNV in Suffolk County. However, decisions regarding mosquito control measures still weigh the potential for impacts to human health and the environment, and compare them to the potential benefits from undertaking control. All aspects of mosquito control are subject to some form of review and regulation; some are self-imposed by the County, but other agencies also have legal and regulatory responsibilities to review and consider many mosquito control activities. The County believes that this combination of voluntary and regulatory review ensures that the mosquito control entered into by the County is commensurate with the evaluation of costs and benefits determined by the Superintendent of SCVC and the Commissioner of SCDHS, among other decision-makers.

Related to these themes were three other comments. In one (AZ-1), the comment was in favor of a plan that stopped mosquito attacks. The County cannot conduct mosquito control in a fashion that ends all mosquito biting, but it has identified high concentrations of human-biting mosquitoes as being a condition that should be alleviated. Another comment (BH-8) noted that mosquito control was generally favored by the HIV-positive community. This may be due to the perception that mosquito-borne illnesses may be of greater concern for such individuals. If the control measures include adulticide applications, however, there are also concerns that pesticides may affect those with depressed immune systems more than people with more normal immune reactions. The risk assessment treated immune-suppressed individuals as having additional risk factors for potential impacts. Another comment (BI-26) noted that one reason not to differentiate between nuisance and health threat controls is because New York State reimburses local mosquito control costs associated with health threat responses. Reimbursement from New York State for mosquito control costs must meet certain technical requirements, and is not affected by programmatic classifications of "nuisance" or "health risk" reduction. In fact, recent changes to State Public Health law make all mosquito surveillance and control measures reimbursable as a general measure to protect public health, rather that only response to a declared health threat. This is a further recognition in public health law of the importance of controlling mosquitoes.

4.1.2 Limitations on the Risk Assessment

Comments were received that addressed theoretical or conceptual issues associated with the risk assessments. In all, 71 comments were classified as relating to this category. Particular technical issues raised on the risk assessments are also addressed in sections 4.9.4 and under particular topics. The County acknowledges that the classification of risk assessment related comments was difficult, and apologizes if the ordering of these comments is suboptimal for some reviewers.

Many of the comments received were difficult to place in large overall groups, and so many comments received individual (or nearly so) responses.

(1) Positive/complimentary comment (D-2, D-3, H-14, T-1, T-2, U-2)

Some comments were pleased with specific design aspects or approaches taken by the risk assessment, or the overall approach to characterizing risk adopted by the County.

(2) Modeling approach needs more transparency (T-29)

A peer reviewer selected by the TAC for the risk assessment found the calculation methodology used in the quantitative risk assessment of pesticides impacts difficult to follow. Therefore, an example calculation has been traced. It is presented in Appendix 8.

(3) Risk scale concerns (N-19, R-14, R-15, R-17, R-18, R-19, AO-20, AO-21, AO-22)

Several comments were concerned that the analysis of different impacts (from pesticides and mosquito-borne disease, for example) were evaluated according to different scales or methodologies. Pesticides were said to be compared to defined risk scales, where acceptable risk is determined if the probability of impact is less than a certain trigger level. Mosquito-borne disease risks were said to have been evaluated on a "zero risk" scale, where there was to be no allowable level of risk.

The DGEIS discusses, briefly, the differences in evaluation methodologies used in the Impact Assessment (see pp. 855-856). The County had anticipated making the human health impact assessment analyses of pesticides and mosquito-borne disease as consonant as possible. Two problems made this technically difficult. One was that the quantitative model of disease transmission that researchers at the Harvard School of Public Health hoped to implement required too many estimated input terms. Despite the comprehensive surveillance program in place in Suffolk County, because information is gathered for operational purposes instead of mosquito ecology purposes, necessary information would not have been based on actual collected data, but secondary estimates or default values. Therefore, a much less sophisticated model for human health impacts from mosquito-borne disease was devised. Secondly, the mosquito-borne disease results could best be expressed in terms of probabilities of illness or death to a population in the course of a season. This is somewhat comparable to how cancer impacts are usually determined, which is in terms of added probability of developing cancer over the course of a lifetime. However, acute and chronic toxicity risk assessments (non-cancerous) are usually computed through use of a Hazard Index or Hazard Quotient. These compare a threshold exposure concentration to measured or modeled environmental exposures. If the measured or modeled concentration is less than the threshold value (HQ/HI < 1), then generally the risk of impact is thought to be slight. An HQ/HI value greater than one is thought to indicate, at a minimum, that the situation is of concern and requires further investigation, because the expected concentration the population is exposed to exceeds the threshold of concern (which generally is based on safety factors, as these thresholds are usually developed using indirect assessments of toxicity, especially for people). This means that the pesticide evaluation, especially for non-cancerous toxicity (all adulticides except permethrin were only evaluated for non-cancerous toxicity), returned "absolute" values based on whether the exposure to the pesticide reached or did not rise to levels of concern. Therefore, the comments almost all reversed the evaluation means: the assessment of mosquito-borne disease found that exposure to WNV, with no control, might lead to as many as 16 deaths per year in Suffolk County (an annual fatality risk of approximately 1/100,000) (see Table 9-7, p. 1234, in the DGEIS), whereas the risks from pesticides were best described as "below reasonable levels of concern" in the felicitous phrasing of Peer Reviewer #2 (comment U-20).

The permethrin cancer risk assessment analysis (Table 7-21, page 1071 of the DGEIS) clearly showed that, based on the modeled exposures used in the quantitative risk assessment, risks associated with permethrin would be hundreds to millions of times lower than the minimal level of concern adopted by USEPA and the Food and Drug Administration of 1 x 10^6 (one in a million excess lifetime cancer risk). On the other hand, actual WNV case rates (per year) for Suffolk County were computed to be 1.8 per million (Table 7-40 in the DGEIS, page 1153). Lifetime risks, therefore, might be in the range of 100 per million, and, given a fatality rate of approximately one per ten serious cases, a lifetime risk from WNV under the existing control program might be characterized as 1 x 10^5 (or ten times above the USEPA lower limit for concern regarding excess cancer risks).

Nonetheless, there is some accuracy to the comments that the County would like to eliminate health risks associated with mosquito-borne disease. Public health officials would like to believe that a high enough standard of mosquito control can be achieved so as to practically eliminate most risk from mosquito-borne disease. From that perspective, every incident of mosquito-borne illness in the County is, in a sense, a failure of the public health system. This goal is not achievable, because it is not feasible to eliminate mosquitoes from Suffolk County, and therefore some degree of mosquito-borne disease risk will always be present. However, because mosquito-borne disease can be nearly classified as preventable illness in a setting such as Suffolk County while maintaining strict environmental standards, there is some validity to the claim that the County has "no tolerance" for mosquito-borne illnesses. At the same time, the data available to the County implies that human health risks associated with pesticide use for mosquito control are below reasonable levels of concern, and that environmental impacts that may occur will not cause ecological degradation, as these were the conclusions of the adulticide risk assessment (see Table 7-22, p. 1074, and Table 7-31, pp. 1117-1118, of the DGEIS).

(4) "No risk" statements-risk characterizations (P-5, R-21, T-4, T-10, U-12, U-13)

Several comments accurately note that risk assessments do not return results of "no risk," which was a phrasing that crept into portions of the impact analysis. "No risk" is not generally considered to be acceptable risk communication, as all activities have some increased risk. The more accurate phrasing that should be understood in place of "no risk" is "risks below levels of reasonable concern" for human health evaluations, and the somewhat less pithy but very accurate modifier used in Table 7-31 of the DGEIS (pp. 1117-1118) for the ecological analyses, that "predicted exposures were below levels of concern established by USEPA and/or others and so do not indicate that there is an increased risk of unacceptable ecological impacts from the use of pesticides under conditions evaluated in this assessment."

One comment also pointed out that the larvicide human health impact analysis did not find "no risks," but rather a risk assessment was not possible to conduct because no reasonable exposure pathway for people from the applications could be construed.

(5) Source information concerns/update information (T-5, T-6, U-5, Z-27, AA-1, AA-5, AA-12, CC-1)

Comments were received on the reliance on the Westchester and New York City DGEISs for toxicological data, and an apparent lack of additional citations from toxicological literature published following the release of those DGEISs.

In Scoping, and as part of the project Workplan (which was incorporated into the EIS Scope) (CA-CE, 2002), the County was open about its intent to use the New York City (NYCDOH, 2001) and Westchester County (Westchester County, 2001) DGEISs as sources of toxicological information. These reports were reviewed, and the information that was presented there was mined. Because the presentation of toxicological information in the DGEISs was not always best in terms of how Integral Consulting planned to use the data in its modeling, most of the key references in the DGEISs were reviewed, meaning that expected savings in time and effort were not as well realized as had been hoped. However, this did allow for independent verification of the content of the DGEISs. In addition, the DGEISs, although not subjected to peer review, were subject to public comment and review, and FGEISs were prepared following substantive comments on their content.

Integral Consulting and SCDHS conducted further research regarding ecological and human health toxicological studies prepared between 20001 and the submittal of the toxicological Literature Search work products (CA-IC, 2004, and CA-SCDHS, 2005, respectively). These reports list dozens of references post-2001. For example, the Ecotoxicological Study lists seven pages of post-2001 references (CA-IC, 2004). The Human Health Toxicological Study did not organize its references in the same fashion, but dozens of post-2001 references can be seen in the separate lists for each agent investigated (CA-SCDHS, 2005). However, the reports were completed in the summer of 2004; this means that late 2004, 2005, and 2006 references cannot have been included in the work.

The DGEIS attempted to address some of these concerns. Comments made regarding the completeness of the methoprene toxicological review were addressed, for example, at some length (pp. 993-1018), and will be revisited somewhat in Section 4.8.1 below. Recent findings regarding pyrethroids were discussed in pp. 1115-116, and recent human health publications were discussed in pp. 1074-1079. The Peterson et al (2006) generic risk assessment regarding pesticides used for mosquito control was discussed in pp. 1077-1078. The SETAC meeting results (Baltimore, MD, November 2005), which were mostly unpublished at the time of the release of the DGEIS, were not discussed in as great a detail as some of the comments would have preferred.

(6) Strawman plan-scenario selection information needed (T-15, T-16, T-17, T-18, T-19, T-23, U-7, U-41, U-45, AA-11, AG-65)

The conditions used for the risk assessment were not always spelled out in constituent documents. Many of the comments were based on reviews of the Task 8 Report (Cashin Associates, 2005a), which did not spell out the development of the strawman plan. However, the

DGEIS did discuss the development of the strawman plan in detail (see pp. 439-483). The strawman plan was intended to be based as closely as possible on a reasonable potential management scenario. This concept was adopted so that if unreasonable risks were found, alterations to the management program could be adopted. Therefore, certain comments do not adequately understand the purpose of the risk assessment, which was meant to help guide the selection of alternative mosquito control methods. On the other hand, in order to avoid constraining the analysis, particular products were not explicitly modeled. Malathion degradates were intended to be modeled, but data to drive the risk quantifications proved to be unavailable, for the most part, and so the analyses were not conducted (see page 1034 of the DGEIS). Irrigated croplands, although present in Suffolk County, have never been targeted for mosquito control purposes, and with label constraints associated with preferred products, are unlikely to be treated except under dire health emergency conditions. In addition, Suffolk County was not modeled as an urban environment, and so the presumptive lower degradation rates in such areas were not considered. One comment also inquired as to why other repellents besides DEET were not considered for study. Early on, the project team determined that DEET was the most controversial of repellents. Although programmatically Suffolk County has no role in overtly affecting repellent use, because advisories sometimes call for repellent use, potential impacts regarding DEET use were included in various assessments. The Long-Term Plan notes that New York State Department of Health recommends DEET formulations, picaridin, and oil of eucalyptus (p. 865 of the DGEIS), and that Bite Blocker (a botanical product) has also tested well.

(7) Address exposure context (T-9, U-8)

Both TAC risk assessment peer reviewers commented that the low exposures associated with mosquito control applications, which drive the calculations that find no exceedances of reasonable risks for both human health and ecological impacts, need to be emphasized more. Essentially, although some of the laboratory toxicity studies can find impacts associated with these pesticides at unimaginably low concentrations (parts per billion or less), the application rates for mosquito control result in environmental concentrations that are even less. These data are reflected in the findings of the Caged Fish study (see pp. 763-769 of the DGEIS, and Cashin Associates, 2005b) and are inherent in the findings of the air modeling that drove the quantitative risk assessment results. The notion of low mosquito control application rates, especially compared to agricultural application rates, especially informs the DGEIS non-target flying insect presentation (see pp. 1083-1090).

However, work conducted in the Long-Term Plan and included in the risk assessment (Appendix to the Quantitative Risk Assessment: Health Risks from Background Pesticide Exposure) and the DGEIS (see Table 3-35, pp. 384-385) suggested that certain exposures to pesticides can reach levels that are higher than levels of concern established by USEPA. Thus, it is true that some pesticides and pesticide usages may elevate risks by appreciable amounts, even to the point that they exceed USEPA guidance values.

(8) Include efficacy information (U-9, U-10)

One TAC peer reviewer believed that efficacy information should have been emphasized. This is because efficacy for standard treatments is often much greater than that for non-standard treatments, and so this drives the selection of standard treatment by operators. Efficacy data presentations for non-standard treatments could also allow weightings of the findings for such treatments, so that small impacts associated with ineffective treatments might be identified as potentially causing more impacts than an efficient means of treatment that had somewhat greater potential to cause impacts.

(9) Young child classification issues (T-26, T-42)

One TAC peer reviewer was concerned about two aspects of the Integral Consulting decision regarding the young child classification. Because very young children sometimes have greater exposures through some pathways than slightly older children do, because of crawling and greater mouthing of objects, concerns were raised that the 0-6 year old classification was too broad to capture all potentially high risk scenarios. Integral Consulting used USEPA guidelines (USEPA, 2003) to develop these exposure groupings, however, and believes they are appropriate for this impact analysis.

Integral discussed this information in more detail, in Appendix D to the Human Health Risk Assessment (provided in the Task Report for Task 8, Cashin Associates, 2005a). USEPA identified 11 potential child age groupings. In particular, the birth to 6 years old grouping was thought to contain as many as seven age groupings. Integral used the single young child grouping, but, in determining exposures for the pathways used in the risk assessment, took the highest values for potential exposure from each subgroup. For example, the 3 to 6 year old grouping has the highest exposures from swimming activities. The one to two year olds have the highest exposures due to soil ingestion. Therefore, to be conservative, Integral used the higher values for the sub groupings. Thus, computational and reporting complexities were minimized, while still maintaining a conservative attitude towards the derivation of risks.

(10) Inclusion of fetuses and women (U-47, BB-5, BB-6, BB-7, BB-12, BB-13, CB-3, CB-9, CB-10, CB-11, CC-1, CE-3)

Scoping determined that impacts on women and fetuses should be included, as practicable, in the assessment of impacts. They were not explicitly included in the risk assessment analysis. Implicitly, these groups were included in the risk assessment through the factors of uncertainty which are applied to human health toxicology data to address concerns regarding more susceptible individuals (see pp. 964-965). This should have been more completely documented in the DGEIS.

Special discussions regarding breast cancer and impacts to children's health were included. There were no pertinent findings for the larvicides, but a discussion on pp. 1119-1131 of the DGEIS found there to be little likelihood of impacts to these receptors from the selected adulticides, based on epidemiological studies (background research for these sections was presented on pp. 390-408).

There were a series of comments that laid out a logical pathway to define impacts to fetuses. That is, material had been presented showing that 1 ppb exposures kill shellfish and finfish eggs (comment BB-6). Applications can deliver as much as 5 ppb (comment BB-7). Concentrations that are harmful to fish must be harmful to people (comment CB-3). Children are more vulnerable to pesticides than adults are (comment CB-9). Embryos and fetuses are more vulnerable to pesticides than children are (comments BB-12, CB-10). Pesticides can pass through the placenta to fetuses (comments BB-13, CB-11). The implication is that vector control applications must be harming fetuses. However, the compounds identified as having impacts on fish larvae (not eggs) at concentrations less than 1 ppb were pyrethroids, while the larvicide methoprene was identified as having environmental concentrations of as much as 5 ppb. It is not necessarily the case that pesticides that affect one organism at a specific concentration will affect others at the same concentration; the Ecotoxicology Literature Search is full of references citing a wide range of concentrations for one pesticide impacting different species. For instance, people detoxify pyrethroids readily, while other organisms have much more difficulty doing so. Therefore, pyrethroids are much more toxic to other organisms such as fish and aquatic invertebrates than they are to people (CA-IC, 2004; CA-SCDHS, 2005). It is almost always the case that children are found to be more vulnerable than adults for toxic impacts, and most information shows fetuses are still more vulnerable yet – although the data sets for fetal exposure are nowhere near as robust. It may or may not be the case that toxic chemicals pass through the placenta; the one citation offered (comment CE-3) referred to poly aromatic hydrocarbons (PAHs), which, while considered to be compounds of concern to people, are not pesticides.

(11) Impacts on male genetic material (CE-1, CE-3)

Two comments were offered regarding the ability of PAHs to alter male genetic material. The implication was that pesticides would also do so, but no evidence was provided. The latter part of the article implied that the work regarding genetic alteration should be considered cautiously, due to the non-standard experimental procedures used.

(12) Include dermal exposure (Q-42, T-7, T-37)

Several linked comments, including two from TAC Peer Reviewer #1, suggested that the human health risk assessment would have been strengthened if it had also considered dermal exposure to adulticides. The Westchester and New York City DEISs considered dermal exposure in their risk assessments (NYCDOH, 2001; Westchester County, 2001); USEPA does not in its assessments of mosquito control pesticides (see for example, USEPA, 2005). Peterson et al. (2006) recently conducted a generic risk assessment for mosquito control pesticides, and used dermal exposures as a potential pathway. The study was reported on in the DGEIS (pp. 1078-1079). Peterson et al. also found no apparent elevated risks for acute or subchronic impacts, and dermal impacts, although contributing to the overall risk burden, were not the major determinant of overall risk.

(13) Enhance the community gardener discussion (T-13)

This comment focused on whether the child community gardener should have been evaluated in place of the adult community gardener. The child community gardener was not evaluated because the risks for the child gardener were not higher than those for the young child resident. The ingestion pathway for the young child resident was based on the mean (central tendency exposure) and 95 percentile (reasonable maximum exposure) ingestion rates for all fruits and vegetables as documented in the USEPA Exposure Factors Handbook (USEPA, 1997) based on children from 0 to 5 years of age. These ingestion rates were modified to reflect the fraction of total fruits and vegetables that are grown at home for the summer and fall months when vector control spraying could occur. Based on the information presented in the USEPA Exposure Factors Handbook (1997), a value of 14% was representative of a total fractional intake of home produced during summer and fall months. A hypothetical child of a community gardener would not realistically consume more homegrown produce than what was assumed for the young child resident. Nor would any other exposure pathways for a child community gardener be elevated above the levels predicted for a young child resident.

The child receptor was selected as the comparison point because they were evaluated for every exposure pathway identified for the Human Health Risk Assessment, and they are typically one of the most sensitive receptor groups. If all exposure pathways for a particular receptor group have a lower potential dose than the child resident, then the child resident can serve as a conservative surrogate for that group. The emphasis is placed on the word all in the previous sentence because if any pathway for a particular group led to a greater dose than the child resident, then the receptor group was retained for evaluation in the Tier I screening-level risk assessment. For example, of the six exposure pathways identified for the adult community gardener, only the produce ingestion pathway led to a higher dose than estimated for the child resident. Yet all six of the exposure pathways were evaluated for the adult community gardener as a means to track the overall potential for adverse health impacts for the receptor group because one pathway led to a higher dose, and without conducting the computation, it could not be assumed that the child resident would serve as a more conservative receptor. Thus, although the child community gardener was not as sensitive a receptor as the resident child, there was a potential that the adult community gardener might be exposed to higher risks from produce consumption than the child resident might be, and so the adult community gardener was evaluated.

(14) Address endocrine effects (U-11)

TAC Peer Reviewer #2, in the course of expressing concerns regarding the lack of nuance in the "no risk" statements in the risk assessment, wondered if discussions regarding potential synergistic or additive effects that pyrethroids might impart in conjunction with other chemicals as endocrine disrupters might not temper the discussion. It was also noted that low concentration impacts on endocrine systems is somewhat controversial. The subject was touched on briefly in pp. 1120-1121 of the DGEIS, in a discussion of how breast cancer risk factors are often hormonally linked. It was concluded that there is evidence both for and against endocrine activity associated with pyrethroids, and that limited testing found no such link with malathion.

(15) Definition of acute impacts (AA-15, AA-16)

The comments concern the definitions of acute impacts. The first comment is concerned that at one point certain of the acute factors that pesticide impacts are tested for were described as being "not very useful,' in that interpretations of impacts other than mortality can be difficult to model quantitatively. Nonetheless, measures other than mortality were used by Integral in its assessment of potential impacts from the agents considered for chronic effects. The second comment is accurate in that "mortality" for organisms typically is determined using LC_{72} values: that is, the concentration that, for 72 hour exposures, causes half of the exposed population to die.

(16) Stress impacts and stress synergistic effects (AG-61, AG-62, AG-63, AG-64)

A series of comments were received regarding long-term stress to organisms, and the synergistic effects of stress (presumably, environmental stress such as high temperatures or low dissolved oxygen (DO), for aquatic life) and exposure to pesticides. The comments were especially interested in non-lethal impacts such as reduced fecundity, but also raised the point that reduced survivorship might result. USEPA has documented impacts to aquatic organisms from varying durations of varying low DOs (USEPA, 2000). Hayes et al. (2006) have designed and executed some elegant experiments testing for pesticides synergism, and there is evidence that some environmental stressors (nutrients, predator presence) may combine with pesticide exposure to increase susceptibility to deformity-causing infections in frogs (Relyea and Mills, 2004) (see p. 1030 in the DGEIS). The pesticides being discussed are the wider application agricultural pesticides, however, and so there is no clear link to mosquito control products and any of these processes.

(17) Include behavior as an impact endpoint (AA-3)

One comment identified behavior as an impact that should be included in the endpoints for the toxicological effects measures. Behavioral impacts were identified in the Ecotoxicological Literature Search (p. 12) (CA-IC, 2004) as issues that bore further consideration in terms of the risk assessment. However, in the end, it was determined that under standard ecological risk assessment procedures, the actions of individual organisms would be difficult to near impossible to factor into an overall ecological impact. Due to the complexity of the analysis, it was determined that population status endpoints were the most consistent, widely available, and important considerations from an overall ecological impact standpoint, and these are almost exclusively derivable from toxicity (LC_{50}) data (see the DGEIS, pp. 967-968).

(18) Bioaccumulation issues (AA-4)

A comment noted that bioaccumulation could affect the determination of chronic effects. Permethrin was identified in the Ecotoxicology Literature Search (CA-IC, 2004) as a compound that may bioaccumulate, and that propensity was factored into its analysis. The comment is no doubt intended, however, to point out that the Literature Search did not include information on apparent bioaccumulation of methoprene in lobsters. This result had been made available to the researchers as a paper in manuscript form in the spring of 2005, although it was not finally published until late 2005 (Walker et al., 2005a). Some of the concerns regarding this paper are discussed below in Section 4.8.1. However, it was feasible for the project researchers to have noted that crustaceans may bioaccumulate methoprene. It is not clear how that information might have been incorporated into the quantitative risk assessment, however.

(19) Expected results of a pesticide study like the second-hand smoking study (CC-1)

This comment reported on the findings that second-hand smoke had been confirmed as a serious public health problem, based on an analysis of many different studies of its potential effects, and was concerned if a similar result might occur with a meta-study of pesticides. It is impossible to tell.

4.1.3 Limitations on the Caged Fish Experiment

This project included extensive efforts to collect local information to inform the development of the Long-Term Plan. In Scoping, NYSDEC identified a "Caged Fish" experiment as an important element of the environmental impact analysis process. NYSDEC wanted to test typical adult fish and invertebrates for acute effects (mortality) from exposure to adulticides (CA-CE, 2002). Partly, this was in response to allegations made by the Peconic Baykeeper that a poorly executed application of resmethrin caused a fishkill in a coastal embayment (CA-SCDHS, 2004).

In 2003, college undergraduates at Southampton College attempted to track impacts of SCVC pesticide applications by caging sheepshead minnows in marshes where SCVC regularly larvicided, and comparing mortality and growth of these fish to those in an embayment near Southampton College. Data collected by these students implied that methoprene caused fish mortality, and resmethrin caused reduced growth rates (the marsh was adulticided during the course of the project due to a public health emergency) (SCERP, 2004).

At the recommendation of the NYSDEC, a Caged Fish experiment was included in the project Workplan and EIS Scope. A long project development phase followed, where experimental design needs often clashed with NYSDEC regulatory requirements. An important point for NYSDEC was that the pesticides needed to be applied operationally – NYSDEC would not permit "unneeded" pesticide applications. Because larvicide applications occurred on a regular basis in certain salt marshes, it was possible to select sites for investigation as to their suitability as an experimental site for larvicide exposure. However, adulticide applications occur less frequently and less predictably. Fresh water sites that may receive applications are very difficult to predict prior to identification of a treatment need. Selection of suitable control sites for unknown locations, and the need to try and mobilize such a complicated experiment on short notice was daunting.

The experiment was therefore reduced in scope to salt water site testing of adulticides and larvicides. During the experimental design phase, it was anticipated that replicated adulticide events could be tested concurrently, but that was an unfortunate misunderstanding, as SCVC cannot apply adulticides by air at two separate locations in the same evening (Cashin Associates, 2005c).

Cooperative discussions with NYSDEC resulted in an identification of an acceptable experimental approach, from a regulatory standpoint, by early July 2004. Necessary permits were received shortly thereafter. However, this meant that 2004 testing occurred in late July and August. Although this is the primary time for operational sprays, it is also the time, when environmental conditions on the marsh were most difficult. Equipment such as the YSI model 85 and WTW 340i dissolved oxygen meters with Durox probes were acquired to ensure that potential confounding environmental factors were documented (Cashin Associates, 2005c; Cashin Associates, 2005d).

Parlaying funds set aside for pesticide sampling, and an on-going cooperative agreement between the US Geological Survey (USGS) and SCDHS, the scope of the experiment was expanded. A detailed water column and sediment sampling effort was included to document the fate of any applied pesticides. In addition, application sampling, efficacy testing, and modeling of the applications were all undertaken for at least some of the applications. This meant there was some assurance that the applied pesticides reached the experimental sites, that they were in a sufficiently great enough concentration to be effective, and that their fate in the aquatic environment could be documented using state-of-the-art chemistry techniques at USGS, Stony Brook University, and the County's Public and Environmental Health Laboratory (Cashin Associates, 2004b).

There were problems with the experiment, mostly associated with keeping caged animals alive in salt marsh ditches in August. This limited the ability to cleanly interpret all of the biological data collected in the experiment. However, the experiment was run for approximately a month, capturing four weeks of methoprene applications and two resmethrin applications. Hundreds of samples of chemical analyses were taken, the organisms were set out, minded, and measured over the course of five days for each application, and laboratory experimentation was conducted to support the field work. Suffolk County spent on the order of $200,000 to comply with the NYSDEC request. Approximately 50 professionals participated in the experiment. A series of 13 reports were posted on the web site documenting the experiment (at http://www.suffolkmosquitocontrolplan.org/, under Task 12 Demonstration Projects); a symposium was given in June 2005, and mosquito control organizations and pesticide manufacturers are publicizing the results of the experiment as the unique, unmatched effort that it, in fact, was. The experiment was described on pp. 747-772 of the DGEIS; the results were interpreted on pp .989-991 (methoprene) and pp. 1131-1133 (resmethrin).

50 comments were received on the Caged Fish experiment. Four were explicitly positive about all or part of the experiment (D-5, H-13, X-12, BD-6).

The other comments can be grouped into eight general categories, plus three miscellaneous comments.

(1) The biological testing suffered from confounding factors (P-42, V-4, V12, U-13, X-6, X-7, X-9, X-11, X-13, X-14, AG-27, BD-8)

The researchers were aware that difficult environmental conditions would make conducting the experiment difficult. Most of the month of July was spent setting out test organisms in various marsh ditches to determine if the site might allow organisms to live through the anticipated four to six day experimental period. Tidal ranges that dried ditches, high temperatures, and low DOs often most proved fatal to the test organisms. Although the number of sites was limited, the best of a marginal set of potential sites at Johns Neck Creek and Timber Point were selected. Difficulty in finding a fourth site (the second control site) meant that Flax Pond, a north shore site, was used as the fourth control location (Cashin Associates, 2005d). The need to study only operational treatments meant that study sites had to both require mosquito control yet still have conditions that would support the caged fish. A fundamental reason why such sites were hard to find is that, by and large, fish and mosquito larvae are incompatible with one another. Fish are voracious predators of mosquito larvae, which mean that marshes that have good conditions to support fish rarely have enough mosquito production to require control. It should therefore be no surprise that the treated marshes were plagued by low oxygen levels that impacted the experiments. Mosquito larvae thrive precisely under those conditions that are hostile to fish.

Reasonable adaptations to conditions were made to try to maintain scientific rigor and statistical validity. Test organisms that died prior to the initiation of the experimental phase (the time the pesticide applications were made, whether at a control or treatment site) were discarded, but the survivors were continued in the experiment unless 80 percent or more of the organisms died that first night. Larger fish were used, as these proved to be slightly more hardy; however, that may have compromised the growth impact testing, as the larger fish apparently grew more slowly than the smaller fish tested by the SCERP students. Enough of the organisms and replication occurred so that the statistical protocols selected (ANOVA, both two-way nested and one-way) were not violated (Cashin Associates, 2005e). In situations where mass mortalities occurred in a statistically significant way, low DOs seemed to account for the losses, based on criteria developed by USEPA to predict fish survivorship in low DO conditions (USEPA, 2000).

In addition, the experiment was designed to test for a pesticide effect. If none occurred, then the experiment would not return significant results. Testing for a negative result is always, in a sense, inconclusive, as criticisms that the test was not broad enough, did not run for the right length of time, or did not test for exactly the right element are easy to make. The biological element of the Caged Fish experiment did seem to show that the application of mosquito control pesticides will not coincide with mortalities of adult invertebrates and fish unless environmental conditions (predominantly, DO) are poor enough to cause similar mortalities at locations where no pesticide was applied. This strongly implies that the pesticide applications are not the primary cause of the mortalities. The associated chemistry work provided plausible mechanisms for the explanation of the events, by demonstrating that the water column did not sustain toxic concentrations (as found by other laboratory testing, and by work associated with this experiment). Laboratory testing, which was not confounded in the least by harsh field conditions (except that shrimp survivors for the prey-capture experiments were sometimes difficult to obtain), duplicated the finding of "no impact" from the pesticides. It is, of course, possible that the pesticides exacerbated poor environmental conditions and so contributed to the mortalities through either additive or synergistic effects. If this was the case, however, the statistical analyses provided no clear evidence in terms of statistically significant differences between treatment and control sites, when DO-induced mortalities were accounted for. In marshes that produce mosquitoes and require larvicide, it appears that low DO is a bigger problem for fish than the pesticides used.

(2) Results were generally inconclusive (S-67, BD-7)

In a sense, these comments are accurate. The testing did not find an impact from pesticides to the organisms. However, conclusions regarding the general impact of these pesticides to these organisms under the test conditions may be drawn.

(3) The associated laboratory work is not sufficient to show the pesticides did not have impacts (P-43)

The laboratory work was designed to supplement the field work. It was an important supplement, however. When mass mortalities occurred at particular sites, the lack of mortalities in the laboratory organisms tended to support explanations that the environmental conditions, not the pesticide exposure, were the cause of detected mortalities (see Cashin Associates, 2005e).

(4) The experiment was not appropriate to determine long-term effects/sublethal effects (P-44, Q-58, V-3, V-8, V-9, V-10, V-11, Y-7, AG-20, AG-27, AP-12)

This is true, but is a hollow point. The experiment was not primarily designed to test for more than acute impacts, as measured by mortality. Because SCERP testing seemed to find variations in growth rates following exposure to resmethrin (SCERP, 2004), sublethal effects on growth were looked for. Although these were not found, it may be that the organisms were not the best to test for these differences (the SCERP experiment did use younger organisms). The prey-capture experiment, praised by one of the more vociferous critics of the experiment (Michael Horst), was a supplement to the major efforts: determine if exposure to methoprene or resmethrin can kill fish or shrimp, and trace the fate of the applied pesticides. NYSDEC comments to this point seem especially ill-considered.

(5) Limited or no replication in the experiment (Q-57, V-2, V-5, V-6, V-7, AG-20, AG-27, AP-12)

NYSDEC restrictions limited the sites that the experiment could cover, in a practical sense. Within the regulatory limitations, the testing was as replicated as resources, time, and conditions allowed. As noted by one comment, the replication met the statistical requirements. To be sure, greater replication might have underscored the reported results.

(6) Criticisms of the techniques employed (X-1, X-2, X-3, X-4, X-5, X-16, AG-28)

- Methoprene will adhere to Plexiglas traps.

The volume of water passing through the traps negated any effect of methoprene adhering to the Plexiglas. It should be made clear that in the turbid organic-rich environment in the ditches, the Plexiglas was not likely to be the preferred binding location for the methoprene. Previous other work on pesticides impact on caged organisms also used Plexiglas containers (Scott et al., 1999). Aluminum or steel wire cages would have been more difficult to fabricate and manage.

- What are the characteristics of the test shrimp?

Adult shrimp were seined for at Flax Pond (a North Shore salt marsh that does not receive pesticide applications from SCVC, and the long-time site of a Stony Brook University-NYSDEC research laboratory), and maintained in large tanks at the Flax Pond research facility. The tank water was replenished weekly; oxygen was constantly bubbled in. The shrimp were fed frozen adult brine shrimp and Tetramin every other day.

- How many shrimp were brought back to the laboratory?

Shrimp numbers are presented in Table 4 of the project report (see Cashin Associates, 2005e). Survivorship varied from two to 14 individuals for different parts of the experiment.

- Were glass containers used to transport the water back to the laboratory?

Brown glass 4L containers were used (see Cashin Associates, 2005e).

- Testing did not account for water flow to or from the sample site.

The testing was designed to sample for the environmental concentrations the organisms were exposed to. This was not intended to be a LaGrangian experiment on the changing characteristics of a particular slug of water. Given the affinity for particulate matter exhibited by both methoprene and resmethrin, a LaGrangian approach would be subject to criticism for ignoring the settling of the pesticides from the water body as it moved.

- Chemistry testing should have been done at 2 hours, 4 hours, 8 hours, and 12 hours following the application

Most toxicity testing is done over longer exposures; in fact, as this commenter himself noted, toxicity testing is generally based on LC_{72} experiments. Therefore, with somewhat limited resources, it was thought important to trace at least some of the pesticides over several days rather than to conduct intensive short-term sampling (see Cashin Associates, 2005b).

- Information was not available for pre-spray conditions, and mortalities could not be determined to have occurred before, during or after applications.

This comment is incorrect for all events except the very first full test, when miscommunication between the helicopter, SCVC, and the experimental team meant the methoprene was applied before the test organisms were observed. In all other cases, data on environmental conditions and animal mortalities were collected prior to the pesticides applications (see Cashin Associates, 2005e).

(7) Inappropriate test animals (X-8, AB-12)

The organisms were selected with some degree of guidance from NYSEDC, which desired a fish and invertebrate species to be tested, using as near to adult specimens as was practical. Sheepshead minnows were selected to try to duplicate the results of the SCERP experiment, although other marsh species might have proved to be hardier. Grass shrimp are a common crustacean in Suffolk County waters, are easily obtained from the wild, and have been used as test organisms for other mosquito control pesticide impact studies (see Cashin Associates, 2005e).

(8) The experiment does not hold up to scientific scrutiny (BD-9)

It is not certain that the test has received appropriate scientific scrutiny from the comments. Two scientists commented extensively on the experiment. One, Jake Kritzer, was an observational biologist when he conducted field work, reporting on reef fishes in the South Pacific. His publications since joining Environmental Defense have been exclusively on marine reserves. Dr. Kritzer does not appear to have a suitable background to judge a field-based experiment such as this. In fairness, his current position is one where he is not required to conduct experiments. Michael Horst is a lobster biologist, employed at the University of Maine (according to the stationery used for his comments, although he also has listed his position as being with Mercer University in Georgia). Dr. Horst has tested lobsters for toxicity to methoprene as part of the Long Island Sound Lobster Research Initiative; previously, he had published work on the impacts of methoprene to crabs. It is clear from the submitted comments that he either did not review the source documents for the Caged Fish experiments, or did not read them carefully, or only read the summary reports provided in the DGEIS. His review was, therefore, incomplete. On the other hand, Robin Barnes' thesis was defended before an appropriate committee of scientists at the Marine Sciences Research Center, who approved her work and enabled her to receive her degree. Presentations on the Caged Fish experiment have been made before the American Mosquito Control Association and the annual meeting of Benthic Ecologists (in 2005), and have been well-received. USGS has published its results. No papers have yet been submitted to professional journals from the experiment, but that is likely to be remedied in the near future. That the study did not "hold up to scientific scrutiny" seems to be a premature judgment, at best, and factually inaccurate by other interpretations.

Several miscellaneous comments included a request for the source of DO LD_{50} data for *P. pugio* (comment X-10), which is USEPA, 2000; the concentrations of methoprene detected in the sediments (comment X-17), which are listed in the DGEIS in Table 6-7, p.765 (the complete results are presented in Cashin Associates, 2005b); and the meaning of the statement that methoprene is "intended to sink through the water column." The timed release formula is encapsulated in material in such a way that it is denser than water; thus, the manufacturer intends the product to sink.

4.1.4 Restatement of Goals & Objectives

A variety of comments (38 in total) were received regarding aspects of the Long-Term Plan goals and objectives. These were difficult to organize into broad categories. Therefore, the comments will be addressed in terms of whether they were generally favorable, somewhat neutral, wished for changes in the existing set of goals, or needed clarification regarding the meaning of a goal or objective.

(1) Generally favorable

- Generally agree with program goals (H-5, U-22, AH-2)
- Generally support goals for ecological improvement (Q-3, AS-1, BE-2)
- Supports reductions in pesticides (I-2, Q-4, AS-2, BA-10)
- Supports improvements in wetlands health (Q-5, AG-2, AS-2)
- Supports no new ditch policy (AG-12)
- Generally supports the presumptive policy of reversion (AG-13)
- Supports reduction in disease transmission (AJ-6)
- Supports reduction of *Phragmites* extent (AR-13)

Each of these accurately depicted a goal or objective of the Long-Term Plan.

(2) Predominantly neutral

- Recognizes a need for mosquito control (H-2)

Establishing a need for the program is essential to then providing a rationale for the selected program.

- A central tenet of the Long-Term Plan is to reduce pesticides use through source reduction (S-30)

The County agrees.

- Mosquitoes are not more important than 50,000 people (AT-8)

Mosquito control must be conducted with the knowledge that it can have significant impacts on the environment. Selecting activities that accomplish mosquito control goals while also limiting the potential for impact mitigates environmental concerns regarding mosquito control. The County also believes that, under certain circumstances, activities undertaken as mosquito control can also provide environmental benefits.

- There are a spectrum of mosquito control activities that the public will support (N-26)

The County believes that it has selected the proper means to address the mosquito control needs of Suffolk County.

- The primary objectives of the Long-Term Plan are mosquito control and disease management (S-53)

The County thinks that this is an incomplete characterization of the goals of the Long-Term Plan. The Long-Term Plan actively advocates selecting mosquito control activities that have the potential to improve certain aspects of the local environment. The days when mosquito control could be conducted while generally ignoring the potential to affect the environment are long gone. Suffolk County will address its obligations to ensure there is no significant degradation of the environment due to mosquito control. Particular projects may, on occasion, misfire; it is intended that such problems will be mitigated, lessons learned, and repetitions avoided. All activities are intended to be, at worst, “environmental impact” neutral, and, where possible, environmentally beneficial.

(3) Primarily desiring changes in the goals/objectives

- Program should focus on human health/is a health threat-centric program (G-2, P-9, AJ-2, BA-7, BE-5)

Impacts to human health from mosquitoes are important. However, the County has an obligation to be an environmentally-sound steward. Therefore, the goals of the program have been, and continue to be, to balance improvements in human health with, at a minimum, maintenance of environmental conditions. The County also expects that its environmentally-aware mosquito control program will present opportunities for enhancement of certain ecological processes.

- A single plan is not appropriate for such a large and diverse County (BJ-7)

The County agrees with this comment, to a point. For one, a separate plan is being developed to fit the environmental and regulatory conditions of Fire Island National Seashore. However, the overall Long-Term Plan was crafted so as to be flexible to suit the diverse needs of mosquito control and environmental stewardship across Suffolk County. The reason that the Long-Term Plan was reviewed as a Generic EIS was to allow for broad conceptual planning, with the understanding that tailoring of the general approaches would be required to meet specific locations or other conditions.

- Substitute the values and functions found in the Tidal wetlands regulations for the goal of increased biodiversity (AG-21)

NYSDEC has requested that the County amend the second goal listed in the Wetlands Management Plan. That goal is stated to be:

> Preserve or increase acreage of coastal wetlands, including vegetated tidal wetlands, and to foster marine and estuarine biodiversity and a mosaic of ecological communities.

NYSDEC would like to replace that goal with one that strives to preserve and enhance the values and functions specified in 6NYCRR 661.1 (the Tidal Wetlands Land Use Regulations). The State established an overall policy to preserve and protect tidal wetlands, and to prevent their despoliation and destruction (with, it is noted, due consideration to the reasonable economic and social development of the State), as is clearly stated in the opening sentences of the regulations. To implement the goal, NYSDEC established regulations to only allow uses of tidal wetlands that are compatible with the preservation, protection, and enhancement of current and potential values and functions of the marshes, will protect the public health and welfare, and will be consistent with reasonable economic and social development. The values identified in the regulations (which carefully note they are not limited to this list) are:

- Marine food production
- Wildlife habitat
- Flood and hurricane and storm control
- Recreation
- Cleansing ecosystems
- Absorption of silt and organic material (refined as "sedimentation control" in 661.2(a))
- Education and research
- Open space and aesthetic appreciation

Suffolk County understands that the intention of NYSDEC in proposing this change is to ensure that there are no conflicts in the general approach to wetlands management between the County and NYSDEC. This is certainly a laudable notion, and will be important to address as the County moves forward with its efforts to define marsh health on a County-wide basis, and then to create and begin to implement an overall marsh management plan. This is discussed in further detail in section 4.6.2, below.

However, the goal that NYSDEC is seeking to replace was developed in a cooperative and open fashion through the management program approach adopted by the County for the Long-Term Plan project. The goal was crafted by consensus of the Wetlands Subcommitee in November

2003, a meeting group in which the DEC was an active participant. The proposed goal was first considered by the Subcommittee as a potential goal or objective for wetlands management to be undertaken through the Long-Term Plan. That committee considered, and slightly modified the original wording. This goal was then presented to the TAC (and CAC) for consideration. It was found to be acceptable, and was subsequently adopted by the Steering Committee. It was then adopted into drafts of the Wetlands Management Plan, which were released for review in June 2005. The goal was also incorporated into the Long-Term Plan, a draft of which was released for review in September 2005. Comments have been received from that time until the present regarding many aspects of the Long-Term Plan and its ancillary documents, including some oral comments from NYSDEC in September, 2005.

NYSDEC was present at all these meetings, and often participated in the discussions at the meetings. Meeting notes and formal minutes do not show that NYSDEC had made previous comments regarding the goal. The County had adopted the management plan format for this project to enhance public participation and to foster the development of consensus on important issues. To make such a major change in an important program goal at this stage, absent input form other involved and interested parties, would not be in the spirit of the project process.

- The goals do not address ecologically sound marsh management (S-54)

The goal cited above was intended to ensure that ecological considerations are part of all marsh management activities. It is true that there is not any consensus regarding definitions of marsh health for the County as a whole. Therefore, it may be that the goal and its associated objectives will require modifications as the County derives its overall marsh management program.

- Certain of the goals are not founded in data (U-23)

TAC Peer Reviewer #2 was concerned that the goals and objectives of the Long-Term Plan were not founded in data. This was especially true of the goal for pesticide reductions (quantified as 75 percent reductions in larvicide use). The reviewer was hampered by not having access to all of the materials in the Long-Term Plan. The 75 percent reduction goal is based on the estimated amount of larvicide applied to salt marshes by helicopter. Objective #4 of the "biodiversity" goal states:

> Generally, marsh management will be conducted with the intent of eliminating routine applications of larvicides for salt marsh mosquito control, so as to result in drastic reductions in the acreage of larvicide treatments. These reduction efforts are quantified to be on the order of 33 percent over the first five years, and 75 percent over ten years assuming regulatory cooperation so as to allow implementation of the necessary projects (as measured by acres of marsh treated in a year.

Therefore, the larvicide reduction goal was deliberately chosen with the expectation that the use of water management would replace larvicides as a means of larval control across broad swaths of the County's marshes.

- The Long-Term Plan will cause increased pesticide use (BA-11)

This comment is founded in the fear that "demonizing" mosquitoes, by identifying the potential for nearly all human-biting mosquitoes in Suffolk County to spread disease, will lead to increased public pressures for pesticide use. However, the Long-Term Plan explicitly aims at replacing most routine larviciding with water management, and is hopeful that greater effectiveness in mosquito control (water management has general been found to be more effective than larviciding at reducing adult populations) will obviate the need for some degree of adult control. Adult control is also driven by pathogen presence. There are some weak links between the amplification of pathogens and overall mosquito numbers. However, overall the risks associated with disease are controlled at first by amplification of pathogens by only a few species of mosquitoes. Risks later in the cycle can be influenced by overall numbers of human-biting mosquitoes. The involvement of only a few species of mosquitoes in pathogen amplification means that disease risk reductions are not necessarily associated with overall mosquito population reductions – although they do tend to be. Therefore, because it was the intent of program designers that the goals be achievable, an absolute reduction in adulticide use was not specified.

- The program should address the dangers of not spraying

The Long-Term Plan believes that adulticide use is integral to a complete mosquito control program. However, the Long-Term Plan recognizes that the use of adulticides is, in a sense, recognition of program failure. The other steps of the hierarchy are intended to avoid the need for adult control.

Suffolk County recognizes an obligation to control mosquitoes, to ensure public health and welfare. The use of adulticides is part of that program. However, as may be alluded to in this comment, the County does not need to treat for mosquitoes as a means of pre-empting private citizen efforts at mosquito control. Such efforts may not always be environmentally sound, but compliance with regulations and laws is intended to prevent the most egregious impacts.

(4) Requires clarification

- Why is no reduction in adulticides anticipated? (AG-126)

The adoption of integrated marsh management should directly reduce larvicide use. That is the clear lesson of similar efforts throughout the northeast US. Most jurisdictions have also seen reductions in the need for adult control. However, that is an indirect benefit. Some of Suffolk County's current adulticiding efforts are, in large part, driven by large numbers of mosquitoes. Implementation of integrated marsh management is intended, at a minimum, to maintain the current levels of control of mosquito populations, and to reduce them in certain cases. If that does occur, then some conditions that might have required adult control may not come to pass. However, some portion of the County's adult control program is directly in response to public health concerns regarding mosquito-borne diseases. The number of mosquitoes available to bite people plays a role in the decision-making regarding health emergency adult control, but other important factors that are considered – some often much more important. Those factors include the extent and seriousness of disease presence in mosquito populations, and the parity of the bridge vectors (parity tells whether a mosquito has laid eggs before or not, and is a measure of whether it has had a blood meal before). Population sizes can affect these parameters, but not necessarily in a direct fashion. This means that reducing the number of human-biting mosquitoes through water management should, but may not, reduce the need to adulticide under Health Emergency conditions.

- Why is the goal to maintain mosquito populations at long-term, current levels? (AG-136)

In the late 1990s, Suffolk County reduced average mosquito counts in its New Jersey light traps by five to ten fold. This was accomplished by adding methoprene to its larvicide mix (Campbell et al., 2005).

Experiences throughout the northeast US are that water management is more effective at larval control than is the use of larvicides (for example, see comments A-4 and L-2). This is because water management is difficult to "cancel" by weather, once implemented it always operates, and, if designed properly, never is "misapplied." However, larvicide applications may not be conducted optimally because of weather conditions. Sampling in a marsh may not necessarily identify a problem in a timely fashion. Sometimes operator issues mean that the pesticide may not be applied as designed. In at least some of those cases, the larval control may fail.

Thus, it is anticipated that further reductions in mosquito populations would be realized if larviciding were to be replaced by water management. However, given the levels currently achieved, it is unclear what the size of the reduction will be. The County believes that an order of magnitude reduction is unlikely. The incremental reduction that is achieved was impossible to forecast; therefore, the County sought a more conservative goal of maintaining the currently low mosquito population level – low, as compared to historical prevalence.

4.1.5 Ensuring Plan implementation

Eight comments were received on this topic. Five were oriented towards the levels of support to be provided to the program by the County administration. Three were concerned with exactly how the County will assure the public that implementation is indeed occurring.

(1) Ensure County support (G-6, H-10, K-7, R-38, AW-11)

Two comments are concerned that program implementation will be too costly. Two comments suggested that the broad scope of the program will require many resources for full implementation.

To date, the County Legislature and Executive have provided the resources necessary to devise the Long-term Plan, even in the face of increased costs resulting from extensive field work requirements, and without support from other levels of governments (applications for Federal and State grants were not approved). In 2006, the County added four positions that were identified as critical for Plan implementation, two in SCVC, and two in the Arthropod-borne Disease laboratory (ABDL). The Long-Term Plan has been identified as a program that is important to the County, and commitments to provide necessary resources have been made.

The fifth comment was specifically concerned, with whether resources are available to implement larval indexes. The resources to implement larval indexes across the County are not available. Not enough data, and not enough data analysts, are available to determine if dip counts would be appropriate for each site that is regularly sampled.

However, site or area specific indexes have been constructed. Several years ago, data analysis of sampling at Wertheim National Wildlife Refuge allowed for a site specific dipping index to be proposed, and, after a season of adjustments, to be finalized. Recently, the development of a GIS database of larval records (as part of the Long-Term Plan project) allowed the County to negotiate a larval index for potential use in Fire Island National Seashore. Therefore, it seems possible that digitization of County records may enable certain sites to be evaluated, on a case-by-case basis, for quantified larval treatment triggers.

(2) Assure the public concerning implementation (R-2, AV-2, AV-3)

One comment referred specifically to the development of an initial three-year marsh management plan. This was incorporated into the May 3, 2006 Long-Term Plan draft that the DGEIS evaluated.

Two other comments concerned the content of the Triennial report. The Long-Term Plan has been amended to add more details regarding the content of the Triennial Report. The changes to the Long-Term Plan were made in Section 2 (Public Education and Outreach), Section 4.3 (Water Management), Section 8 (Administration), and Section 10.2 (Adaptive Management, Structures and Mechanisms) (see Appendix 5).

4.1.6 Referencing discussions (Z-26, AD-9, AG-84, AO-8)

Four comments were received regarding the general quality of references (some specific comments are addressed under the appropriate, individual topics). One comment touted virtues of peer review, and suggested all references should only be from peer reviewed sources. The other general group of comments was that too many references were drawn from "mosquito control sources."

Peer review is highly touted in scholarly circles. It is also undergoing potential revision, and there have been questions raised regarding its value. Peer review is based on the following pillars of scientific behavior:

- The work being reviewed accurately reports what occurred
- The work being reviewed objectively reports the results
- The blind reviewer has no stake in the evaluation of the reviewed paper
- A reviewer will not take advantage of the review process, and use information received for gain

Whether due to the potential for financial gain associated with patents and other recent changes in experimental credits, for prestige, or for professional advancement, these common notions are apparently increasingly being disregarded. At least, reports documenting failures of the peer review process are increasing in number. Incidents such as the retraction of papers on human cell cloning by Hwang Woo-suk, papers that were peer reviewed, have raised grave questions about the "guarantees" associated with peer review. Incidents where papers may have been inadequately reviewed because the reviewer had some stake in the success of the report, or where negative reviews were issued to harm rivals, have further damaged the credibility of the approach. Still other researchers have complained that rivals have stolen ideas that were only available to them as reviewers.

In the Internet Age, where self-publishing, Wikipedia, government-sponsored reports, and peer-reviewed papers can all appear to have the same scholarly authority, having the imprimatur of peer review and editorial reviews by a journal are extremely valuable. However, vast and important sources of information are not routinely peer reviewed. Most government publications (all of USEPA, USGS, and other widely recognized authoritative sources) are not peer reviewed in the same way that journal articles are. Many important compendiums of information, which because they contain little "new" information, are not generally published in peer reviewed outlets, would not be considered. Presentations at conferences, many book chapters, and most scholarly books are not peer reviewed.

The Scope of the EIS identified gray literature as an important source of information for the project, and it turned out to be invaluable. Comments received in Scoping urged the project to consider various alternatives to scholarly documents, as perhaps it was perceived that the standard literature would tend to support standard means of mosquito control (CA-CE, 2002). Much mosquito control is conducted by governments; these agencies do not have the same publishing imperatives that academics do. As will be discussed in more detail in Section 4.6.4, this may result in a failure to document activities as scientists might. It certainly meant there was not as much readily available information as might have been expected for as widely practiced a trade as mosquito control. All credible information was thus extremely valuable.

It is true that much of the referenced material in the DGEIS came from sources connected with mosquito control in some way. Similarly, an EIS focusing on ground water quality would be likely to refer to articles by geologists and hydrologists, or one on coastal erosion might use coastal geologists as the primary source of information. It is also true that those with technical mosquito control backgrounds tend to practice mosquito control. It is not a field with a substantial number of academic departments at major universities.

It is notable that main stream researchers almost seem to avoid the subject of mosquito control even when it would seem to be an important factor. Mark Bertness, a renowned salt marsh ecologist, has conducted almost all of this research in salt marshes in Connecticut, Rhode Island, and Massachusetts. Nearly without exception, these marshes were ditched for mosquito control purposes. Over the past 20 years, many of these marshes have been further manipulated to enhance mosquito control or to undo ditching impacts. Many of his papers, book chapters, and a textbook were reviewed in the course of this work. Nowhere does Dr. Bertness mention mosquitoes, mosquito ditches, or OMWM, although several of his publications are concerned with impacts to marsh ecology from anthropogenic sources. It may be that these marsh elements are not important for the subjects Dr. Bertness is interested in, but it still remains true that the work of a major northeast US marsh ecologist cannot be used to evaluate mosquito control effects in salt marshes, except through inferences and analogies.

Therefore, information in the field is presented primarily by mosquito control professionals, partly because those are the kinds of professionals doing this work and partly because other scientists apparently choose not to become involved in mosquito control issues.

4.1.7 *Compliance with published plans and programs*

Comments were received regarding consistency of the Long-Term Plan with the Peconic Estuary Program, and various pesticide-mosquito control laws, programs, and policies. In all, 12 comments were identified that relate to this topic.

(1) Compliance/consistency with PEP (C-8, AG-135, AL-4, AL-5, AL-6, AO-5, BB-1, BB-2)

Most of the comments concern interpretations of the Peconic Estuary Program Comprehensive Conservation and Management Plan (CCMP). One series of comments interpreted the CCMP as banning marsh management and pesticide use for mosquito control, essentially. NYSDEC noted that the CCMP specifically did not say mosquito ditch maintenance could not be conducted. A further comment expressed the desire for a consistent Peconic dredged material management policy that could be applied to any material generated through marsh management.

The recommendations of the CCMP that relate directly to mosquito control are as follows:

HLR-5.3: Maintain and enforce the policy of creating no new mosquito ditches in tidal wetlands and establish a policy for not re-opening ditches that have filled-in by natural processes.

HLR-5.4: Ensure that SCVC works cooperatively with all government agencies, East End towns and local conservation organizations in planning of wetland mosquito ditch maintenance and pesticide spraying.

HLR-8.1: Encourage cooperation among governmental agencies to plan and implement Open Marsh Water Management (OMWM) to manage tidal wetlands with grid ditches for mosquito control with the goal of also restoring more natural conditions.

HLR-8.2: Develop recommendations in the PEP Habitat Restoration Plan for control of *Phragmites australis* by restoration of natural processes such as removal or modification of flow-restriction devices, removal of hardened shorelines, and revegetation of bay and creek shoreline or by other means.

HLR-16.6: Research the lethal, sublethal, and synergistic effects of elevated nutrients, toxic chemicals, and Brown Tide on the reproduction and behavior of finfish and invertebrate species.

Page 6-9 of the CCMP states:

> Vector control ditches (mosquito ditches) are maintained by the Suffolk County Department of Public Works (SCDPW), which typically applies sprays for larval control of mosquitoes. Problem areas are monitored to determine effective treatments. The primary insecticide used is Bti (Bacillus thuringiensis var. israelensis); in some areas methoprene is used. The use of mosquito larvicides in storm drains and catch basins has been advocated as a mosquito control measure. This could contribute larvicides to surface waters following rainfall events. Recently, the pesticide malathion has been applied in residential areas. Malathion is labeled for use on adult mosquitoes and cannot be applied to water.

That leads directly to the following recommendation:

T-7.3: Reduce the use of insecticides for mosquito control to the maximum extent practicable [but maintain levels] that still adequately protect human health. [C]onsider adverse impacts on the environment in insecticide selection. Encourage good housekeeping methods of control, such as eliminating/reducing standing water that functions as breeding sites.

With the exception of including Towns and conservation organizations in pesticide application planning (beyond the kinds of efforts demonstrated by the production of the Long-Term Plan), the County has worked very hard to ensure that the Long-term Plan implements the recommendations of the CCMP.

(2) Consistency with pesticide/mosquito control programs/laws/policies (D-4, K-14, AC-14, AO-4)

One comment noted that the County program complies with the requirements of the USEPA Pesticide Environmental Stewardship Program (PESP). In addition, in April 2006, the County received a letter from the CDC, which explained that CDC had reviewed the Long-Term Plan and had determined it met CDC guidelines for effective and appropriate mosquito control. This letter was not considered to be an official comment on the DGEIS. However, it is presented in Appendix 9.

A second wondered if the Long-Term Plan would ever allow the County to drop back to Tier 1 of the New York State WNV Plan. The Long-Term Plan would be too aggressive in its initial stages of mosquito control, if the County were in Tier 1. However, Tier 1 requires no anticipated WNV presence and no WNV presence in the previous season in Suffolk County. This was thought to be too unlikely a contingency to consider.

A third comment urged the County to adopt 90 percent mosquito mortality as its evaluation of success for adulticiding. This is the generally accepted target for mosquito control success for adulticides. The County intends to achieve this rate, and will analyze all applications that do not reach this level to determine how improvements might be implemented for future applications. However, the County also notes that it may apply pesticides under suboptimal conditions if risks and needs are great enough, with the foreknowledge that doing so may result in less than 90 percent control.

The fourth comment was a reference to the finding that pesticides proposed for use in the Long-Term Plan were not found to have significant environmental or human health risks, although the County has adopted a Phase-out Law for pesticides on County properties. The inference is that the finding of no significant risks conflicts with the findings that drove the Legislature's adoption of the Phase-out Law. Vector Control pesticides are exempt from the Phase-out Law. The Legislature recognized that pesticides are needed for mosquito control and cannot be phased out at this point.

The DGEIS (pp. 367-389) attempted to determine the degree that other pesticide use might or might not present human health and ecological concerns. Conducting a comprehensive analysis is hampered by reporting issues. However, the DGEIS reached the kind of conclusion reached by others, in that certain pesticides use may be of concern. As discussed by Peer Reviewer #2 (comment U-20), mosquito control pesticide use tends not to have impacts of concern because of the low application rates. Because some pesticides use has the potential to affect human health and the environment, it is perfectly appropriate for the Legislature to enact public policy leading to reduced pesticides use. However, it is also appropriate, if the pesticide use is found to not have significant risks for impacts, for the Legislature to also allow the pesticide to be used, especially if public benefits result from the pesticide applications.

4.1.8 Alternatives selection

Comments were received (N-21, N-22) that the alternatives reviewed by the DGEIS were inappropriate. The comments focused in particular on the set of water management alternatives.

Alternatives evaluated by the DGEIS included the required "No Action" alternative (which would result in a continuation of the current program, and a No Vector Control program. In addition, various programmatic choices were evaluated (different adulticide formulations, different triggers for action, etc.). These provided a robust selection of policy choices. However, clearly, the Long-Term Plan provided the best combination of public health and environmental cost-benefit assessments, in the mind of the preparers of the DGEIS.

Many comments on the DGEIS and the underlying Long-Term Plan were received, as can be seen from this document. Many comments disagree with the evaluations offered by the County. Some requested changes to the underlying Plan. By-and-large, the major criticisms of the Long-Term Plan (apply pesticides for public health purposes only, do not conduct any water management, do not conduct certain kinds of water management) were anticipated in the alternatives.

The complaints about water management are illustrative. The comment is not satisfied with the choices of reversion only, selections from the BMP manual as are appropriate, selected ditch maintenance, or maintenance of the entire ditch system. However, comments that reject water management entirely are calling for a "reversion only" water management program. Comments that reject parts of the BMP approach can be interpreted as suggesting that certain of the BMPs should be found to be inappropriate for Suffolk County. Although the County disagrees with this analysis, it is in keeping with the BMP approach, as particular tools in the toolbox do not need to be selected for projects if they are not the right choices. It is possible to interpret NYSDEC comments as rejecting nearly all of the BMPs except ditch maintenance (although the County is not interpreting them in that fashion), suggesting that the notion of continued selected ditch maintenance has some support. Finally, it is the impression of some people that "in the bad old days" the intention of the County was to maintain all of the grid ditches, whether the maintenance was needed or not. It was thought to be important to explicitly address that particular position.

4.1.9 Use of the Management Plan process

The County wanted to ensure that the development of the Long-Term Plan was robust, transparent, and responsive to public concerns. For these reasons, the County employed a variation on the National Estuary Program management plan process. Formal advisory groups were created. Project work products were released as prepared for review and comment. The plan development team presented various iterations of concepts and approaches so that input could be received. To this end, the original draft Long-Term Plan (September 2005) was revised twice following receipt of comments (December 2005, and then May 3, 2006) for formal review through SEQRA, and will once again be revised in light of comments as part of this FGEIS.

A total of 24 comments were classified as commenting on the project and/or Long-Term Plan development process.

Six of the comments were generally positive, noting the comprehensive nature of the plan and process, extensive public outreach, the continual amendment process, and that it analyzed the current program and identified areas for improvement (D-1, H-1, H-9, H-16, Q-1, and R-1).

Ten comments were essentially neutral or advisory, calling for the Long-Term Plan to be based on effective science and to note that the Long-Term Plan called for an expanded program (G-19, G-20, G-21, AO-14, AW-12, AW-13, AW-14, BC-12, BC-13, BC-14).

One stated that the efficacy of the Plan was unknown (AO-15). The County disagrees with this comment, as it believes it has taken an effective approach (the current program), identified some areas for improvement, and selected methods used elsewhere as the means to address the areas where change was thought to be needed. Therefore, the County believes it is justified in anticipating that there will be fewer human health impacts, fewer environmental impacts, greater protection of the public health and welfare, and potentially areas where ecological processes will be enhanced as the Long-Term Plan is implemented.

Another comment called for release of peer reviews (R-46). The County did release peer reviews as they became available. Nine parts of the Literature Review received formal peer review (per the TAC), and all of these reviews were made available. The Task 8 Task Report (referred to as the "Risk Assessment," although it comprised more than the quantitative risk assessment of pesticides) was reviewed by two peer reviewers. These reviews were also made available, and in fact were submitted by COCOPAW as part of its formal comment set.

Five comments found that the process failed to meet the stated goals of transparency, public participation, and responsiveness to comments (AL-7, AL-8, AL-9, AO-2, AP-15). Linked to this comment was one claiming that the plan was not supported by the impact analysis (BI-25).

The County notes that it did not have the technical resources to conduct the work necessary to create the Long-Term Plan and its associated DGEIS. The selected consultant team included many academics, and the reports produced by the team were so unbiased that some of the information generated by the project has been used to criticize the project. The Long-Term Plan was released prior to the DGEIS. This is partly because the impact analysis could not be completed until the plan was finalized. However, the project proceeded as it did so that as more information was gathered regarding the potential for impacts from aspects of the Long-Term Plan, adjustments to the Long-Term Plan could be made. The County believes that this process, which was immeasurably aided by public input and comment through the three years of the project, may give the impression that there is little wrong with the Long-Term Plan, as crafted. If that is the case, much of the credit belongs to the critics of the Long-Term Plan who helped the County refine those aspects of the proposal that were most troublesome.

4.1.10 County responsibility for a Tick Management Plan

11 comments were received that related to the County's responsibility for tick management (AL-14, AL-15, AL-16, BE-4, BBJ-4, BP-1, BP-2, BP-3, BQ-1, CF-1, CF-2). Lyme disease is relatively common in Suffolk County (more people develop Lyme's disease than do mosquito-borne illnesses, for instance), and it is a vector-borne disease. However, the County has insisted

from the start that the scope of this project has been mosquitoes. Thus, the comments, in a sense, are not germane.

It was thought that perhaps the County could add tick control to the vector control program, or drop mosquito control entirely and devote its resources to tick control. In response, SCVC noted that effective tick control involves the use of pesticides, establishing a tick program would require SEQRA compliance, and that such compliance would probably result in an expensive EIS. However, some of the comments pointed out that public education has been found to produce very impressive decreases in Lyme disease, as for Burlington Township in New Jersey, where cases fell by 50 percent from 1995 to 2005. Thus a program based on public education might be helpful for Suffolk County.

The County notes four important points. One, Suffolk County's incidence rate for 2005 was approximately 45 percent the 1995 incidence rate (the most conservative report of Suffolk County Lyme disease for 1995 was 1,245 cases, in a press release from Governor Pataki's office, and the New York Times cited a 2005 case load of 542 for 2005). Secondly, reported case loads can vary widely from year to year (one paper has cited the production of acorns two years earlier as the best predictor of Lyme disease rates [Ostfield et al., 2006]). Thirdly, reporting of cases is not consistent across jurisdictions or years, and therefore the disease incidence rates may not be reliable indicators of actual disease impacts. Finally, although chronic impacts from Lyme disease may shorten lives, it has not been shown to have fatal acute effects, which is the case for mosquito-borne diseases. Thus, this may make the fewer-but-potentially-more-dangerous illnesses carried by mosquitoes a greater public health concern than tick-borne diseases. Nonetheless, the County conducts a wide-ranging education program, similar to that described in the comments as accomplished by Burlington Township, and has concerns regarding the incidence of Lyme disease across Suffolk County.

4.1.11 Current litigation

A member of the CEQ requested that the potential for change to the Long-Term Plan be considered in light of the current lawsuit filed against the County under the Federal Clean Water Act. The County Attorney, because litigation is still proceeding, thought it ill-advised for the

County to discuss the case outside of the defined legal process. The County offers this report on the progress of the case, which is copied from the Task 2 Legal report (Cashin Associates, 2005):

> **Peconic Baykeeper Inc v Suffolk County et al.**
>
> US District Court: Eastern District of New York
>
> Civil Action: CV-04-4828
>
> Filed November 2004
>
> This Federal suit is brought under Section 505(a) (1) of the Federal Water Pollution Control Act. This suit claims that the Peconic Area is a wetlands within the meaning of the CWA and that operation of the vector control ditch network directly impairs the natural hydrology of tidal wetlands which in turn affect the wildlife. The Complaint also claims that the resmethrin in the pesticide is "highly toxic to fish and marine invertebrates" and has killed fish which injured the plaintiffs. The Complaint requests the following relief: (1) a declaration that the defendants are in violation of the CWA; (2) civil penalties; (3) an award of costs and fees.
>
> The answer by Suffolk County denies the allegations and further raises the Affirmative Defense that the complaint fails to state a claim upon which relief can be granted.
>
> This case is currently pending and a motion for Summary Judgment is before the Court.

4.1.12 Mosquito Ecology

Comments were received regarding mosquitoes and their ecological roles. The 15 comments were parsed into three general categories:

(1) "Natural" mosquito predators (C1, C2, C3, I34, I48, I49, I50)

Comments were expressed that increasing the numbers of natural mosquito predators would enhance mosquito control to the point where organized mosquito control might not be necessary. Support for these views is often based on observations of organisms hunting over salt marshes, or the absence of mosquitoes in coastal settings when some potential predator is present. These can be valid determinations. Smith (1904) connected the presence of killifish in certain areas of salt marshes with the absence of mosquito larvae, and the presence of larvae in the absence of killifish. This was the genesis of what came to be known as "quality" ditching, a concept which came to be refined in the 1960s as Open Marsh Water Management (Ferrigno and Jobbins, 1968). OMWM is effective as mosquito control largely because the channels, ponds, and other constructed waterways provide habitat for killifish, and access for killifish to mosquito breeding sites.

The comments identified barn swallows, bats, blue (meaning, *purple*) martins, birds, frogs, fish, and dragonflies as mosquito predators, and advocated increasing populations by building bat houses, bird houses, doing appropriate plantings, and digging ponds to enhance the natural populations. There is ample evidence that these organisms eat mosquitoes, although some of the more outlandish claims have been discredited. The DGEIS (pp. 524-528) discussed the evidence both for and against these predators as effective controls of mosquitoes. Very broadly generalizing, the strongest case against conducting mosquito control by augmenting natural predators is that large-scale predation on adult mosquitoes tends to only occur when the mosquitoes are concentrated (immediately after hatching, and while mating). Providing bird and bat houses may not produce enough numbers to control mosquitoes, and if enough bats or birds were introduced to control mosquitoes, they would upset other ecological dynamics because mosquitoes are certainly not enough to sustain these organisms. Dragonfly nymphs (not adults) are known to be very effective predators of mosquitoes – when they share habitats. It is difficult to increase dragonfly nymph habitat exploitation, as adult dragonflies must be persuaded to lay eggs in the desired habitat, or the nymphs must be introduced. Fish are easier to accept as effective mosquito predators that can be augmented; in salt water, new marsh habitat appears to be exploitable by killifish populations with little to no observed ecological shifts. Stomach content analyses of killifish show they primarily feed on vegetation (algae), but are opportunistic omnivores (see McMahon et al., 2005). There are actually few measurements of killifish that have eaten mosquito larvae, although circumstantial evidence that they do eat them is widely accepted in mosquito control circles. *Gambusia* are often introduced into mosquito breeding environments; however, there is good evidence that such introductions cause major changes in the aquatic environments. Fresh water mosquitoes most often breed in settings where predators are lacking. Other organisms, particularly amphibians and invertebrates, also exploit these predator-free locations, and will be consumed in turn by *Gambusia*, should that fish be introduced.

Therefore, the County continues to insist that killifish appear to be the sole mosquito predator that can effectively control mosquito populations, and apparently can do so without disrupting the salt marsh ecosystem. This will be discussed in more detail in Section 4.6.4, below.

(2) Mosquito dynamics, especially in unaltered environments (S-6, S-7, AG-54, AG-82, AG-83)

Comments were received requesting expanded discussions of mosquito dynamics, especially in unaltered environments. At least one of these comments predated changes to the EIS, as reflected in the text found on pp. 76-96 and pp. 524-530. However, it is true there is little quantitative information regarding the productivity of mosquitoes, especially in unaltered settings. A database search by Wayne Crans, Rutgers University, found no peer-reviewed articles addressing these topics. Therefore, there is also no substantive information regarding the impact of removing mosquitoes from the landscape. As noted in the DGEIS (p. 524) most marsh ecology texts do not include mosquitoes. Anecdotal information drawn from over 40 years of successful mosquito control over large swaths of marsh in many northeastern states suggests that few detectable changes in overall marsh ecology have resulted. On the other hand, the lack of well planned and executed studies to detect ecological changes associated with mosquito control means that any assertions to the contrary (such as, declines in salt marsh sparrow populations/failures of the populations to recover are due to the removal of mosquito larvae from the salt marsh ecosystem) cannot be cavalierly dismissed, either. That large numbers of human-biting mosquitoes can be part of the "unaltered" landscape is not seriously disputable. Many texts from European explorers and settlers in areas of the United States report pestiferous populations; it is unknown if the marshes that produced these mosquitoes had been managed by Native Americans for any purpose, however.

(3) Mosquito breeding sites (I-44, AS-14)

One comment stated that most mosquitoes breed in fresh water. The statement can be interpreted in many ways, but the most likely meaning is that more human-biting mosquitoes are produced in fresh water environments than in salt water environments in Suffolk County. There is no means available to test that assertion. Trap data (reported in the DGEIS for 2005, pp. 78-80) suggests, but is not conclusive, that there are actually more salt water mosquitoes than fresh water mosquitoes. It must be understood that the trap data are biased in several ways (the kinds of species they catch, the locations they are set, and that the New Jersey and CDC trap data are certainly not directly comparable).

Another comment suggested that standing water in yards is mosquito breeding ground. In a sense that is true, but it is not entirely accurate. Mosquitoes need standing or sluggish water to breed in; however, not all standing water will lead to mosquito breeding. Therefore, an unattended wading pool or bird bath may result in mosquito breeding, if female mosquitoes lay eggs there. Not every potential breeding point breeds mosquitoes, however.

4.1.13 Long-Term Plan as an IPM plan

The County designed the Long-Term Plan as an expression of Integrated Pest Management (IPM). In fact, the organization of the Long-Term Plan and the impact analysis was suggested by the IPM hierarchical approach.

Comments were received regarding various aspects of IPM and the way the Long-Term Plan did or did not conform to it. The 15 comments have been classified as general and specific comments.

(1) General comments (H-8, I-36, U-4, R-34, BE-1, AJ-7, AO-1)

Several of these comments recognized that the County had adopted a hierarchical approach that broadly conceptualized control roles, and that IPM is the best means of addressing such problems. One comment, apparently meant as a criticism, called the Long-Term Plan an “advertisement for IPM.” However, another comment complained the Long-Term Plan did not follow IPM (apparently as specified in NYSDEC agricultural pesticide rules, see just below). One comment expressed the desire for “spraying and a middle ground,” which has been interpreted here as concern for the environment, and as something that is reflected in the IPM approach. Finally, a comment was offered that the Lon-Term Plan focuses on controlling mosquitoes through chemical, physical, and biological methods. The County believes this is correct, but also insists that its education and outreach program is an important element, too.

(2) Specific comments (D-6, I-39, U-3, AI-27, AI-28, AJ-8, AL-3, BV-3)

One comment noted with approval, and one with disapproval, that the Plan identified pesticides as an acceptable element of mosquito control.

There was the comment that the Long-Term Plan does not comply with NYSDEC standards for agricultural use of pesticides. The program's use of pesticides is extensively regulated by NYSDEC, and meets all requirements.

An emphasis on education, source reduction, and surveillance was thought to be most appropriate for Huntington. The results of the surveillance activities will dictate whether larval or adult control is necessary there.

The marsh management plan was identified as a positive portion of the overall plan, as being central to the plan, and, without water management, control of mosquitoes would focus on pesticides, and that allowing ditches to infill can also lead to more pesticides use. The County agrees with all of these comments.

4.1.14 Document Format Issues

14 comments were received that discussed the way that the DGEIS or Long-Term Plan were assembled, written, or otherwise formatted.

There was a request to include acronyms with the list of definitions following the Table of Contents. Each volume of the DGEIS included a list of the abbreviations and acronyms used in the DGEIS; each acronym or abbreviation was spelled out and then abbreviated on its first use.

There were three comments that requested definitions of terms used in the Executive Summary. These terms were defined as they were used in the body of the DGEIS. These definitions are offered to assist reader comprehension:

- Cycling center/amplification area (K-16): virus that mosquitoes transmit to people often are more transmissible in birds (or other organisms). EEE and WNV both are much more readily transmitted by mosquitoes to birds. If more than one mosquito bites the infected bird, as is often the case, then the incidence of virus in the mosquito population has increased. The larger number of infected mosquitoes then can infect even more birds, resulting in many more infected mosquitoes, etc. Since mosquitoes tend to bite multiple times, the increase in infected birds/mosquitoes can be exponential. If this amplification process has a geographical nexus, as it does for EEE (Atlantic white cedar swamps or red maple swamps) because the mosquito *Cs. melanura* is the only mosquito that can transmit enough virus from a bird to allow the amplification process to continue, the location is called a "cycling center" (because of the mosquito-bird-mosquito cycle) or an amplification area (see the DGEIS, pp. 330-332).

- Multivoltine/univoltine (AG-47): some mosquitoes reproduce once a year (univoltine), others have many generations across a summer (multivoltine). Once all of a univoltine mosquito generation has emerged, that species numbers will only decline over the course of a season. Multivoltine species numbers can vary over the course of a year, depending on survivorship across generations, and the size of a brood that emerges.

- MIR (AG-51): MIR stands for minimum infection rate. Mosquitoes are tested for pathogen presence in batches, because of the generally low rate of infection (testing individual mosquitoes would result in mostly no detections of virus) and their small size (older test methods called for groups of mosquitoes to be used to ensure there was enough material available to be tested; more modern methods do not require as much sample, but the historical practice is still followed). Because more than one mosquito is tested at a time, a positive result means that any number from one to the number of mosquitoes in the pool had the pathogen. Analysts assume that only one mosquito was infected, although more may have been. Therefore, the reported infection rate is the minimum infection rate, as it could have been higher. Infection rates reported for mosquitoes are thus an underestimate of true infection rates (assuming the sample tested was large enough to be representative of the population, which is rarely the case).

There was a request to relocate the application restrictions in the text, as they were believed to be the most important determinants of whether an application might occur or not (comment K-18). The County disagrees. The determination of whether mosquito conditions (numbers, predominantly, for vector control applications, and pathogen presence and human health risks for Health Emergency applications) meet thresholds is more important. It is conceivable, for example, if risks were grave enough that the Commissioner of SCDHS might determine that an application was needed despite suboptimal weather conditions.

The format for Table ES-10 is suboptimal (comment K-23). This table was originally part of one table with Table ES-14; when they were separated into distinct tables, the format was maintained as a parallel construction, although that meant much of the content of Table ES-10 was empty.

Decision-makers are clearly identified in Section 8 of the Long-Term Plan. For the most part, decisions are made by the Commissioner of SCDHS, the SCVC Superintendent, or their immediate deputies. From time-to-time, on matters within their competence, field supervisors will make decisions. In this day of immediate communication, there is often ample opportunity for consultation between field workers and supervisors.

Thresholds for action (comment R-8) were added to the description of the Long-Term Plan in both the Executive Summary and Section 2.10.

At one time, it was anticipated that the DGEIS might be constructed to attempt to satisfy SEQRA, and also to meet NEPA needs for a special use permit for work in Fire Island National Seashore (comment S-5). Consultation with FINS determined that such an approach would most probably not satisfy NEPA requirements, and so a separate NEPA analysis is being prepared.

NYSDEC is concerned that either a "however" is needed in the discussion on page ES-102, or the citation is incorrect (AG-52). A "however" would have been appropriate, as the findings of Merrimam and Redfield did not agree.

NYSDEC would like Karen Graulich's name added to the list of attendees for the Wetlands Subcommittee (AG-69). Those lists were compiled from voluntarily-completed attendance sheets; Ms. Graulich's presence at more than one such meeting is officially noted, however.

The lack of data with conclusions drawn from the Caged Fish experiment was noted (comment AG-106) (see the DGEIS at pp. 989-992, 1131-1133). This is because a larger discussion of methods and results had been presented on pp. 747-772. In addition, the full project report, in 13 distinct sections, was posed on the website. The results for the biological testing, which seem to be of most concern, were published as a separate file, and account for 72 pages of material. The

County considers this material to be "widely available," but in any case will provide hard copies, computer discs, or any other media presentation to any one who requests it.

A lack of references was noted for the Long-Term Plan (Comment AG-120). Plans do not need to be annotated, although that is done at times. The DGEIS is referenced, as is required by SEQRA.

It is also noted that the Long-Term Plan does not contain an environmental impact analysis (comment AG-121). The DGEIS is the environmental impact analysis for the Long-Term Plan.

4.1.15 EIS tone, overall content

Some comments (8) were pleased with the way the DGEIS was written; others (13) were not.

(1) Overall positive (P-1, AC-1, AG-1, AH-1, AJ-1, AJ-17, AJ-18, AI-1)

Compliments were made regarding the level of work, the implications of the project, the persuasiveness and reasonableness of the DGEIS.

(2) Generally negative (N-5, N-18, N-19, N-27, P-49, U-1, T-3, AC-8, AO-3, BI-27, BI-28, BJ-9, BV-5)

Several comments though the document was too strident in making its points. Most EISs reach conclusions regarding the analyses presented. The County believed that it presented information regarding the potential for impacts, and then reached conclusions regarding the ability to avoid or mitigate those impacts. In some cases the County identified benefits that might be achieved by employing the espoused techniques. Some comments thought the benefits so presented were overstated, or that impacts, especially from pesticides (pyrethroids in particular) or to human health from pesticides, were not properly presented. The County stands by its analysis that the potential for increased risks to human health or for ecological impacts from the use of mosquito control pesticides (especially the pyrethroids resmethrin and sumithrin) as described in the Long-Term Plan will be minimal. One comment noted that the DGEIS noted there are "no risks" from pyrethroids at one juncture, and "no significant risks" at another, and wondered if there was a distinction. A flat statement of "no risks" is considered to be poor risk communication. The risk analysis has shown that at no time do modeled exposures to the pyrethroids exceed the concentrations that are believed to be below a threshold for harm to people (see the DGEIS, pp. 1064, Table 7-19). This is a description of "no significant elevation of risk" associated with their use.

The County was asked to acknowledge that there is public controversy regarding potential benefits and impacts of the selected mosquito control means. The County has tried to accomplish this, for example, by including descriptions of potential impacts associated with implementing particular BMPs, and, in the environmental impact assessment, discussing how a BMP might be appropriate at one site but not at another, and providing concrete details to illustrate the points (see pp. 883-936). Despite this presentation, comments were received that the DGEIS did not account for conflicts between marsh values and mosquito control, and did not determine that the BMPs might not be best under all conditions. The drafters of the water management program have attempted to ensure that water management will only be implemented under conditions where environmental and ecological values are protected, where appropriate monitoring will occur to ensure the project meets its intended goals, and where mitigation of any project failures can be attempted should it be warranted (see Section 3.3, above, and section 4.6.2, below, for more details on the process changes being proposed to help to meet these needs). Another comment asked that the weight of scientific evidence be considered in the evaluation; it is obvious that the commenter and the County disagree as to how that weighting plays out.

Two comments were somewhat related. One asked that because of other potential impacts to marine resources, that a harder look be made than might be otherwise made at the impacts associated with vector control. The related comment was that the Long-Term Plan needed to ensure that no ecological impacts occur because of its implementation. The County believes that overall, the Long-Term Plan implementation will have a beneficial effect on the environment. This is to be achieved by reducing pesticides use and by conducting water management projects that meet dual aims of being effective means of mosquito control and also enhancing salt marsh ecological functions.

The two TAC risk assessment peer reviewers indicated that the Executive Summary of the Risk Assessment contained too many conclusions. The convention of the project, to avoid duplication and under the assumption that many readers might only read the Executive Summary of documents, had been to not write separate conclusions for reports, but rather to incorporate the document conclusions into the Executive Summary. Nonetheless, the comment is well-taken, and the Task 8 Task Report will be re-written to incorporate this and other risk assessment-related comments.

4.1.16 SEQRA technical issues

(1) Meets the requirements of SEQRA (H-17)

The County concurs.

(2) Is incomplete/inadequate (N-6, AV-1)

In a technical sense, the CEQ determined on March 17, 2006, that the DGEIS was complete and contained enough information to support the decisions required under SEQRA. To the extent that this FGEIS provides additional or clarifying information to assist in that determination, the points are well-taken.

(3) Revise the DGEIS to address peer reviewer comments (Q-41)

The DGEIS has been determined by the CEQ to be complete and adequate with respect to the scope and content. The FGEIS is intended to address substantive comments, either by providing new information or clarifying the presentations of information made in the DGEIS. This is done for all comments.

(4) Prepare a separate NEPA analysis for FINS (AH-3, AH-4, AH-5)

These comments, from the Superintendent of FINS, noted that NPS and FINS believed that a separate plan, and an associated NEPA-compliant environmental impact assessment, would be required for the County to receive a special use permit to allow for continued mosquito control within the boundaries of FINS. The County agrees this is the case, and notes it is currently working closely with FINS to achieve these aims.

4.2 Legal Issues

Certain overriding legal and regulatory issues were raised in comments. It may have been possible to address these comments under the particular sections of the Long-Term Plan. A decision was made to break these particular issues out separately, however. Some related topics may be addressed under the particular topics, nonetheless.

4.2.1 Triggers for future environmental review

Every DGEIS is required to specifically identify triggers for further environmental review, under SEQRA (6NYCRR 617.10(c)). Six comments were received regarding the water management portion of the proposed Long-Term Plan, nearly all expressing concerns or disagreeing with how the County had proposed to consider its SEQRA responsibilities for water management projects.

It is clear that extensive, open public review of nearly all water management projects will be required. The County has revised its plans with regard to the Best Management Practices, and has reclassified them. This new classification allows the County to state that all water management projects will be subject to SEQRA, with the exception of those having been identified with the potential to have “no or little impact” (BMPs 1 and 2) or “minimal impact” (BMPs 3 and 4). And, within this changed classification scheme, any culvert replacement that is not a strict “replacement in kind” will be subject to SEQRA, and ditch maintenance will be limited projects that affect a maximum of 50 acres per year. The only way that the 50 acre limit can be breached is if NYSDEC insists on ditch maintenance for one of its sites, although other management approaches had been considered by the County or the Wetlands Stewardship Committee. Under such circumstances, the NYSDEC properties will not be included in tallies towards the 50 acre limit.

This change in approach is intended to address comments such as AG-19 and AG-63, in which the commenter thought the criteria offered by the County to determine if further environmental review were required were too vague or not a correct interpretation of SEQRA. The County has included this kind of information in the revised Long-Term Plan (in Section 4) and in the constituent Wetlands Management Plan and BMP Manual (see Appendices 5-7) (comment 163).

One pair of comments (BA-24, BA-26) suggested that all water management projects be the subject of a DGEIS. The County is considering water management in order to eliminate aerial larviciding over 4,000 acres, and may consider water management projects in other parts of the remaining 13,000 acres of salt marsh spread across the County for various reasons. The intent of the DGEIS was to identify conditions and circumstances where the kinds of water management supported by the BMPs may have the potential for negative, significant environmental impacts. The County believes that where small projects are proposed using well-defined methods in a purposeful, planned fashion, and where environmental analysts familiar with the site agree that the potential for negative impact is minimal, that an EIS is not needed. For larger more complex projects, the County believes that careful project design, justification of design and technical choices before review bodies and permitting agencies, and presentation of the analyses of the potential for impacts at a level below that of an EIS may be sufficient for many projects. The County also understands that there may be projects where the preparation of an EIS is deemed necessary by a Lead Agency under SEQRA. However, the County does not expect that Lead Agencies for water management projects (in many cases if not most, the County Legislature will be the Lead Agency) will make a positive declaration thus requiring an EIS.

The County had anticipated that NYSDEC would consider issuing a general permit for one or more BMPs; the US Army Corps of Engineers considers that most water management projects fall under its Nationwide General Permit 27, which covers wetland restoration activities, although this decision is still made on a case-by-case basis (and requires consultation with USFWS). Comment AG-164 suggests that NYSDEC is not amenable to issuing any general permits for water management at this time.

4.2.2 County authority to enter onto other governments' lands?

Two comments (AG-26 and AG-110) raised the question regarding whether or not the County had the legal authority to enter onto all lands to conduct its business. Comment AG-26 noted that the County Charter granted SCVC the power to do so, but wondered if such authority is explicitly recognized in State Law.

Under State Public Health Law, Article 15, section 1525, the following is found:

1525. County mosquito control commission; powers and duties; entry on lands.

1. Each county mosquito control commission shall use every means feasible and practicable to suppress mosquitoes, ticks, flies and other hominoxious arthropods of every kind requiring community action for their control, and which may be found within the county for which such commission is appointed.

2. Such commission shall have power and authority to enter without hindrance upon any or all lands within the county for the purpose of draining or treating the same and to perform all other acts which in its opinion and judgment may be necessary and proper for the elimination of mosquitoes or other hominoxious arthropods which may require community action for their control, and which may be found within such counties, but such measures shall not be injurious to wild life.

3. Before entering upon any such lands for such purposes as outlined under this section, the commission shall publish each year at least once during the year, immediately following the approval of the board of supervisors of its plans for work during the ensuing year as provided in this article, in at least one newspaper in every town of the county where work is to be performed and in which such a paper is published, a general description of the land where the work is to be performed, and in case of a town where work is to be performed by the commission and in which no newspaper is published, individual notices shall be first sent to every owner in such town upon whose land the commission proposes to enter for said purposes if the name of such owner be known; if unknown such notice shall be posted in not less than five conspicuous places in such town.

This part of the State Code grants SCVC the right to enter onto all property within the County regardless of ownership.

The second comment noted that there have been issues raised regarding Trustee rights that may predate the State Constitution. Such issues have been extensively litigated, and Suffolk County and the various Town Trustees abide by the settled law established in those cases.

4.2.3 Federal/State/County/Trustee permit obligations

The DGEIS noted in passing that certain levels of government may be exempt from permit requirements imposed by other levels of government. This is much too simple a description of permit obligations as established by various Federal, State, and local laws and as interpreted by various court cases. The comment (comment AG-143) that various jurisdictions apply for permits as required under State Law appears to be accurate. Suffolk County notes that it complies with all permit requirements that it is subject to.

4.2.4 FIFRA and State pesticide law elucidation

Several comments discussed finer points of State pesticide law that were not completely, clearly, or correctly discussed in the DGEIS.

- Federal Minimum Risk Pesticides (FIFRA) and State pesticide law (AG-73)

Minimum risk pesticides (as classified under the Federal Insecticide, Fungicide, and Rodenticide Act [FIFRA] 25(b)/40 Code of Federal Regulations [CFR] 152.25(f)) are exempt from New York State registration requirements. They are still classified as pesticides in New York State, and are subject to all New York State use regulations, except for neighbor notification and annual report requirements.

- Emergency applications near State listed wetlands (AG-75)

The DGEIS and the Long-Term Plan are not accurate to report that, per Article 24, emergency applications made under a Health Emergency are exempt or received "waivers" from wetlands regulations. Rather, under Article 24 authority, NYSDEC issues an Emergency Authorization to permit the applications that otherwise would violate Article 24.

- Regulation of barrier treatments (AG-116)

It was suggested that stating that most states do not regulate barrier treatments was misleading and might imply these treatments are not regulated in New York. Barrier treatments are considered minimum risk pesticides, and are subject to New York State use regulations.

- Regulation of traps emitting octenol (AG-117)

Any device using octen-3-ol as an attractant is subject to New York State registration requirements.

4.2.5 Interpretations of State Wetlands Regulations

The County had developed, at the urging of the Wetlands Workgroup (primarily the New York State regulators sitting on that committee), a listing of how the State might interpret the BMPs in terms of its Salt Marsh Land Use Regulations, in March 2005. Comments were received regarding these lists, as they were presented in the DGEIS, suggesting that they might not be the most accurate interpretation of the wetlands regulations (AG-41). Therefore, the County amended the BMP tables, as follows (Tables 4-1 - 4-5) (note, per Section 4.2.1, the classification of the BMPs has been amended).

Table 4-1. Management Activities with No or Minimal Impacts

BMP	Action	Factors to Consider	Potential Benefits	Possible Impacts	Equipment to be used	General Compatibility With Tidal Wetlands 6 NYCRR Part 661
BMP 1.	Natural processes (reversion/no action)	- Default option - Land owner prefers natural processes to proceed unimpeded - Natural reversion is actively infilling ditches - No existing mosquito problem	- Return to pre-ditch hydrology - More natural appearance/processes - Requires no physical alterations	- Possible increase in mosquito breeding habitat, creation of problem - Loss of ditch natural resource values - Loss of tidal circulation - Phragmites invasion if fresh water is retained on marsh - Drowning of vegetation if excess water is held on marsh	Not applicable	NPN
BMP 2.	Maintain/repair existing culverts	- Flooding issues - Are existing culverts adequate for purpose? - Are existing culverts functioning properly?	- Maintain existing fish and wildlife habitats - Maintain tidal flow and/or prevent flooding	- Continue runoff conveyance into water bodies - Roads & other associated structures	- Hand tools (minor maintenance) - Heavy equipment for repair	GCp

Please note that other jurisdictions besides NYSDEC may also regulate activities in wetlands.

Table 4-2. Management Activities with Minor Impacts

BMP	Action	Factors to Consider	Potential Benefits	Possible Impacts	Equipment to be used	General Compatibility With Tidal Wetlands 6 NYCRR Part 661
BMP 3.	Maintain/ reconstruct existing upland/ fresh water* ditches	- Flooding issues - Are existing ditches supporting flood control? - Are existing ditches needed for agricultural uses?	- Maintain existing fish and wildlife habitats and hydrology - Prevent or relieve flooding - Support turtle habitat - Provide fish habitat	- Continue runoff conveyance? - Perpetuate existing degraded conditions - Excess drainage	- Hand tools (minor maintenance) - Heavy equipment for reconstruction (rare)	NPN, GCp (6 NYCRR Part 663)
BMP 4	Selective Maintenance/ Reconstruction of Existing Salt Marsh Ditches	- Local government issues and concerns resolution - SCDHS Office of Ecology review - Mosquito breeding activity - Land owners long-term expectations - Overall marsh functionality - Ditch maintenance is to be selective and minimized	- Enhance fish habitat - Maintain existing vegetation patterns - Maintain existing natural resource values - Allow salt water access to prevent/control Phragmites - Reuse pesticide usage	- Perpetuate ongoing impacts from ditching (lack of habitat diversity)	- Hand tools (minor maintenance) - Heavy equipment for reconstruction	NPN, GCp

Please note that other jurisdictions besides NYSDEC may also regulate activities in wetlands.

Table 4-3. Management Activities with the Potential for Significant Impacts

BMP	Action	Factors to Consider	Potential Benefits	Possible Impacts	Equipment to be used	General Compatibility With Tidal Wetlands 6 NYCRR Part 661
BMP 5.	Upgrade or install culverts, weirs, bridges	- Flooding - Flow restrictions - Associated marsh impacts - Cooperation from other involved departments	- Improve tidal exchange and inundation - Improve access by marine species - Increase salinity to favor native vegetation - Improve fish habitat & access	- Negative hydrological impacts - Changes in vegetation regime	- Heavy equipment required	GCp, P, PiP
BMP 6.	Naturalize existing ditches	- Grid ditches - Mosquito breeding activity - Landowner needs - In conjunction with other activities	- Increase habitat diversity - Increase biofiltration - Improve fish habitat and access by breaching berms	- Hydrology modification - Minor loss of vegetation - Possible excess drainage	- Hand tools (minor naturalization) - Heavy equipment for major	GCp
BMP 7.	Install shallow spur ditches	- Mosquito breeding activities - Standard water management not successful (continued larviciding)	- Increase habitat diversity - Allow higher fish populations - Improve fish access to breeding sites	- Drainage of ponds and pannes - Hydraulic modification - Structure not stable	- Preferably hand tools	GCp
BMP 8.	Back-blading and/or sidecasting material into depressions	- Mosquito breeding activities - Standard water management not successful (continued larviciding)	- Improve substrate for high marsh vegetation - Compensate for sea level rise or loss of sediment input - Eliminate mosquito breeding sites	- Excessive material could encourage Phragmites or shrubby vegetation - Materials eroded so that application was futile	- Heavy equipment required	Usually NPN or GCp; could be PiP or I
BMP 9.	Create small (500-1000sq. ft) fish reservoirs in mosquito breeding areas	- Mosquito breeding activities - In conjunction with other water management - Natural resource issues	- Increase wildlife habitat diversity/natural resource values - Improve fish habitat - Eliminate mosquito breeding sites - Generate material for back-blading	- Convert vegetated area to open water with different or lower values	-Heavy equipment required	PiP

Please note that other jurisdictions besides NYSDEC may also regulate activities in wetlands.

Table 4-4. Management Activities with the Potential for Major Impacts

BMP	Action	Factors to Consider	Potential Benefits	Possible Impacts	Equipment to be used	General Compatibility With Tidal Wetlands 6 NYCRR Part 661
BMP 10.	Break internal berms	- Water quality (poor) - Standing water (mosquito breeding) - Impacts on structural functions	- Allow access by marine species - Prevent waterlogging of soil and loss of high marsh vegetation - Improve fish access to mosquito breeding sites - Prevent stagnant water	- Changes in system hydrology - Excessive drainage of existing water bodies - Introduction of tidal water into areas not desired	- Hand tools (minor) - Heavy equipment (major)	Pip
BMP 11.	Install tidal channels	- Improve water quality - Tidal ranges and circulation - Increase salinity (invasive vegetation) - Natural resources enhancement	- Improve tidal exchange - Improve access by marine species - Increase salinity to favor native vegetation - Improve tidal inundation - Improve fish habitat	- Changes in system hydrology - Excessive drainage or flooding of uplands - Increase inputs from uplands into water body	- Heavy equipment	PiP
BMP 12.	Plug existing ditches	- Improve fish habitat - Tidal ranges and circulation - Prevent upland inputs - Natural resources enhancement	- Return to pre-ditch hydrology & vegetation - Reduce pollutant conveyance through marsh - Provide habitat for fish & wildlife using ditches - Retain water in ditch for fish habitat - Deny ovipositioning sites	- Changes in system hydrology - Reduce tidal exchange - Reduce fish diversity in ditches due to lack of access - Impoundment of freshwater could lead to freshening & Phragmites invasion - Possible drowning of marsh vegetation	- Heavy equipment	PiP or I
BMP 13.	Construct ponds greater than 1000 sq.ft.	- Landowner's needs - Water fowl habitat - Natural resources enhancement - Aesthetic improvements	- Increase habitat values for targeted species and associated wildlife - Improve habitat for fish - Eliminate mosquito breeding sites	- Changes in system hydrology - Convert vegetated areas to open water with different and possibly lower values	- Heavy equipment	PiP
BMP 14.	Fill existing ditches	- Landowner's needs - Aesthetic improvements - To restore pre-ditch hydrology - Vegetated areas	- Return to pre-ditch hydrology and vegetation - Reduced likelihood of pollutant conveyance through marsh - Create vegetated habitat to replace that lost by ditches or by other alterations - Deny mosquito breeding habitat by eliminating stagnant ditches	- Potential to create new breeding habitats if ditches are not properly filled or by making the marsh wetter - Loss of ditch habitat for fish, other marine species & wildlife using ditches - Loss of tidal circulation - Phragmites invasion if freshwater is retained on marsh - Drowning of vegetation if excessive water is held on marsh	- Heavy equipment	PiP or I
BMP 15.	Remove dredge spoils	- Increase wetland habitat	- Convert low-value upland to more valuable wetland habitats - Eliminate mosquito breeding sites	- Could result in new breeding sites if not carefully designed - Major change in local topography	- Heavy equipment	PiP

Please note that other jurisdictions besides NYSDEC may also regulate activities in wetlands.

Table 4-5. Interim Management/Ongoing Maintenance Actions

Interim Action	Action	Factors to Consider	Potential Benefits	Possible Impacts	Equipment to be used	General Compatibility with Tidal Wetlands 6 NYCRR Part 661
IMA 1.	Natural processes (No action reversion)	-Presumptive interim action	- Non-intervention in natural system	- Non-intervention in natural system	- Non-intervention in natural system	- Non-intervention in natural system
IMA 2.	Selective ditch maintenance (Standard Water Management)	- mosquito breeding activity - water quality (poor) - improve fish habitat	- Enhance fish habitat - Maintain existing vegetation pattern - Improve fish access to breeding sites - Increase fish and wildlife habitat diversity - Increase biofiltration - Improve fish habitat and access by breaching berms	- Perpetuate ongoing impacts from ditches - Hydrology modification - Minor loss of vegetation - Possible excess drainage of marsh surface	- Hand tools (Minor) - Heavy equipment (Major)	NPN, GCp
IMA 3.	Culvert repair/maintenance when tidal restrictions are apparent	- improve water quality - restore pre-restriction hydrology -mosquito breeding activities	- Maintain existing habitat - Maintain existing flows and/or prevent flooding	- Continue runoff conveyance into water bodies - Potentially inadequate water transmission	- Heavy equipment	GCp
IMA 4.	Stop-gap ditch plug maintenance	- prevent upland inputs - increase wetland habitat - sustain fish and wildlife habitat	- Return to pre-ditch hydrology & vegetation - Reduce pollutant conveyance through marsh - Provide habitat for fish & wildlife using ditches - Retain water in ditch for fish habitat - Deny ovipositioning sites	- Reduce tidal exchange - Reduce fish diversity in ditches due to lack of access - Impoundment of freshwater could lead to freshening & Phragmites invasion - Possible drowning of marsh vegetation - Impermanent approach (likely to fail within 5 years)	- Heavy equipment	GCp

Please note that other jurisdictions besides NYSDEC may also regulate activities in wetlands.

Because water management projects that could result in source reduction for certain mosquito species, a request was made to note that for some mosquito species source reduction efforts, "[a]ny project in Tidal Wetlands and which requires a Tidal Wetlands permit must meet the standards of permit issuance in order to be undertaken" (comment AG-42). The County always intends to comply with permit conditions, especially given its status as a governmental agent. The County does not believe that complying with permit conditions is a constraint on its actions that needs to be specially called out in a table identifying difficulties and problems in conducting source reduction with certain mosquito species. The County did note that many fresh water species controlled in other jurisdictions cannot be similarly controlled in New York State due to regulations that severely restrict water flow manipulations in fresh water marshes. The County also noted throughout that section that such restrictions had been made for the purpose of protecting valuable fresh water wetlands habitats. This was not intended as a criticism of New York State regulations.

Comment AG-74 corrects the mis-citation of State Law. The Freshwater and Tidal Regulations are "Article 24" and "Article 25," respectively, not "Section 24" and "Section 25" of the Environmental Conservation Law.

Comment AG-77 corrects the mis-citation of the size of freshwater wetlands regulations, which is 12.4 acres, not the mistakenly listed 12.6 acres.

Comment AG-88 corrects the mis-citation of the regulations, in that wetlands that are smaller than 12.4 acres may be mapped and regulated under authority granted by 6NYCRR Part 664.

4.2.6 R-T-E as constraints on actions

Four comments addressed rare-threatened-endangered (R-T-E) species, and how they may be constraints on actions undertaken under the Long-Term Plan. If an USACOE permit or permit review is required, then a consultation with the USFWS will also be required under the Endangered Species Act, to ensure any Federally-protected species will not be harmed by the proposed action (AF-2). In addition, if a review conducted even when a USACOE permit is not required determines that a Federally-listed species might be impacted by the project, then a USFWS review should also be conducted (AF-3).

Comment AG-72 noted that any species listed on the State lists of R-T-E cannot be taken without a permit. Comments AG-72 and AG-105 amended the lists of RTE species found in the DGEIS, Table 3-2 and 7-4, respectively. However, please note that the piping plover was included in the Table, although the NYSDEC comment indicated it was not. It is correct, and intentional, that Table 3-2 does not include any marine mammals. Amended versions of Tables 3-2 and 7-4 follow.

Table 4-6. DGEIS Table 3-2 "Species of Special Concern Found in Suffolk County" Corrected

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING
Dragon-/Damselfly	Enallagma minusculum	Little Bluet	Threatened
Dragon-/Damselfly	Enallagma pictum	Scarlet Bluet	Threatened
Dragon-/Damselfly	Enallagma recurvatum	Pine Barrens Bluet	Threatened
Dragon-/Damselfly	Nehalennia integricollis	Southern Sprite	Special Concern
Dragon-/Damselfly	Anax longipes	Comet Darner	Unlisted
Dragon-/Damselfly	Enallagma laterale	New England Bluet	Unlisted
Dragon-/Damselfly	Libellula needhami	Needham's Skimmer	Unlisted
Dragon-/Damselfly	Ischnura ramburii	Rambur's Forktail	Unlisted
Butterfly	Callophrys hesseli	Hessel's Hairstreak	Endangered
Butterfly	Speyeria idalia	Regal Fritillary	Endangered
Butterfly	Callophrys irus	Frosted Elfin	Threatened
Butterfly	Atrytonopsis hianna	Dusted Skipper	Unlisted
Butterfly	Satyrium edwardsii	Edwards' Hairstreak	Unlisted
Butterfly	Calycopis cecrops	Red-banded Hairstreak	Unlisted
Butterfly	Parrhasius m-album	White-m Hairstreak	Unlisted
Moth	Catocala herodias gerhardi	Herodias or Pine Barrens Underwing	Special Concern
Moth	Catocala jair ssp. 2	Jersey Jair Underwing	Special Concern
Moth	Hemileuca maia ssp. 5	Coastal Barrens Buckmoth	Special Concern
Moth	Heterocampa varia	A Notodontid Moth	Special Concern
Moth	Anisota stigma	Spiny Oakworm Moth	Unlisted
Moth	Apharetra dentata	Toothed Apharetra	Unlisted
Moth	Chaetaglaea cerata	A Noctuid Moth	Unlisted
Moth	Chytonix sensilis	A Noctuid Moth	Unlisted
Moth	Cisthene packardii	Packard's Lichen Moth	Unlisted
Moth	Eucoptocnemis fimbriaris	A Noctuid Moth	Unlisted
Moth	Euxoa pleuritica	A Noctuid Moth	Unlisted
Moth	Euxoa violaris	Violet Dart	Unlisted
Moth	Hyperstrotia flaviguttata	Yellow-spotted Graylet	Unlisted
Moth	Itame sp. 1	Barrens Itame	Unlisted
Moth	Metalectra richardsi	Richard's Fungus Moth	Unlisted
Moth	Monoleuca semifascia	A Slug Moth	Unlisted
Moth	Morrisonia mucens	Gray Woodgrain	Unlisted
Moth	Psectraglaea carnosa	Pink Sallow	Unlisted
Moth	Zale sp. 1 nr. lunifera	Pine Barrens Zale	Unlisted
Moth	Apamea burgessi	A Noctuid Moth	Unlisted
Moth	Faronta rubripennis	The Pink Streak	Unlisted
Moth	Euchlaena madusaria	A Geometrid Moth	Unlisted
Moth	Citheronia sepulcralis	Pine Devil	Unlisted
Moth	Apamea inordinata	A Noctuid Moth	Unlisted
Moth	Hydraecia stramentosa	A Noctuid Moth	Unlisted
Moth	Lepipolys perscripta	A Moth	Unlisted
Moth	Oncocnemis riparia	A Noctuid Moth	Unlisted

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING
Moth	Rhodoecia aurantiago	Aureolaria Seed Borer	Unlisted
Moth	Richia acclivis	A Noctuid Moth	Unlisted
Moth	Abagrotis crumbi benjamini	Coastal Heathland Cutworm	Unlisted
Moth	Papaipema appassionata	Pitcher Plant Borer Moth	Unlisted
Moth	Papaipema stenocelis	Chain Fern Borer Moth	Unlisted
Moth	Schinia bifascia	A Noctuid Moth	Unlisted
Amphibian	Ambystoma tigrinum	Tiger Salamander	Endangered
Amphibian	Rana sphenocephala	Southern Leopard Frog	Special Concern
Amphibian	Acris crepitans	Northern Cricket Frog	Endangered
Amphibian	Ambystoma opacum	Marbled Salamander	Special Concern
Amphibian	Ambystoma laterale	Blue-spotted Salamander	Special Concern
Amphibian	Scaphiopus holbrookii	Eastern Spadefoot Toad	Special Concern
Reptile	Kinosternon subrubrum	Eastern Mud Turtle	Endangered
Reptile	Heterodon platyrhinos	Eastern Hognose Snake	Special Concern
Reptile	Clemmys guttata	Spotted Turtle	Special Concern
Reptile	Terrapene Carolina	Eastern Box Turtle	Special Concern
Reptile	Pandion haliaetus	Osprey	Special Concern
Bird	Laterallus jamaicensis	Black Rail	Endangered
Bird	Asio flammeus	Short-eared Owl	Endangered
Bird	Charadrius melodus	Piping Plover	Endangered
Bird	Sterna dougallii	Roseate Tern	Endangered
Bird	Sterna antillarum	Least Tern	Threatened
Bird	Sterna hirundo	Common Tern	Threatened
Bird	Bartramia longicauda	Upland Sandpiper	Threatened
Bird	Circus cyaneus	Northern Harrier	Threatened
Bird	Podilymbus podiceps	Pied-billed Grebe	Threatened
Bird	Protonotaria citrea	Prothonotary Warbler	Protected
Bird	Caprimulgus carolinensis	Chuck-will's-widow	Protected
Bird	Oporornis formosus	Kentucky Warbler	Protected
Bird	Tyto alba	Barn Owl	Protected
Bird	Ammodramus maritimus	Seaside Sparrow	Special Concern
Bird	Rynchops niger	Black Skimmer	Special Concern
Bird	Ardea alba	Great Egret	Protected
Bird	Egretta thula	Snowy Egret	Protected
Bird	Egretta tricolor	Tricolored Heron	Protected
Bird	Plegadis falcinellus	Glossy Ibis	Protected
Bird	Colonial Waterbird Nesting Area		Unlisted
Bird	Gull Nesting Colony		Unlisted
Fish	Enneacanthus obesus	Banded Sunfish	Threatened
Fish	Etheostoma fusiforme	Swamp Darter	Threatened
Fish	Aphredoderus sayanus	Pirate Perch	Unlisted
Fish	Menidia beryllina	Inland Silverside	Unlisted
Fish	Menidia menidia	Atlantic Silverside	Unlisted
Vascular Plant	Agalinis acuta	Sandplain Gerardia	Endangered
Vascular Plant	Agalinis maritima var. maritima	Seaside Gerardia	Unlisted
Vascular Plant	Ageratina aromatica var. aromatica	Small White Snakeroot	Endangered
Vascular Plant	Aletris farinosa	Stargrass	Threatened
Vascular Plant	Amaranthus pumilus	Seabeach Amaranth	Endangered
Vascular Plant	Amelanchier nantucketensis	Nantucket Juneberry	Endangered
Vascular Plant	Angelica lucida	Seacoast Angelica	Endangered
Vascular Plant	Asclepias variegata	White Milkweed	Endangered
Vascular Plant	Atriplex glabriuscula	Seaside Orach	Endangered
Vascular Plant	Bartonia paniculata	Screw-stem	Endangered
Vascular Plant	Bolboschoenus maritimus ssp. paludosus	Seaside Bulrush	Endangered
Vascular Plant	Bolboschoenus novae-angliae	Saltmarsh Bulrush	Endangered
Vascular Plant	Botrychium oneidense	Blunt-lobe Grape Fern	Endangered
Vascular Plant	Callitriche terrestris	Terrestrial Starwort	Threatened
Vascular Plant	Cardamine longii	Long's Bittercress	Threatened

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING
Vascular Plant	Carex barrattii	Barratt's Sedge	Endangered
Vascular Plant	Carex bullata	Button Sedge	Endangered
Vascular Plant	Carex buxbaumii	Brown Bog Sedge	Threatened
Vascular Plant	Carex collinsii	Collins' Sedge	Endangered
Vascular Plant	Carex hormathodes	Marsh Straw Sedge	Threatened
Vascular Plant	Carex merritt-fernaldii	Fernald's Sedge	Threatened
Vascular Plant	Carex mesochorea	Midland Sedge	Endangered
Vascular Plant	Carex mitchelliana	Mitchell's Sedge	Threatened
Vascular Plant	Carex straminea	Straw Sedge	Endangered
Vascular Plant	Carex styloflexa	Bent Sedge	Endangered
Vascular Plant	Carex typhina	Cat-tail Sedge	Threatened
Vascular Plant	Carex venusta var. minor	Graceful Sedge	Endangered
Vascular Plant	Chamaecyparis thyoides	Atlantic White Cedar	Rare
Vascular Plant	Chasmanthium laxum	Slender Spikegrass	Endangered
Vascular Plant	Chenopodium berlandieri var. macrocalycium	Large Calyx Goosefoot	Endangered
Vascular Plant	Chenopodium rubrum	Red Pigweed	Threatened
Vascular Plant	Coreopsis rosea	Rose Coreopsis	Rare
Vascular Plant	Crassula aquatica	Water Pigmyweed	Endangered
Vascular Plant	Cyperus flavescens	Yellow Flatsedge	Endangered
Vascular Plant	Cyperus polystachyos var. texensis	Coast Flatsedge	Endangered
Vascular Plant	Cyperus retrorsus	Retrorse Flatsedge	Endangered
Vascular Plant	Desmodium ciliare	Little-leaf Tick-trefoil	Threatened
Vascular Plant	Desmodium obtusum	Stiff Tick-trefoil	Endangered
Vascular Plant	Dichanthelium wrightianum	Wright's Panic Grass	Endangered
Vascular Plant	Digitaria filiformis	Slender Crabgrass	Threatened
Vascular Plant	Diospyros virginiana	Persimmon	Threatened
Vascular Plant	Eleocharis engelmannii	Engelmann's Spikerush	Endangered
Vascular Plant	Eleocharis equisetoides	Knotted Spikerush	Threatened
Vascular Plant	Eleocharis fallax	Creeping Spikerush	Endangered
Vascular Plant	Eleocharis halophila	Salt-marsh Spikerush	Threatened
Vascular Plant	Eleocharis obtusa var. ovata	Blunt Spikerush	Endangered
Vascular Plant	Eleocharis quadrangulata	Angled Spikerush	Endangered
Vascular Plant	Eleocharis tenuis var. pseudoptera	Slender Spikerush	Endangered
Vascular Plant	Eleocharis tricostata	Three-ribbed Spikerush	Endangered
Vascular Plant	Eleocharis tuberculosa	Long-tubercled Spikerush	Threatened
Vascular Plant	Erechtites hieraciifolia var. megalocarpa	Fireweed	Endangered
Vascular Plant	Eupatorium album var. subvenosum	White Boneset	Threatened
Vascular Plant	Eupatorium hyssopifolium var. laciniatum	Fringed Boneset	Threatened
Vascular Plant	Eupatorium leucolepis var. leucolepis	White Boneset	Endangered
Vascular Plant	Eupatorium rotundifolium var. ovatum	Round-leaf Boneset	Endangered
Vascular Plant	Euphorbia ipecacuanhae	American Ipecac	Endangered
Vascular Plant	Eurybia spectabilis	Showy Aster	Threatened
Vascular Plant	Fimbristylis castanea	Marsh Fimbry	Threatened
Vascular Plant	Gamochaeta purpurea	Purple Everlasting	Endangered
Vascular Plant	Gaylussacia dumosa var. bigeloviana	Dwarf Huckleberry	Endangered
Vascular Plant	Helianthemum dumosum	Bushy Rockrose	Threatened
Vascular Plant	Helianthus angustifolius	Swamp Sunflower	Threatened
Vascular Plant	Hottonia inflata	Featherfoil	Threatened
Vascular Plant	Hydrocotyle verticillata	Whorled-pennywort	Endangered
Vascular Plant	Hypericum adpressum	Creeping St. John's-wort	Endangered
Vascular Plant	Hypericum densiflorum	Bushy St. John's-wort	Endangered
Vascular Plant	Hypericum denticulatum	Coppery St. John's-wort	Endangered
Vascular Plant	Hypericum hypericoides ssp. multicaule	St. Andrew's Cross	Endangered
Vascular Plant	Hypericum prolificum	Shrubby St. John's-wort	Threatened
Vascular Plant	Iris prismatica	Slender Blue Flag	Threatened
Vascular Plant	Juncus marginatus var. biflorus	Large Grass-leaved Rush	Endangered
Vascular Plant	Juncus scirpoides	Scirpus-like Rush	Endangered
Vascular Plant	Juncus subcaudatus	Woods-rush	Endangered

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING
Vascular Plant	Lachnanthes caroliniana	Carolina Redroot	Endangered
Vascular Plant	Lechea pulchella var. moniliformis	Bead Pinweed	Endangered
Vascular Plant	Lechea tenuifolia	Slender Pinweed	Threatened
Vascular Plant	Lemna perpusilla	Minute Duckweed	Endangered
Vascular Plant	Leptochloa fusca ssp. fascicularis	Salt-meadow Grass	Endangered
Vascular Plant	Lespedeza stuevei	Velvety Bush-clover	Threatened
Vascular Plant	Liatris scariosa var. novae-angliae	Northern Blazing-star	Threatened
Vascular Plant	Ligusticum scothicum ssp. scothicum	Scotch Lovage	Endangered
Vascular Plant	Lilaeopsis chinensis	Eastern Grasswort	Threatened
Vascular Plant	Linum intercursum	Sandplain Wild Flax	Threatened
Vascular Plant	Linum medium var. texanum	Southern Yellow Flax	Threatened
Vascular Plant	Lipocarpha micrantha	Dwarf Bulrush	Endangered
Vascular Plant	Listera australis	Southern Twayblade	Endangered
Vascular Plant	Ludwigia sphaerocarpa	Globe-fruited Ludwigia	Threatened
Vascular Plant	Lycopodiella caroliniana var. caroliniana	Carolina Clubmoss	Endangered
Vascular Plant	Lycopus rubellus	Gypsy-wort	Endangered
Vascular Plant	Lysimachia hybrida	Lance-leaved Loosestrife	Endangered
Vascular Plant	Lythrum lineare	Saltmarsh Loosestrife	Endangered
Vascular Plant	Magnolia virginiana	Sweetbay Magnolia	Endangered
Vascular Plant	Myriophyllum pinnatum	Green Parrot's-feather	Endangered
Vascular Plant	Oenothera laciniata	Cut-leaved Evening-primrose	Endangered
Vascular Plant	Oenothera oakesiana	Evening Primrose	Threatened
Vascular Plant	Oldenlandia uniflora	Clustered Bluets	Endangered
Vascular Plant	Orontium aquaticum	Golden Club	Threatened
Vascular Plant	Paspalum laeve	Field Beadgrass	Endangered
Vascular Plant	Paspalum setaceum var. psammophilum	Slender Beadgrass	Endangered
Vascular Plant	Paspalum setaceum var. setaceum	Slender Beadgrass	Threatened
Vascular Plant	Plantago maritima var. juncoides	Seaside Plantain	Threatened
Vascular Plant	Platanthera ciliaris	Orange Fringed Orchid	Endangered
Vascular Plant	Platanthera cristata	Crested Fringed Orchis	Endangered
Vascular Plant	Polygala lutea	Orange Milkwort	Endangered
Vascular Plant	Polygonum buxiforme	Small's Knotweed	Endangered
Vascular Plant	Polygonum careyi	Carey's Smartweed	Threatened
Vascular Plant	Polygonum glaucum	Seabeach Knotweed	Rare
Vascular Plant	Polygonum hydropiperoides var. opelousanum	Opelousa Smartweed	Threatened
Vascular Plant	Polygonum setaceum var. interjectum	Swamp Smartweed	Endangered
Vascular Plant	Populus heterophylla	Swamp Cottonwood	Threatened
Vascular Plant	Potamogeton pulcher	Spotted Pondweed	Threatened
Vascular Plant	Potentilla anserina ssp. egedii	Silverweed	Threatened
Vascular Plant	Proserpinaca pectinata	Comb-leaved Mermaid-weed	Threatened
Vascular Plant	Pycnanthemum muticum	Blunt Mountain-mint	Threatened
Vascular Plant	Pyxidanthera barbulata	Flowering Pixiemoss	Endangered
Vascular Plant	Rhynchospora inundata	Drowned Horned Rush	Threatened
Vascular Plant	Rhynchospora nitens	Short-beaked Bald-rush	Threatened
Vascular Plant	Rhynchospora scirpoides	Long-beaked Bald-rush	Rare
Vascular Plant	Rotala ramosior	Tooth-cup	Threatened
Vascular Plant	Rumex hastatulus	Heart Sorrel	Endangered
Vascular Plant	Rumex maritimus var. fueginus	Golden Dock	Endangered
Vascular Plant	Sabatia campanulata	Slender Marsh-pink	Endangered
Vascular Plant	Sabatia stellaris	Sea-pink	Threatened
Vascular Plant	Sagina decumbens ssp. decumbens	Small-flowered Pearlwort	Endangered
Vascular Plant	Sagittaria teres	Quill-leaf Arrowhead	Endangered
Vascular Plant	Salicornia bigelovii	Dwarf Glasswort	Threatened
Vascular Plant	Schizaea pusilla	Curlygrass Fern	Endangered
Vascular Plant	Scleria minor	Slender Nutrush	Endangered
Vascular Plant	Scleria pauciflora var. caroliniana	Few-flowered Nutrush	Endangered
Vascular Plant	Scleria triglomerata	Whip Nutrush	Threatened
Vascular Plant	Sericocarpus linifolius	Flax-leaf Whitetop	Threatened

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING
Vascular Plant	Sesuvium maritimum	Sea Purslane	Endangered
Vascular Plant	Sisyrinchium mucronatum	Michaux's Blue-eyed-grass	Endangered
Vascular Plant	Solidago latissimifolia	Coastal Goldenrod	Endangered
Vascular Plant	Solidago sempervirens var. mexicana	Seaside Goldenrod	Endangered
Vascular Plant	Sphenopholis pensylvanica	Swamp Oats	Endangered
Vascular Plant	Spiranthes vernalis	Spring Ladies'-tresses	Endangered
Vascular Plant	Sporobolus clandestinus	Rough Rush-grass	Endangered
Vascular Plant	Stachys hyssopifolia	Rough Hedge-nettle	Threatened
Vascular Plant	Suaeda linearis	Narrow-leaf Sea-blite	Endangered
Vascular Plant	Suaeda rolandii	Roland's Sea-blite	Endangered
Vascular Plant	Symphyotrichum concolor	Silvery Aster	Endangered
Vascular Plant	Symphyotrichum subulatum	Saltmarsh Aster	Threatened
Vascular Plant	Tipularia discolor	Cranefly Orchid	Endangered
Vascular Plant	Tripsacum dactyloides	Northern Gamma Grass	Threatened
Vascular Plant	Utricularia juncea	Rush Bladderwort	Threatened
Vascular Plant	Utricularia radiata	Small Floating Bladderwort	Threatened
Vascular Plant	Utricularia striata	Fibrous Bladderwort	Threatened
Vascular Plant	Uvularia puberula var. nitida	Mountain Bellwort	Endangered
Vascular Plant	Viburnum dentatum var. venosum	Southern Arrowwood	Threatened
Vascular Plant	Viburnum nudum var. nudum	Possum-haw	Endangered
Vascular Plant	Viola brittoniana	Coast Violet	Endangered
Vascular Plant	Viola primulifolia	Primrose-leaf Violet	Threatened

Table 4-7. DGEIS Table 7-4, "Natural Heritage Program R-T-E Species in Fresh Water Environments of Suffolk County" Corrected

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING	HABITAT PREFERENCE
Dragonfly/Damselfly	*Enallagma minusculum*	Little Bluet	Threatened	F
Dragonfly/Damselfly	*Enallagma pictum*	Scarlet Bluet	Threatened	F
Dragonfly/Damselfly	*Enallagma recurvatum*	Pine Barrens Bluet	Threatened	F
Dragonfly/Damselfly	*Nehalennia integricollis*	Southern Sprite	Special Concern	F
Dragonfly/Damselfly	*Anax longipes*	Comet Darner	Unlisted	F
Dragonfly/Damselfly	*Enallagma laterale*	New England Bluet	Unlisted	F
Dragonfly/Damselfly	*Libellula needhami*	Needham's Skimmer	Unlisted	F
Dragonfly/Damselfly	*Ischnura ramburii*	Rambur's Forktail	Unlisted	F, S
Butterfly	*Callophrys hesseli*	Hessel's Hairstreak	Endangered	F
Amphibian	*Ambystoma tigrinum*	Tiger Salamander	Endangered	U, F
Amphibian	*Rana sphenocephala*	Southern Leopard Frog	Special Concern	F, U
Amphibian	Acris crepitans	Northern Cricket Frog	Endangered	F
Amphibian	Ambystoma opacum	Marbled Salamander	Special Concern	F, U
Amphibian	Ambystoma laterale	Blue-spotted Salamander	Special Concern	F, U
Amphibian	Scaphiopus holbrookii	Eastern Spadefoot Toad	Special Concern	U
Reptile	Clemmys guttata	Spotted Turtle	Special Concern	F
Reptile	*Kinosternon subrubrum*	Eastern Mud Turtle	Endangered	F, S?
Bird	*Protonotaria citrea*	Prothonotary Warbler	Protected	F
Fish	*Enneacanthus obesus*	Banded Sunfish	Threatened	
Fish	*Etheostoma fusiforme*	Swamp Darter	Threatened	
Fish	*Aphredoderus sayanus*	Pirate Perch	Unlisted	
Vascular Plant	*Bartonia paniculata*	Screw-stem	Endangered	F
Vascular Plant	*Botrychium oneidense*	Blunt-lobe Grape Fern	Endangered	F

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING	HABITAT PREFERENCE
Vascular Plant	*Carex barrattii*	Barratt's Sedge	Endangered	F, U
Vascular Plant	*Carex bullata*	Button Sedge	Endangered	F
Vascular Plant	*Carex buxbaumii*	Brown Bog Sedge	Threatened	F
Vascular Plant	*Carex collinsii*	Collins' Sedge	Endangered	F
Vascular Plant	*Carex styloflexa*	Bent Sedge	Endangered	U, F
Vascular Plant	*Carex typhina*	Cat-tail Sedge	Threatened	U, F
Vascular Plant	*Carex venusta var. minor*	Graceful Sedge	Endangered	F, U
Vascular Plant	*Chamaecyparis thyoides*	Atlantic White Cedar	Rare	F
Vascular Plant	*Chasmanthium laxum*	Slender Spikegrass	Endangered	F
Vascular Plant	*Coreopsis rosea*	Rose Coreopsis	Rare	F
Vascular Plant	*Cyperus flavescens*	Yellow Flatsedge	Endangered	F
Vascular Plant	*Dichanthelium wrightianum*	Wright's Panic Grass	Endangered	F
Vascular Plant	*Eleocharis engelmannii*	Engelmann's Spikerush	Endangered	F
Vascular Plant	*Eleocharis equisetoides*	Knotted Spikerush	Threatened	S, F
Vascular Plant	*Eleocharis fallax*	Creeping Spikerush	Endangered	F, S
Vascular Plant	*Eleocharis quadrangulata*	Angled Spikerush	Endangered	F
Vascular Plant	*Eleocharis tenuis var. pseudoptera*	Slender Spikerush	Endangered	U, S, F?
Vascular Plant	*Eleocharis tricostata*	Three-ribbed Spikerush	Endangered	F
Vascular Plant	*Eleocharis tuberculosa*	Long-tubercled Spikerush	Threatened	F
Vascular Plant	*Eupatorium leucolepis var. leucolepis*	White Boneset	Endangered	F, U
Vascular Plant	*Eupatorium rotundifolium var. ovatum*	Round-leaf Boneset	Endangered	F
Vascular Plant	*Gamochaeta purpurea*	Purple Everlasting	Endangered	U
Vascular Plant	*Gaylussacia dumosa var. bigeloviana*	Dwarf Huckleberry	Endangered	F, U
Vascular Plant	*Hottonia inflata*	Featherfoil	Threatened	F
Vascular Plant	*Hydrocotyle verticillata*	Whorled-pennywort	Endangered	F
Vascular Plant	*Hypericum adpressum*	Creeping St. John's-wort	Endangered	F
Vascular Plant	*Hypericum densiflorum*	Bushy St. John's-wort	Endangered	F
Vascular Plant	*Hypericum denticulatum*	Coppery St. John's-wort	Endangered	F
Vascular Plant	*Hypericum prolificum*	Shrubby St. John's-wort	Threatened	U, F
Vascular Plant	*Iris prismatica*	Slender Blue Flag	Threatened	U, F
Vascular Plant	*Juncus marginatus var. biflorus*	Large Grass-leaved Rush	Endangered	F
Vascular Plant	*Juncus scirpoides*	Scirpus-like Rush	Endangered	F
Vascular Plant	*Juncus subcaudatus*	Woods-rush	Endangered	F
Vascular Plant	*Lachnanthes caroliniana*	Carolina Redroot	Endangered	F
Vascular Plant	*Lemna perpusilla*	Minute Duckweed	Endangered	F
Vascular Plant	*Lilaeopsis chinensis*	Eastern Grasswort	Threatened	S
Vascular Plant	*Lipocarpha micrantha*	Dwarf Bulrush	Endangered	F, U
Vascular Plant	*Listera australis*	Southern Twayblade	Endangered	F
Vascular Plant	*Ludwigia sphaerocarpa*	Globe-fruited Ludwigia	Threatened	F
Vascular Plant	*Lycopodiella caroliniana var. caroliniana*	Carolina Clubmoss	Endangered	F
Vascular Plant	*Lycopus rubellus*	Gypsy-wort	Endangered	U
Vascular Plant	*Lysimachia hybrida*	Lance-leaved Loosestrife	Endangered	F, U

GROUP	SCIENTIFIC NAME	COMMON NAME	NY LISTING	HABITAT PREFERENCE
Vascular Plant	*Myriophyllum pinnatum*	Green Parrot's-feather	Endangered	F
Vascular Plant	*Oldenlandia uniflora*	Clustered Bluets	Endangered	F, U
Vascular Plant	*Platanthera ciliaris*	Orange Fringed Orchid	Endangered	U, F
Vascular Plant	*Platanthera cristata*	Crested Fringed Orchis	Endangered	U
Vascular Plant	*Polygala lutea*	Orange Milkwort	Endangered	F
Vascular Plant	*Polygonum careyi*	Carey's Smartweed	Threatened	F, U
Vascular Plant	*Polygonum hydropiperoides var. opelousanum*	Opelousa Smartweed	Threatened	F
Vascular Plant	*Polygonum setaceum var. interjectum*	Swamp Smartweed	Endangered	F, U
Vascular Plant	*Populus heterophylla*	Swamp Cottonwood	Threatened	F
Vascular Plant	*Potamogeton pulcher*	Spotted Pondweed	Threatened	F
Vascular Plant	*Proserpinaca pectinata*	Comb-leaved Mermaid-weed	Threatened	F
Vascular Plant	*Rhynchospora inundata*	Drowned Horned Rush	Threatened	F
Vascular Plant	*Rhynchospora nitens*	Short-beaked Bald-rush	Threatened	F
Vascular Plant	*Rhynchospora scirpoides*	Long-beaked Bald-rush	Rare	F
Vascular Plant	*Rotala ramosior*	Tooth-cup	Threatened	F, U
Vascular Plant	*Sagittaria teres*	Quill-leaf Arrowhead	Endangered	F
Vascular Plant	*Schizaea pusilla*	Curlygrass Fern	Endangered	F
Vascular Plant	*Sesuvium maritimum*	Sea Purslane	Endangered	F, U
Vascular Plant	*Sphenopholis pensylvanica*	Swamp Oats	Endangered	F
Vascular Plant	*Tipularia discolor*	Cranefly Orchid	Endangered	U, F
Vascular Plant	*Utricularia radiata*	Small Floating Bladderwort	Threatened	F
Vascular Plant	*Utricularia striata*	Fibrous Bladderwort	Threatened	F
Vascular Plant	*Viburnum nudum var. nudum*	Possum-haw	Endangered	F

F = Fresh Water
U = Upland
S = Salt Water

4.2.7 Permit Issues and Concerns

A special request was made by a CEQ member to address particular permit issues that might arise when various Clean Water Act lawsuits are resolved, which have the potential to change the way mosquito control is regulated. Some State regulators, and certain local officials, as well, have been concerned that the County needs to understand its duties to comply with permit application requirements, and to comply with any conditions that may be associated with permit issuance. The County complies with all applicable laws and regulations, and follows permit conditions. This is its intent. It must be understood that due to ignorance, mistakes, and, at times in the past, some willful violations, these intentions may not always have been kept.

However, it is the County's position that it will, in the course of executing the Long-Term Plan, follow all applicable Federal, State, and local laws, apply for all necessary permits, follow all permit conditions associated with those permits, and urge all and any partners in any Long-Term Plan activity to likewise comply.

4.3 Concerns Regarding Public Education

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately, biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Public Education and Outreach.

4.3.1 Impacts of pesticides

Comments were received regarding the need to educate the public regarding potential adverse effects associated with pesticides and repellent use. These were separated into more general comments, and those that focused on DEET. Often, comments regarding the need to educate the public about other, specific chemicals or types of pesticides were addressed under those topics (larval or adult control).

- Educate that pesticides have impacts (E-9, P59, AK-11)

These three comments were concerned that aspects of the Long-Term Plan could lead to increased pesticide use and were concerned that the public needed to be educated about the potential harmful effects of pesticides. The County notes that the Long-Term Plan intends to reduce larvicide use by approximately 75 percent, and that it anticipates reducing adulticide use as well. This is because water management is thought to be as effective as or more effective than larviciding; this means that the implementation of water management projects should result in the ability to control mosquito populations without the use of larvicides. Concomitant adulticide reductions are anticipated to follow, although the need to conduct Health Emergency control does not directly relate to mosquito numbers. Comments L-8 and L-9 suggested this was the experience in Delaware. In addition, the risk assessment conducted as part of the Impact Assessment found there to be very little increase in risks to human health, as all exposure scenarios (save one for malathion) resulted in projected environmental concentrations that would not result in human exposure to concentrations above defined levels of concern (in the DGEIS, see pp. 1064-1066). Notwithstanding the findings of the risk assessment, the County tends to agree that decreases in pesticide use are generally to be fostered; this is the intent of the County Pesticide Phase-out Law, and the intent of the Long-Term Plan. Therefore, the County does not believe that it needs to stress the negative effects of pesticides in structuring its public education effort. The potential for negative impacts from pesticides will be discussed at appropriate times and places in all outreach efforts.

- Increased use of DEET (S-17, S-18, U-71, BA-12)

Several comments noted that a potential effect from the Long-Term Plan public education effort could be an increase in repellents, especially DEET. The County agrees that increased use of repellents would be a positive sign associated with the public education effort. Work in Canada linked decreased human health risks associated with WNV exposure if individuals took steps to minimize exposure to mosquitoes and/or reduced the chances of being bitten by mosquitoes (Loeb et al., 2005). Comments do note that there is potential for impacts associated with DEET exposure, but effective alternatives to DEET are becoming widely available. The Long-Term Plan notes that three are fairly widely available: picaridin, a botanical product sold as "Bite-blocker," and oil of eucalyptus. The Long-Term Plan also cites New York State Department of Health (NYSDOH) advisories regarding DEET, and there is a discussion of negative reports regarding DEET in the DGEIS (pp. 864-866). As reported in the DGEIS, NYSDOH (2001a) recommends DEET as an effective mosquito repellent, especially where infestations are heavy, but advises to follow label restrictions as some information indicates a potential for health impacts.

- Information regarding DEET (U-70, Y-11, AC-9, AC-10)

Several of the comments offered some information regarding DEET. TAC Peer Reviewer #2 suggested that Abdur-Rahman had compiled some data regarding impacts from DEET; the

Human Health Literature Search (Book 6 Part 1) (CA-SCDHS, 2005) discussed this at some length, primarily under permethrin, as most of this research was on "Gulf War syndrome," which is hypothesized to have been generated by exposures to mixtures of toxicants (DEET, permethrin, petroleum products, depleted uranium, and various vaccinations are all implicated). A second comment suggested the use of citronella, despite findings that it is not effective (Fradin and Day, 2002) and concerns raised by Health Canada (2004) that use, especially directly on the skin, could cause some serious health impacts. It was also suggested that DEET is a pesticide. It is not so classified, as it does not kill mosquitoes but deters them from biting people. The mode of action of DEET is not well understood, however. The comment that caution is advisable with DEET use for children is noted... NYSDOH suggests that children should only use lower concentration formulations, and infants should have exposures to DEET minimized. These are precautions, however, and there are no well-founded data sets suggesting that DEET is harmful to people when used according to label restrictions (NYSDOH, 2001).

4.3.2 Means of mosquito control

There were two thrusts to these groups of comments:

- Education programs regarding means of mosquito control (E-10, AK-12, AS-12)

These comments direct attention towards education regarding mosquito control. This is because those who know more about mosquitoes and mosquito control apparently are more likely to avoid mosquitoes. The County believes that if people become better informed about the mosquito control program, then their reactions to and requests of the program will be more reasonable and in tune with program goals and objectives.

- Education is an effective means of behavior modification (P-55, P-56, Q-28, R-36, R-39, S-10, AJ-13)

Closely linked to the first set of comments above is the idea that education will lead to modifications of people's behavior. This implies that teaching people about mosquitoes, means of reducing mosquito risks, and overall mosquito control issues will result in changes in people's behavior. This is a tenet of public education and outreach. As cited above, Loeb et al. (2005)

found that public health benefits accrued to those who used protective measures in a time when a WNV outbreak was occurring in an Ontario community.

However, two quantitative studies of the effectiveness of public education found some problems with traditional outreach methods. In Louisiana, the geographical message portrayed in news media regarding public health responses to WNV supported racial and ethnic stereotypes. Because WNV initially was primarily a suburban illness, black residents in the cities found little reason to comply with health advisories, and were cynical about government's intention of providing equitable mosquito control. The study also pointed out that some of the messages regarding health protection conflicted with cultural practices, as many in poorer black communities in Louisiana tolerate summer heat partially through evening socializing through the milieu of the front porch/front stoop. Requesting that residents minimize exposure to biting mosquitoes was seen as a threat to long-standing ways of life (Zielinski-Gutierrez, 2002). In a study for Kansas, word of mouth and media news broadcasts were found to be the most common sources of information, far beyond the targeted brochures-advertisement approach used by the State Department of Health. Knowledge regarding protective measures did not correlate with their use. DEET use was much less than respondents' knowledge regarding its effectiveness; this was ascribed to concerns regarding health impacts or negative aesthetics with DEET applications (oily, bad odors). Use of the three other suggested mosquito avoidance tools (clear standing water, wear long sleeves and pants, and repair screens) was greater than awareness of their effectiveness as mosquito avoidance, which was ascribed to respondents taking these steps for other benefits besides mosquito disease prevention. Education of Spanish-speaking residents was statistically-significantly worse than it was for English-speaking residents. The study suggested that education efforts must incorporate "free media" better, emphasize the safety of DEET, and find some way of encouraging word-of-mouth communication in Spanish speaking circles and subpopulations that are greater at risk (Averett et al., 2005).

4.3.3 Tolerance for mosquitoes (E-11, P-26, P-27, P-28, P-57, P-58, S-25, S-26, AK-13, BA-16, BA-17)

These comments recommended that the County incorporate increased tolerance for mosquitoes and mosquito biting into its program. Several of the comments expressed an understanding that this was a project goal.

The County does not believe that mosquitoes should (or can) be eradicated from the County. The thresholds for vector control adulticide applications are not based on preventing all mosquito biting. It is impractical to eliminate all risk of diseases from mosquitoes. As the County establishes numerical triggers for larvicide applications in various areas, it is a tacit admission that some mosquito breeding is acceptable. To these extents, some tolerance of mosquitoes will be needed by the County's residents.

However, the County believes that mosquitoes of concern represent clear and defined risks to the public health and well-being of the residents of Suffolk County. The County has not accepted an overall policy of "live and let live" with respect to mosquitoes. Rather, the County has documented the ways that mosquitoes impact the people of Suffolk County, in actuality and as represented by hypothetical conditions in the absence of mosquito control. The County has further outlined a hierarchical approach to address these problems. The potential for impacts to human health and the environment have been determined under this proposed Long-Term Plan, and found to be less than those impacts associated with mosquitoes. In fact, ancillary benefits that can be realized by conducting mosquito control were found, and determined to ensure that the Long-Term Plan will provide many more benefits than it will cause impacts. Tolerance for mosquitoes is not part of the program.

4.3.4 Brochure accuracy

Several comments addressed the brochures used by the program. The publication produced by the CAC was found to be inflammatory by one comment (F-1); the County notes that it reviewed the brochure prior to publication, and found it to be in accord with almost all of the Long-Term Plan's contents. The County believes that the CAC publication is a good addition to the current stable of publications used for public outreach. There was a request to have wider distribution of the brochures (I-43); the County will be glad to do so. One request was to change the title of the State publication, "Fight the Bite," in line with the perceived need for greater tolerance of mosquitoes (P-60). The County has little influence on the name of State programs, and in any case has little inclination to support the request (see just above). Finally, NYSDEC noted that a portion of the County publication, "Dump the Water," could be interpreted as condoning clearing aquatic vegetation from settings where permits (or, at a minimum, NYSDEC reviews) are required prior to doing so (AG-76). The County will change the current language, and provide the proposed changes to NYSDEC for consultation prior to reprinting the brochure early in 2007.

4.3.5 Program details

Some comments requested or made requests regarding program details. Comments included that an education program was a necessary part of the Long-Term Plan (Q-26, R-33), that the presentation in the Long-Term Plan was a "good start" but that "(additional) details were needed (Q-25, Q-27, R-10, R-37).

The County remains committed to an aggressive and adaptive public education and outreach program. The County will continue to use its two SCDHS public educators on an as-needed basis. It will look to promote the education and outreach program. The content generated by the development of the Long-Term Plan will be infused throughout the education and outreach efforts. SCVC will continue to use resident education as its most effective means of source reduction, through inspector visits in response to mosquito complaints. Seminars are anticipated to allow for cross-fertilization between the hitherto separate educator and inspector efforts, and it is anticipated that these feedback channels will sharpen the approaches taken by each group to County residents.

One commenter wished to know if information was available regarding the efficacy of mosquito control education and outreach programs (P-61). As discussed above (Section 4.3.2), the effectiveness of mosquito control outreach has resulted in both success and failure. The advice given appears to be effective, but it is unclear if all audiences are equally affected, and if the delivery of the message, as usually chosen, is effective in causing behavioral changes.

One comment suggested the use of "reverse-911" to notify residents of upcoming adulticide events (P-62). This is a practice in Onondaga County. Suffolk County currently believes that the effort required to establish this outreach effort, and the potential for confusion from the recipients of the messages for something that the County does not believe should be cause for alarm, greatly exceeds the greater penetration that would accompany such a noticing effort. The County believes that its statement of precautions, as promulgated over the web, and through print and electronic media, is sufficient given the potential elevation of risks associated with the use of adulticides as identified in the Long-Term Plan.

A series of specific additions to the education and outreach program were suggested:

- Use PSAs (Q-29, R-40)

The County has found that, very generally speaking, Public Service Announcements (PSAs) are ineffective means of reaching target audiences. They are costly (if professionally produced). If not professionally produced, they can be unattractive for media outlets to use. Their use is totally at the whim of the outlet, and so there is no control for the County to ensure that the messages are made at times when their use would be productive or not.

The County is not adverse to PSAs. However, in a setting of limited resource availability, producing PSAs does not seem to be the most productive activity the County should consider.

- Conduct elementary school education programs (Q-30, R-41)

Elementary education outreach can be very effective, as schoolchildren can often be made fierce disciples, and will strive to convert parents to correct behavior. On the other hand, mosquito education is best accomplished in late spring or early fall (or during the summer). These are not times that are largely amenable to administrators supporting outside education efforts. The County has primarily focused on incorporating mosquito education into earth science programs. This is the most appropriate school education discipline. Older children retain information longer than do younger children (under most circumstances). Therefore, the education efforts are not as seasonally-oriented for older children. Older children may be less effective communicators to adults, however.

- Conduct homeowner association education programs (Q-31, R-42)

SCDHS educators will present to groups such as homeowner associations. Better communication between the SCVC and SCDHS education/outreach efforts may allow broader geographical areas of concern to be highlighted, and lead to prophylactic outreach contacts to allow for source reduction prior to development of problems.

- Target school properties for inspections (Q-32, R-43)

Massachusetts includes this action as a step in its viral response plan. It should be noted that the times of greatest risk for transmission of WNV in Suffolk County (late July through early September) are generally times when schools are not in session. However, the point is well taken with regard to EEE outbreaks. EEE risks are greater for younger children, and inspections for mosquito breeding at schools near EEE cycling centers should be undertaken if virus cycling is detected. Unfortunately, *Ochlerotatus sollicitans*, identified in New Jersey as the prime vector for transmission to people, does not necessarily only feed in the close vicinity of its breeding points (see the DGEIS, pp. 328-332).

SCVC inspectors will inspect all sites for potential breeding problems, and present remedies for any breeding identified, on receipt of mosquito complaints.

- Focus on waste tire removal (Q-33, R-44)

Waste tires, historically, have been viewed as a litter and waste management problem. This has minimized County involvement, as the County only addresses litter issues on County roads and on County property. Waste management has always been a village and Town function.

Nonetheless, the Long-Term Plan identified tire management as a public health concern. SCVC and the Department of Public Works will work with Town parks, highway, and waste management personnel, in conjunction with the recycling mandates associated with the Department of Environment and Energy, to establish a more effective tire removal program. Initial efforts are likely to consist of an informational seminar that highlights the need to remove tires along with more progressive means of managing tires.

- Conduct residential and commercial property audits (Q-34, R-45)

The County is simply too large to conduct mosquito audits on a proactive basis. The County will continue to promptly respond to complaints regarding mosquitoes by conducting inspections, and then providing the means of alleviating the identified problems.

4.3.6 Public opinion surveys

The CAC for the Long-Term Plan project commissioned a public opinion survey to help guide its education and outreach program. The survey results were never released to the general public. Several comments were received regarding those results from a member of the committee. In addition, several speakers from Fire Island reported on public opinions regarding SCVC operations there; at least one was based on some kind of polling of the residents of a community.

- CAC Poll Results (AL-11, AL-12, AL-13, BN-1, BN-2, BN-3, BN-4, BN-5)

A member of the CAC (privy to the results of the poll) reported some of the data as comments on the Long-Term Plan. The poll was accomplished by Zogby International, a well respected national polling organization. Zogby reported that its respondents fairly well matched the general demographics of Suffolk County, and so it expected that the results would be representative of County residents as a whole. The polling was accomplished twice. The CAC did not submit its questions for County review prior to authorizing Zogby to conduct the poll. This was in violation of its contract with the County. Zogby repeated select portions of the polling to address what the County and its consultant feared were biased questions. The CAC has not authorized release of the poll report or any data at this time, and therefore the Long-Term Plan and the DGEIS did not use any of the information generated by the polling.

The comments concerned three issues. The comment accurately reported the results of the poll on these three questions. The first result was that the public felt equally strongly concerning relative risks between mosquitoes and mosquito-borne disease compared to use of pesticides to control mosquitoes and disease. Secondly, the public strongly disapproved of eliminating wetlands for mosquito control purposes (this was one of the questions the County had concerns about in terms of biased phrasing). Thirdly, the public believes deer ticks pose more of a health threat than mosquitoes do by a greater than two to one ratio. The County believes these opinions are signs of a relatively well-informed public. Risks from pesticides and mosquito-borne disease are both relatively small, although the County believes that the risks of disease are demonstrably greater even when control is occurring, and would be much greater than Long-Term Plan pesticides risks if there were no control program. The County does not believe that wetlands should be eliminated for mosquito control purposes; however, the County also believes that mosquito control programs, properly implemented, can augment important wetland functions and so restore wetland values to degraded marshes. Finally, many more cases of Lyme disease than mosquito-borne diseases are diagnosed in the County each year. However, Lyme disease has not been shown to cause fatalities (directly). WNV has killed four County residents since 1999.

The final points made from the poll data concerned public attitudes towards information sources. The comments annotated the results, indicating that the public had no trust in SCVC for information regarding mosquito control and use of pesticides. The County notes two things. One, SCVC was not specifically identified. The phrase was Suffolk County pest control experts, which could include private sector businesses, academics, and others not affiliated with Suffolk County government. Secondly, these local experts were ranked approximately the same as environmental organizations in terms of trust. The two highest ranking sources were EPA and the news media (more so for mosquito control information, perhaps due to SCVC-SCDHS press releases). CDC, Suffolk County Cooperative Extension, and personal research all ranked approximately the same as local pest experts and environmental organizations (between 8 and 10 percent each).

- Other reported opinion results (AV-1, BH-1, BH-2, BJ-10)

The Fire Island communities of Davis Park and Fire Island Pines report strong approval of SCVC efforts. Fire Island Pines, reportedly on the basis of a survey of residents, expressed an overwhelming (90 percent) approval of continued adulticide applications on a regular basis.

4.4 Concerns Regarding Surveillance

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately, biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Surveillance. Some surveillance issues may also have been classified with the actions that may result on the basis of surveillance, such as water management, larval control, or adult control.

4.4.1 Dipping techniques (Q-10, Q-11)

Two comments were received regarding mosquito larvae dipping techniques. One was document the means that are used to ensure dipping is conducted as systematically as possible. The second was to document staff training.

Dipping was discussed in Section 3 of the Long-Term Plan and in the DGEIS on p. 155, and again on pp. 188-189. Dipping has the appearance of being a quantitative means of sampling a larval population. However, mosquito larval populations are heterogeneously distributed. They tend to be patchy, so that there are many sites with no or few individuals and certain sites that are much more densely populated. Varying water depth at sites means dippers may or may not be filled with the same volume of water at each site. Repeated sampling at the same site tends to lead to greatly diminished collection numbers, as mosquitoes are skittish and will dive to the bottom to escape potential predation. Skill and experience in dipping can allow the dipper to become good at capturing more organisms at a site than is representative. Conversely, careless sampling will result in lower detection levels.

Unbiased sampling under such conditions is difficult. The eye is drawn to the moving larvae, large numbers of larvae, or dark colored larvae. Another factor to consider is environmental conditions. In conditions when water levels are low, as when a marsh is drying down, there may be more larvae in each unit volume of water. However, if the marsh has recently flooded, that same number of mosquitoes may be dispersed over a much larger body of water. These kinds of considerations are the basis for the conservative “some or none” presence-absence decision-making that the County follows. When large areas of the marsh are being sampled, it becomes impossible to sample the entire site, and so a selection of key areas determines the approximate extent of any breeding problem.

Capturing larvae also serves the purpose of species identification carried out in the ABDL. Therefore, field crews are encouraged to capture larvae whenever possible.

However, field crews tend to sample the same routes over time. This means there is continuity to the collection of samples, and relative indices become possible. Suffolk County worked with Wertheim National Wildlife Refuge staff to determine the lower 25th percentile of larval counts. Conceptually, the notion was that broods produced by the smaller larval populations might not impact the surrounding communities too much. This estimate has proven to be workable. Its fundamental basis was, however, that USFWS staff were sampling key sites on a weekly basis and measuring larvae across a series of sites on a monthly basis. SCVC has similarly worked with FINS staff to determine what larval count appears to correspond to the lower 25 percentile in the communities on Fire Island. This number is likely to be at least an order of magnitude higher than the Wertheim index. It will be tracked across 2006 to determine how well biting problems in the communities do or do not track with the larval index.

Training for dippers is very hands on. Trainees trail experienced samplers for a matter of months, slowly being entrusted with more dipping duties. When the senior staff determines that sufficient skill has been obtained, the trainee will lead for several sampling events. At that time, the trainee will become assessed as completely trained, and given a route to conduct surveillance alone. As with any skilled practice where judgment plays a major role, it is to be expected that values generated by different samplers may vary at the same place (even when similar conditions exist).

4.4.2 Larval index

A comment was made requesting a fuller discussion of larval indices (AG-46).

Many vector control professionals are comfortable evaluating the potential for mosquito breeding through presence-absence testing for larvae, in conjunction with judgments regarding the extent of the breeding and the possibility that natural processes such as marsh dry down or flooding could improve or exacerbate the situation.

Others, believe that the decision to control larval breeding should be made on the basis of a quantitative analysis of the collected data. The most common means is to determine the number of larvae per dip. The trigger value at Wertheim was set at 0.2 larvae per dip. FINS staff recently suggested a value of five per dip, although that is being negotiated.

A more complicated approach, attributed to Sjogren and Genereaux (1987), and intended to justify marsh management also accounted for the area of marsh affected. As reported in the DGEIS (p. 541):

> I= MA x SC x AC
>
> where
> MA = percent of the marsh capable of breeding mosquitoes (the "marsh area")
> SC = number of field visits where dip counts exceeded five per dip (the "sufficient count") (presumably across a standard season of 20 or so weeks)
> AC = average mosquitoes per dip in the sufficient counts (the "average count")

I equal to or greater than 100 would be necessary for water management.

Some of the vagaries associated with dipping have been mentioned above which make those who are aware of them less comfortable with quantitative analyses of dipping. The presence-absence approach showing any mosquito presence, as a larval index, is objectionable to others. However, presence-absence supporters would also suggest it is not easy to detect mosquito larvae on a marsh under conditions where breeding is not a problem. If larvae are present in one locale of a large landscape feature, it is likely that they also can be found elsewhere.

Nonetheless, the County is aware that there is a desire among many parties for decisions to be made more for objective rather than subjective reasons, and that the objective criteria should be nuanced, demonstrating more than reflexive action should a potential problem be diagnosed. For that reason, the County has included a willingness to explore the development of larval indices. At this time, the County believes it most appropriate to develop the indices on a site-by-site basis. To date, the approach has been to eliminate a relatively arbitrary amount of the larvicide applications (one tenth, one-quarter, one-third, one-half, say) by selecting the appropriate trigger to define the lower percentile of the larval count data. This process was assisted at FINS by the development of a nine-year data base from 1996 to 2004 of larval sampling data as part of the Long-Term Plan.

4.4.3 QA/QC team

A comment was received regarding the membership of the QA-QC Team. The QA/QC Team is more properly identified as the Mosquito Surveillance and Control unit (see section 8.1 of the Long-Term Plan, and p. 165 of the DGEIS). Currently, the unit consists of a Vector Control Supervisor, a Vector Control Aide, an Entomologist, a seasonal Auto Equipment Operator and a Laboratory Technician. A Laboratory Technician position is currently vacant.

A related comment concerned whether or not the pre-spray mosquito population sampling would include non-target insect sampling (Y-9). The intention is not to do so at this time. Part of the pre-spray sampling intention is to confirm (for non-Health Emergency applications) that minimum population values have been achieved. These population values are 25 female mosquitoes of human-biting species for New Jersey light traps, and 100 mosquitoes, similar characteristics, for CDC light traps. Precise non-target sampling would use UV light traps, or something else other than standard mosquito traps. This means that either separate traps would need to be set, or good trigger values for the alternate trapping method would need to be developed.

4.4.4 Disease detection issues

Nine other comments were received on the surveillance program. Most of these concerned the County's ability to detect disease.

- Disease comments (H-11, I-28, K-15, P-33, R-26, R-27, BA-18, BS-6)

Two comments complimented the County on its extensive surveillance program. Another echoed the County's concern that it should strive to reduce the time interval between sampling and the reporting of sampling results for virus testing.

Another comment called for increased surveillance, both in terms of population surveillance and disease detection. The County has plans to extend its population sampling with New Jersey traps, primarily on Fire Island. CDC light traps will also be used more extensively as a means of population sampling. The CDC trap network will be increased. Some of that surveillance expansion is occurring in 2006, in terms of more intensive analysis of speciation data. The implementation of more trap deployment will generally be a function of increased personnel availability for either SCVC, ABDL, or both (which was the subject of another comment). The expansion of the trap networks is discussed in the DGEIS, pp. 157-163.

It was noted that the thick underbrush on Fire Island can make it difficult to locate dead birds there, suggesting that disease risks are not accurately determined. Dead bird sampling is a biased means of determining disease presence. The greater the population and the higher the degree of affluence, the more likely it is that dead birds will be called in to the County for action. The County uses dead birds as a means of focusing its mosquito surveillance efforts. Surveillance for Fire Island is being further refined in the stand-alone FINS plan. However, the notion that additional virus sampling is pertinent due to environmental conditions may be discussed there.

Two comments were made that suggested the surveillance program used in Suffolk County can measure an “intolerable” disease risk, and therefore the County can establish the level of surveillance to determine if that risk is occurring in the County. The County risk assessment leading to Health Emergency application decisions is not quantitative. Rather, SCDHS officials examine surveillance data to determine if particular areas of the County have relatively elevated risks of disease transmission. Indicators of increased risk include repeated detections of virus in a defined geographical area. Dead bird detections are generally insufficient evidence. Mostly, repeated detection of virus in mosquito pools is a necessary, but not sufficient, element of the increased risk determination. Historical precedents or conditions like these elsewhere in the County, are considered as guides to the potential for a problem. The time of the season is important. Vector potentials are also assayed. Falling mosquito populations may actually signal greater potential for risk, depending on which species are involved. Mosquitoes that appear as broods decline in overall numbers as the population ages. However, a mosquito needs to feed twice to spread virus, meaning an older mosquito is much more dangerous than a young mosquito. Therefore, a waning brood may define a higher risk level. Operational issues also are important – is the area amenable to treatment? Is the weather acceptable? Can notices be issued in a timely fashion? Therefore, the determination of risk that is no longer tolerable is a multi-variate computation, and one that ultimately resides with the judgment of the Commissioner of SCDHS regarding whether illness will strike the citizens of the County if action is not taken. These are not determinations that can be made from mosquito counts or laboratory results, although such information is invaluable in assisting the determination (and the more information that is available, the better the decision-making). The discussion of adulticide decision-making has been amended in the Long-Term Plan so as to describe this process more plainly (please see Section 7 in Appendix 5).

- Other comments (Q-52)

This comment asked how the trap data are used. The trap data are used to inform adulticide decisions, to determine the effectiveness of treatments, and as monitors of mosquitoes, both population numbers and vector issues. This is discussed extensively in the DGEIS, primarily but not exclusively in pp. 157-163.

4.5 Concerns Regarding Source Reduction

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Source Reduction (excluding water management).

4.5.1 More nuanced recharge basin discussion (S-8, AG-30, AJ-9, AJ-10, AJ-11)

Five comments concerned storm water management. One was a request dating from December 2005 to expand the discussion of storm water management and mosquito control. This was addressed in the DGEIS, in Sections 2.10, 6.9, 6.10, 7.5, 7.7, and in the Long-Term Plan in Sections 2.1, 4.2, and 5.2. SCVC is well aware that storm water management structures can support mosquitoes, particularly *Culex pipiens*. *C. pipiens* has often been described as the primary vector for WNV in the northeast US (Andreadis et al., 2004). Book 10 Part 2 of the Literature Search focused on the relationship between storm water management, mosquitoes, and current regulations regarding storm water management (particularly USEPA Phase II Stormwater

Regulations) (Cashin Associates, 2004a). A survey of storm water catch basins and recharge basins established that the scope of the Suffolk County surveillance program should be enhanced to more effectively treat these structures (see the DGEIS pp.828-837).

Three comments focused on the Town of Huntington. Since *C. pipiens* is known to breed in storm water structures, maintenance of storm water structures, which was identified as a means of controlling breeding in storm water structures in the DGEIS (pp. 151, 157, 168), was identified as a priority for areas in the Town. It was also noted that maintaining storm water structures can improve water quality in the surrounding estuary. Suffolk County agrees with these points, and notes that increasing retention and detention time for storm water by maintaining storm water structures has been shown to reduce suspended solids releases because of additional settling time, as well as allowing for treatment of coliform, which will benefit receiving waters.

The final comment was that the DGEIS include "ecological" as well as standard recharge basins in its discussion of storm water management. The DGEIS does not explicitly discuss recharge basins that have been constructed to retain water so as to provide certain ecological benefits associated with surface waters to the upland. However, the DGEIS stresses that any treatment of a basin that retains water must be conducted with some sensitivity. This is because the DGEIS suggested that at least some of these basins may serve as ecological equivalents of vernal pools – that is, relatively predator-free sites that are not permanent. For permanent bodies of water, selection of potential biocontrols as a treatment measure was to occur only when the body of water had been well-characterized, to minimize possibilities of disturbing the existing flora and fauna (see the Long-Term Plan, Section 5, and the DGEIS, pp. 185, 943-947). The limited sampling program conducted in recharge basins suggests that basins with more robust ecologies (including fish) will not support much mosquito breeding; most of the basins that bred mosquitoes did so because their food chain was depauperate, and did not include any aquatic invertebrate predators, mostly because of poor water quality or impermanent water supplies.

4.5.2 More emphasis on actions that can be taken around the home (I-45, I-46, I-47, AJ-12)

A series of actions was proposed by a commenter to limit breeding around the house. These included use of "time-of-day" watering, avoidance of pooled water in containers and other receptacles, and the construction of fish ponds. Time of day watering is a water conservation BMP. The County believes that reductions in pooled water will decrease mosquito breeding, but is not certain how time of day watering will reduce mosquito breeding. Mosquitoes require at least three days and as much as a week and a half of standing water for breeding to be completed. If around home watering produces that much persistent water, there are steps that need to be taken besides optimizing the time of day when watering occurs. The construction of fish ponds also may not reduce mosquito biting around the house. Mosquitoes will normally try to use all available breeding habitats; it may be that having a fish pond will divert some egg-laying to the pond, where the fish will then ensure breeding is not completed. And most garden fish avidly feed on any available mosquito larvae, so stocking potential breeding locations with fish may reduce breeding. However, such stocking needs to be done with care to avoid ecological effects – see the Biocontrols discussions in the DGEIS and below. But a fish pond will have no impact on adult mosquitoes, nor on larvae other than those that may be in the pond itself.

The final comment was a request to continue inspector responses to complaint calls. This is a backbone of the Long-Term Plan, and will be continued.

4.6 Concerns Regarding Water Management

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Water Management. More comments were received on this topic than any other. Section 3.3 above provided a summary of important issues involved in the County's responses to the comments. This section provides specific responses. Please note that although efforts were made to respond to each concept raised in comments, not every comment received an individual response.

For the first three-year period, the County will evaluate the possibility of larvicide reduction using low-impact BMPs at the high priority sites identified in the Wetlands Management Plan (i.e., the 4,000 acres of coastal marsh that currently receive regular larvicide treatments via helicopter). The County may also consider more work in the Wertheim National Wildlife Refuge, per USFWS plans and programs. All projects using BMPs 2 and 4 through 15 will require permitting by NYSDEC, at a minimum (other organizations may require permits as well). Projects using BMPs 10 to 15 will automatically undergo full review by the Wetlands Stewardship Committee. The Wetlands Stewardship Committee will receive formal notification of all projects using BMPs 5 to 9. The Wetlands Stewardship Committee membership can decide to review any and all projects that have raised particular concerns or interest. All projects will be reviewed with local (Town and/or Trustee) natural resource specialists. For all projects, wetlands health will be the paramount consideration, through analysis of wetlands functions and values and intentions to increase biodiversity, although mosquito control will also be an important element in determining the project design.

The County will provide support to enable the Wetlands Stewardship Committee to determine a working definition of marsh health for the County's 17,000 acres of coastal marsh, and to use that definition to develop a comprehensive marsh management plan. This plan will incorporate all within-marsh and out-of-marsh (estuarine and upland) concerns, address issues such as tidal isolation, Phragmites (and other invasive species) invasions, needs to augment marsh production, increase biodiversity, improve aesthetics, and potentially restore conditions to some previous state for all marshes across the County, as well as considering mosquito control concerns. This plan will be the basis for implementation of an Integrated Marsh Management program for Suffolk County that moves beyond the limited area of vector control.

Generally, there will be no major projects implemented until the Wetlands Stewardship Committee reports on its efforts (through the first Triennial Report).

4.6.1 Key term definitions and use

The County discussed its water management efforts in the Long-Term Plan as "progressive water management." This coinage was adopted in an effort to avoid some of the definitional and operational confusion associated with a more common term for water management made by mosquito control agencies. The term in question, "Open Marsh Water Management" (OMWM), was created by agencies in New Jersey in the 1960s (Ferrigno and Jobbins, 1968). It was often used in the DGEIS in discussing actions undertaken by others, particularly in Section 5. The DGEIS only called water management as it was contemplated under the Long-Term Plan as "progressive water management" and did not refer to proposed County activities as OMWM. Progressive water management was intended to denote the more enlightened approach to source reduction within marshes intended under the Long-Term Plan, as compared to a ditch maintenance focus, (see comment U-21, which requested a clarification of the word "progressive"). In spite of this intention of the County, it is apparent that many comments found progressive water management and OMWM to be synonymous.

The County has adopted the language used in Connecticut. There, management of salt marshes proceeds under the connotation of "Integrated Marsh Management." Integrated Marsh Management includes restoration of tidal flows where they had been occluded, ditch plugging and other typical "OMWM" projects, classic physical restoration of features to marshes where they had once historically existed, and reconstructions of marshes in areas that were filled or otherwise made solid ground. Connecticut looks at all projects in terms of all of these elements; other important elements in determining the design and implementation of a project in marshes are Federal and State regulatory restrictions. However, mosquito control is a consideration when reconstructing or restoring a marsh for ecological purposes, and ecological value retention or enhancement is integral to any project with an explicit mosquito control purpose.

Integrated Marsh Management, as discussed here and as reviewed under the phrase progressive water management in the DGEIS, is not the complete package of actions undertaken by Connecticut under its practice of Integrated Marsh Management. The scope of the project did not allow for such a comprehensive marsh management discussion. As discussed in Section 3.3 and in Section 6.2.2, the Wetlands Stewardship Committee will have the responsibility for defining marsh health for Suffolk County, and establishing programmatic goals and objectives to achieve better marsh health. Since these overarching goals have not been determined at this time, there are many elements of Integrated Marsh Management which cannot be determined through this project. For instance, some comments suggested that marsh management should be undertaken to improve surrounding estuarine water quality as a means of environmental restoration; other comments suggest that environmental restoration should focus more on restoring marshes back to the conditions and/or functional status that existed prior to the 20th Century. It is possible that these ends may be perceived as being conflicting; the County would like to believe that there are ways to find compatible management approaches that can incorporate what may appear to be divergent conceptual bases.

What the County has proposed in the Long-Term Plan is to establish a framework under which source reduction in salt marshes can be considered as a mosquito control tool. This is not intended to be a management framework for all marshes in Suffolk County. Approximately one-quarter of all of the marsh land acreages is not to be considered under this approach. Explicitly, only one-quarter of the County's marsh acreage has been deemed as worthy of consideration under this management plan which include the 4,000 acres that currently receive aerial larvicide applications. The County notes that these marshes should be good candidates for one or more of the BMPs, unless other considerations determine that such actions are not environmentally suitable. If the marshes that currently are treated with larvicides by helicopter were all addressed as suggested under the Wetlands Management Plan, the County believes the use of larvicides could be reduced by approximately 75 percent by 2009. Implicitly, the remaining half of all marshes will need to be classified, in terms of their status as mosquito problem areas, and as to whether management activities should be undertaken there in the future. Other marshes may be nominated for management under this approach, for reasons that may have little to do with mosquito management. Additionally, any potential management project can be revised or cancelled if reviewers find that ecological costs exceed presumptive benefits.

The management framework contains the following bounds and conditions:

- identification of 15 BMPs
- creation of a project consideration and management process

- evaluation of conditions under which the BMPs appear to be best suited to implement and those conditions where they do not seem to be well-suited

- a broad identification of the kinds of sites where BMP implementation, at some scale, would result in reduced larvicide use, and other areas that need to be evaluated in order to determine if water management is appropriate to reduce mosquito problems.

The Wetlands Management Plan does not select particular BMPs for particular marshes. The Wetlands Management Plan does not assert that all 17,000 acres of salt marsh in Suffolk County need to be managed for mosquito control purposes. The Wetlands Management Plan suggests that 75 percent of aerial larvicide use can be eliminated if appropriate selections from the BMPs are made. The Wetlands Management Plan proposes an open process to ensure that "appropriate" in terms of water management is not limited to efficacy in mosquito control, but rather includes considerations regarding landowner management preferences and ecological benefits.

Many of the comments made regarding the presentation of water management in the May 2006 Long-Term Plan and DGEIS will not be resolved by the responses in this section. This is because concepts that were raised in some of the comments and those positions adopted by the County espouse positions that are based on profoundly conflicting or opposed philosophical bases. At other times, it seems to the County that the comments are based on misunderstandings of the way the County used certain words or phrases. There were some comments that the County believed to be based on some misinformation or a misreading of the underlying science.

This first section is intended to address the issues associated with philosophical differences and misunderstandings of County phrasing. It is, to oversimplify, a vocabulary and definitions section. Counting the comment mentioned above, a total of 89 comments were classified as relating to this topic.

(6) Restoration (O-6, O-16, P-93, S-49, S-55, S-62, AG-31, AG-34, AH-12, BV-7)

Everyone supports and is interested in marsh restoration, as noted in one comment. However, exactly what constitutes marsh restoration is not easy to agree on. NYSDEC has stated it will evaluate projects based on its regulations, and would prefer the goals of the program match its identified marsh function list:

- Marine food production
- Wildlife habitat
- Flood and hurricane and storm control
- Recreation
- Cleansing ecosystems
- Sedimentation control
- Education and research
- Open space and aesthetic appreciation

These regulations identify the overall NYSDEC goal as to "preserve and protect tidal wetlands," which is not necessarily the same as "restoring" them.

Several comments defined restoration as a return to some pre-disturbance or pre-20th Century state. The County agrees that many authorities have this exact concept of restoration (see National Research Council, 1992). In particular, one comment noted that restoring ponds to a marsh does not involve the kinds of steps associated with mosquito control installation of ponds, such as targeting breeding area, and installing radial or reservoir ditches.

However, many others have a different view of restoration. As noted in the DGEIS, increasing or returning functions to a system that had lost them is often called ecological restoration (Niedowski, 2000; Society for Restoration Ecology International Science and Policy Working Group, 2004). In this sense, because the BMPs intend, in most cases, to enhance one of more of the identified NYSDEC salt marsh functions, the County believes it is justified to discuss these BMPs as marsh restoration tools as well as mosquito control means.

This will not satisfy those who expect "restoration" to be restricted to a physical return to pre-disturbance conditions. The County believes that the more ambitious goal is often not attainable; as one comment offered (comment O-17), achieving natural restoration conditions is sometimes only feasible to consider if human time frames are not important. The County appreciates this point of view, but believes that government most often cannot be, and perhaps should not be, so patient. Often in settings where aspects of the existing ecology are quite different from pre-disturbance conditions, the County believes it is justified to take steps to restore ecological features in the context of the existing conditions. Salt marshes in Suffolk County are most often embedded into a human ecology; therefore, management of marshes should be cognizant of that fact. In the most ambitious aspects of its program, the County believes that the BMPs will augment particular marsh functions, and thinks this might be good to consider because other human activities have damaged related functionalities in the surrounding estuaries. Thus, marsh management may be able to counter some negative aspects of ecological change brought about by increased human presence in the overall setting. This will be discussed further in Section 6.4.4.

(7) Goals of County program (N-23, O-15, P-74, P-75, P-95, P-96, S-11, S-56, AD-1, AE-16, AG-36, AG-86, AI-2)

Several comments noted that using different definitions for the terms in question seemed to be a basis for misunderstanding. This is partly why the County is now using the term Integrated Marsh Management to describe the intention of its program. This sidesteps the issue, raised by several comments, as to whether progressive water management is or is not equivalent to OMWM. Integrated Marsh Management is intended to be a comprehensive marsh management program, and vector control will be only a part of the overall. Marsh management of some kind is required, as noted in comments, because nearly all County marshes have been manipulated and are in need of some management attention.

The intent of the County program is, as identified in comments, to reduce pesticide usage by decreasing the breeding sites of salt marsh mosquitoes. This can be achieved, in the County's view, by implementing one of more of the BMPs in such a way as they increase ecological functions of the marsh. Two comments take issue with this. One explicitly denies that water management conducted with mosquito control purposes in mind can be considered to be restoration; the County does not agree. The underlying disagreement here has to do with the definition adopted for the term “restore.” A second comment was concerned that the County believed all activities that eliminate mosquitoes are environmental beneficial. This is not true. The environmental analysis in the DGEIS (pp. 883-936) clearly described situations where implementation of a BMP in a particular setting will not achieve mosquito control goals, but also described situations where negative environmental effects may occur because the setting and the BMP are not well matched. It is true that County believes there are occasions when each of the BMPs will result in mosquito control and environmental benefits. These also were described and are the focus of the assessment. This is because it was the intention of the County to analyze the setting for each potential project, and to determine, in conjunction with the land manager and with review and oversight from outside parties, an action that would address the mosquito control problem at hand, selecting one of more appropriate BMPs to do so with the constraints of avoiding environmental impacts and following the land manager’s preferences.

As noted by one comment, doing so blurs distinctions between mosquito control and marsh restoration. For decades, much of the County’s mosquito control program was conducted without adequate regard for environmental considerations. When the County stepped away from DDT due to the impacts to local ecology associated with that pesticide, it embarked on a mosquito control program where environmental issues were more important in its decision-making. As part of this approach, marsh management is to be, at worst, environmentally neutral (causing no impact), and, in many cases, intentionally conducted so as to provide ecological benefits by restoring or enhancing certain marsh functions. The ways this can be achieved will be discussed in more detail in Section 6.4.

Thus, the County believes, as stated in one comment, that its approach is one that joins wetlands restoration with mosquito management. The County does not agree that the techniques used for mosquito control cannot serve as a means of marsh restoration. The marsh management approach adopted by the County is intended to accomplish three goals, concurrently:

- Reduce pesticide use (larvicides explicitly, but also implicitly to lead to less adulticides use)

- Maintain or enhance current controls on mosquito populations

- Enhance or restore certain important marsh functions so as to increase the ecological and environmental value of the marsh

(8) Definition of County program (A-1, P-77, S-33, AG-123, AI-4, AI-5, AI-6, AI-26, AI-31)

Suffolk County is undertaking the implementation of Integrated Marsh Management, as defined through comments offered by Connecticut DEP officials, and as defined through use in that state. Connecticut defines Integrated Marsh Management as a comprehensive means of looking at its salt marshes, to reach a multitude of goals, with mosquito management being one of only many needs that CDEP tries to address through its program. Although the process of project refinement was not addressed in the comments, the process of weighing different stakeholders' positions and finding a balance between sometimes conflicting goals and aims is an important element of the County's approach. Therefore, the County's program is not synonymous with OMWM. The County does not believe OMWM is broad enough, as it is usually thought of, to describe all of the techniques for marsh management contained in the BMP Manual. The Integrated Marsh Management program is a process, not a collection of physical alterations of salt marshes. Integrated Marsh Management is intended to encompass the process used to develop, select, assess, and only then to implement projects. Eventually, it is intended that a whole range of underlying purposes will be included in this program. For now, until the theoretical underpinning of other aspects are well determined, the explicit intent of the program is for mosquito management. Mosquito management is to be conducted in the context of reducing pesticide use, maintaining control of mosquito populations, and maintaining and potentially enhancing marsh functionalities. If this suite of goals and purposes are not understood to be part of the County program, then the County has failed to adequately portray its intentions.

(9) Definition of OMWM (I-4, O-1, O-2, O-4, O-5, P-90, P-92, P-94, S-46, S-48, S-50, AD-2, AD-3, AD-4, AD-5, AD-20, AE-4, AE-5, AE-6, AE-7, AE-8, AG-7, AI-8, AI-9, AI-10, AI-11, AI-12, AI-13, AI-14, BD-20, BI-8, BI-9, BV-2)

In 1901, salt marshes in Lloyd Harbor were ditched in an effort to control mosquito populations. This was a coastal application of the techniques used in upland areas in Panama to control pestiferous, disease-bearing mosquitoes. Ditching had worked very well in upland wetlands because the ditches provided a means to drain water out of the wetlands, using gravity. A very simplified conceptual depiction of fresh water wetlands would assume they have directional water flows, in that water generally enters in one area and drains out another. Ditches amplify the draining process, and so usually result in removal of the water that created the wetland. The loss of water also removes breeding opportunities for mosquitoes.

This conceptual treatment of fresh water sites was applied, imperfectly, by analogy to salt marshes. The conceptual failure was that salt marshes have bi-directional flows, in that water flow is generally controlled by tides. Therefore, it is generally impossible to permanently remove water from a salt marsh through ditches. Nonetheless, ditching was reasonably successful as a means of mosquito control. Ditching, especially in areas with high tidal amplitude, may have removed some of the water from the high marsh. Ditching also seemed to provide access for mosquito larvae predators, primarily killifish, to areas of the marsh that formerly were not as accessible to these fish. The combination led to mosquito breeding control over large areas of the marshes that were ditched. However, linear, even-width ditches violate several natural principles regarding water and sediment conveyance. Even though peat is a good material for maintaining structures, very often ditches either fill or widen under hydraulic stress or sediment transport.

Smith (1904) recognized many of these issues as ditching was being experimented with. He also bemoaned the wasted effort in ditching low marshes, where no mosquito breeding occurs. He therefore called for "quality ditching" to be undertaken, where ditches would only be installed where mosquito breeding occurred.

It proved to be simpler to install surveyed grid ditches across entire marshes, rather than to pause to determine where best efforts might be made. This was especially true when during the

Depression coastal communities seized on grid ditch construction as the kind of make-work that provided public benefit and allowed public assistance to be made under the guise of public works employment.

The DGEIS notes that (see page 492)

> [t]he overall impact of this ditching on the condition and health of salt marshes has been the subject of acrimonious disputes. Generally, ditching is said to have changed marshes in four ways (which sometimes intersect and overlap). They are:
> 1) reductions in the amount of mosquito breeding;
> 2) alterations of the salt water table found in the marsh peats
> 3) vegetation distribution changes
> 4) changes in use of the marsh by important species or species guilds

The DGEIS then summarizes discussions of apparent impacts (pp. 492-496), drawn from the Book 9 Part 3 Literature Search (Cashin Associates, 2004b). It is of some importance to underline that general findings of impacts from salt marshes are not common; rather, the finding of impacts (or, more rarely, no impacts) were made in specific settings. The conclusions from specific settings were often generalized, and the appropriateness of doing so is subject to considerable dispute. Nixon noted that the findings of ditching studies usually "reflect the biases of 'mosquito controllers' or conservationists" (Nixon, 1982); it might be argued that, more charitably, observers tend to report results that support their own world views, and do not rush to report things that might not be so supportive of their views or preconceived notions.

Nonetheless, it is clear that the potential for mosquito management to have negative impacts on the marshes has long been recognized. Glasgow (1938) pointed out that "harm to wildlife habitats might result from hastily organized or inadequately supervised mosquito control work," a statement that the County still finds to be valid. Awareness that more nuanced source reduction efforts in salt marshes could be made, at least partially so as to reduce the potential for harm, led to experimentation in New Jersey. There, a series of connected actions that were described as Open Marsh Water Management were developed. Clear descriptions of exactly what was meant by the term OMWM and how it was to achieve its mosquito control goals are presented in papers such as Ferrigno and Jobbins (1968), Ferrigno et al. (1975), and Shisler (1978). The clear intention of OMWM was to conduct source reduction, in a more effective manner than was possible with ditching and follow-up maintenance of the ditches, to limit impacts from water management, and to restore certain functions that may have been limited under strict ditch maintenance.

OMWM was then adapted by those who sought to implement it in their own jurisdictions. A major change was the addition of ditch plugging to the accepted repertoire (Dale and Hulsman, 1990). Ditch plugging was a clear variation from the initial New Jersey approach. However, 20 years after the New Jersey model was introduced, OMWM as implemented on Long Island was an exclusive ditch plugging technique (see Lent et al., 1990). In fact, in most of the northeast US, the primary means of conducting OMWM is to install ditch plugs (e.g., Hruby and Montgomery, 1985; James-Pirri et al., 2001).

The two variants became classified as "open" and "closed" systems, depending on whether the project was intended to be open to tidal circulation, or mostly closed to it (Dale and Hulsman, 1990). It must be understood that, especially for the standard New Jersey model, most installations had both open and closed elements. The New Jersey model often had isolated ponds in the high marsh, a closed element, but depended on tidal circulation to maintain overall water quality. The ditch plug model was closed to tidal circulation, except on the six or more occasions a month when the tides override the marsh surface and ditch plugs.

The USFWS-USGS study of OMWM (2001-2003) was conducted at ditch plugging sites (James-Pirri et al., 2001). Many of the comments on the Long-Term Plan marsh management program were concerned with the construction of ponds in the high marsh, which is the signature of a New Jersey style OMWM (see Shisler, 1978) and generally not a feature of a ditch plug scheme.

OMWM, as defined in New Jersey, and when rigorously used by Connecticut regulators, is a mosquito control technique. The marsh management efforts are intended to control mosquito breeding. There may be ancillary benefits associated with the project, but the initiating reason for the action is mosquito control. This definition of "OMWM" is not always followed. For instance, in calling for OMWM in place of ditching in the Peconic Estuary, it is not entirely clear that the PEP CCMP (SCDHS, 2002) was focusing on continued mosquito management. The Town of East Hampton, for instance, in a cooperative project with Nature Conservancy in

Accabonac Harbor, described the effort as OMWM although mosquito control was clearly not the primary reason for plugging the ditches (Town of East Hampton, 2002). OMWM has therefore become a somewhat diffuse mosquito control technique. Additionally, OMWM has also seemingly become a somewhat commonly used phrase to describe marsh manipulations that are less than a "restoration" (e.g., a return to pre-ditching conditions) but that may not focus on mosquito control.

Therefore, it is entirely sensible that many comments should be received regarding the definition of OMWM, and the relationship of various definitions of OMWM to the kind of marsh management techniques proposed by the County. However, it must be understood that the intent of the Suffolk County Wetlands Management Plan was not to implement a form of "classic" or "standard" OMWM. For one, the Wetlands Management Plan proposes to use some techniques that are not typically used in either the standard New Jersey or ditch plugging models, such as naturalizing or filling ditches. More importantly, the County approach, while identifying projects because of perceived mosquito control needs, has a much stronger awareness of, and concern for, the "ancillary" issues of ecological benefit generation than is typically understood to occur with "OMWM." That is, the County adopted an approach that mosquito control with unacceptable ecological impacts was not acceptable. In addition, the County approach also requires rejection of a "model" OMWM implementation scheme. Again, the County is not proposing to adopt either the New Jersey pond-channel approach or ditch plugging, but rather to adopt them both, and implement particular BMPs as directed by the particularities of the setting and the natural resource concerns of the land manager. It is clear that the perceptions of the County plan are very different, as many comments identify a County focus on pond installation or channel construction. It is true that these are considered under the Wetlands Management Plan and were conducted for the Demonstration Project at Wertheim National Wildlife Refuge, but they are not requisite elements of every project, as some commenters seem to think.

It would be less complex and easier to discuss the issues if the County had not made a determined effort to cull the best parts from other successful programs, and instead had simply said, "Suffolk County is adopting OMWM as practiced by ___." Such a program would not have the potential for environmental benefits that the County believes this Wetlands Management Plan has, and the chances for inappropriate implementations would be increased.

This means that in the following section the County will generally agree with most comments concerning OMWM, even those strongly critical of OMWM. It should be understood that the program the County has proposed is not the same as the "OMWM" being described. Thus, in agreeing with criticisms that are offered, the County is not criticizing its own proposal.

For instance, several comments noted that OMWM is not restoration, sometimes adding that it is a marsh alteration technique. The County agrees that OMWM generally does not return a salt marsh to pre-ditching conditions. However, the County notes that OMWM can enhance or restore conditions and functions of a marsh that may have existed pre-ditching. There are few extant records regarding surface waters on Suffolk County salt marshes before ditching was conducted; however, it is clear that Suffolk County salt marshes today have fewer surface water features that cover less marsh area than is typical either for New Jersey or New England unditched marshes. Therefore, constructing ponds on the marshes could be construed as returning these marshes closer to a pre-ditching condition (Lathrop et al., 2000; Adamowicz and Roman, 2005). As will be extensively discussed below, the County believes there is good reason to believe that these kinds of water management enhance important ecological functions identified with salt marshes. In that instance, augmenting these functionalities can be determined to restore the marshes, being an improvement of their condition.

Similarly, the County agrees that OMWM generally does not result in restoration of marshes back to pre-ditching or pre-20th Century physical settings. However, OMWM may undo some of the changes in marsh functions that led to loss of water fowl or fish habitats, if that was the case when ditching was undertaken. Many of the BMPs described in the Wetlands Management Plan will also change the aesthetics of the marsh, in some cases erasing some of the overtly unnatural features of a grid ditched marsh. Comments that describe the Wetlands Management Plan, and OMWM in general, as not recreating unaltered marsh are generally accurate.

The County agrees that OMWM involves techniques that control mosquitoes, and differs from ditching.

The County agrees that many of its BMPs, and "OMWM" (as understood in other jurisdictions), generally seeks to reduce ovipositioning sites for mosquitoes and also to provide better habitat for fish that consume mosquito larvae, generally, killifish. OMWM has been found to reduce larvicide use, and to potentially increase marsh functions and values. The County further agrees with comments that noted there are also a great many ways to conduct OMWM.

Therefore, the County generally agrees with a comment that OMWM always involves excavation of some sort. Even the simplest ditch plugging project usually requires movement of marsh sediments, often creating a deeper area in the ditch, and using those sediments to create the plug. However, other comments that focus on particular BMPs proposed by the County appear to misunderstand the purpose of the BMP manual. The BMP manual and the Wetlands Management Plan do not require that these techniques be used for each project, but rather identifies a palette from which the designers can choose appropriate actions as needed for particular settings, marsh management needs, and regulatory restrictions. Not all marsh management under the proposed approach requires digging ponds. Therefore, a comment stating all OMWM requires ponds is also inaccurate. Not all OMWMs require installation of pools and channels or the construction of artificial creeks. Not all OMWMs involve "leveling" the high marsh. Some OMWM projects conducted in various jurisdictions have used these techniques, it is true, and the County believes that all of these actions may be of use as it considers management possibilities for one or more marshes in Suffolk County.

It is essential to understand that the crux of the Wetlands Management Plan is that the County will seek to select an appropriate means of achieving mosquito control and environmental maintenance, or even enhancement, through coordination with the land manager and with extensive review and oversight by outside parties. Management is not intended to be conducted in a cookie-cutter fashion across the breadth of the County's marshes.

(10) Integrity/functionality of salt marshes (I-3, S-57, S-58, AG-16, AG-32, AH-11, AL-2)

Certain comments focused on perceived deficits in County marshes. It was noted that many of the marshes in the County fail to serve the full functionality associated with salt marshes and that many marshes in the County need restoration of some sort. Conversely, comments were also received noting that many marshes, although ditched, are functioning well. Other comments noted that constructing ponds in marshes will not preserve the integrity of the existing marsh and that habitat creation may not necessarily be beneficial for the marsh as a whole.

These seemingly contradictory stances are, in a sense linked. It is clear that nearly every acre of marsh in Suffolk County has been altered. On the other hand, many of these altered marshes appear to be relatively stable systems that have not drastically changed in the decades since the major modification(s) was undertaken. However, it is also not inherently clear that making further modifications to these systems will lead to a new, equally stable state. In fact, arguments are often set forth that salt marshes are insulted systems where incremental effects lead to major perturbations, this is sometimes stated to be the reason for the accelerated loss of marsh in Jamaica Bay [Hartig et al., 2002; Hartig et al., undated]. Therefore, those concerned with marsh health need to weigh the need to restore marshes with the potential for problems if the system is further changed.

This responsibility weighs heaviest on NYSDEC, which has been given the legislative mandate to preserve and protect the resource and its functionalities. It is clear that maintaining the status quo is the most defensible means of achieving the mandate, and that is the generally conservative approach adopted by NYSDEC. However, such a frame of mind leads to comments such as "ditched marshes may be functioning well;" the County does not necessarily disagree with this statement, but has concerns regarding the basis of the determination of "functions well." NYSDEC does not measure any of the functionalities it is charged with maintaining, outside of spotty and infrequent surveys of marsh area. Its resources are not limitless, and its time and efforts are primarily reserved for regulatory processes. Therefore, it seems this determination of functionality can only be made on the basis of value judgments by its internal scientists/experts. This makes it difficult to engage in a dialog regarding optimal states for County marshes, because there is no quantitative means to determine NYSDEC's satisfaction that proposed alterations will constitute improvements. The County clearly understands that resource limitations mean the kinds of measurements that would be advantageous to make cannot be made. The County wishes to observe, however, that the identification of "good functioning" marshes may be based on a somewhat limited set of observations. It may be that agreement on the kinds of conditions that determine an optimal status for marshes might lead to greater acceptance of changes at sites that otherwise had been determined to be in a "good" state. If a project augments one or more marsh functions (with an identification that there are limited probabilities of negative effects from the project), then a "good" marsh might be made "better."

The discussion of the role of salt marshes in overall coastal ecology, developed in Section 4.6.4, below, may be helpful in this light.

(11) Scope of proposed program (E-12, P-76, P-82, S-38, S-32, S-59, S-60, S-61, Y-3, AG-37, AH-13, AK-14, BI-7)

Despite its best efforts, the County was not able to make the scope of its program clear, according to some comments. One noted that the area of salt marsh and fresh marsh in Suffolk County was much greater than the areas discussed for source reduction through marsh management. This is true. It should be made clear that nearly all considerations of water management are restricted, by State regulations, to salt marshes. Therefore, the universe considered for action is the approximately 17,000 acres of salt marshes identified in Suffolk County.

Those 17,000 acres are to be parsed as follows:

- There are approximately 4,000 acres of salt marsh, including areas in FINS where management efforts are restricted by federal rules, places such as Gardiners Island or Robbins Island, where management is restricted by geographic considerations, and those that do not breed enough mosquitoes close enough to residential areas to cause a mosquito problem. These marshes are not considered to be candidates for marsh management under the Wetlands Management Plan, with one exception. An agency other than SCVC might nominate such a marsh for marsh restoration under the Wetlands Management Plan program. So long as mosquito control issues are adequately considered in the project, and it passes all other reviews and oversight steps, such a project might gain approval although the site was initially identified as being one of the presumptive reversion sites (see Section 4.6.2 for more process details).

- There are 45 "named" salt marshes comprising approximately 4,000 acres of marsh that are currently receiving regular aerial larvicide applications, as determined by surveillance of mosquito breeding within these marshes. These sites are the de facto marshes of interest for a source reduction program. They are considered to be the priority sites for water management projects. However, being identified as a priority site does not mean the County has determined that water management must be conducted at the site. Further assessment of the setting and the land manager's plans, if any, for the site need to be considered. The review of any potential project will determine whether the County has adequately mitigated any potential for ecological impact, and to assess whether the potential for improvements in mosquito control is worth the potential for negative ecological impact. Also factoring into the determination will be possibilities for potential improvements to certain ecological functionalities that may be part of the project design.

- Another 9,000 acres of County marsh lands can not be instantly determined to either represent or not represent a mosquito problem that should be addressed under this program. Breeding may be occurring at these marshes and causing problems in the surrounding communities, but the size of the area causing the problem may be too small for aerial treatments. Or, development in the surrounding area may magnify a hitherto insignificant issue. Or, the potential means of addressing any mosquito problem would result in unacceptable risks of a negative ecological impact. In any case, these sites will require future reassessment in order to determine if they will receive water management or not.

In considering available resources and capabilities, the County believed that the maximum number of major, significant marsh projects it could address over twelve years was approximately 15. This does not mean that only 15 of the 45 priority marshes will be addressed. It signals that most of the mosquito management problems in the County can be addressed through smaller, lower impact kinds of projects. The Wertheim National Wildlife Refuge project was an anomaly in terms of the scope of the project undertaken, insofar as the County can project potential future project designs for other aerially-larvicided marshes that may be actively managed by a smaller scale project. The number of major projects, given that the 12-year completion goal has been relaxed, might be increased. However, major projects will be determined largely by land manager goals and expectations for the marshes. They will also be subject to stringent review by permitting organizations, the Wetlands Stewardship Committee, and other interested and involved agencies and parties. Therefore, it would seem doubtful that the County will be able to conduct as many as one major project each year of the Long-Term

Plan (especially considering there are most probably to be none in the first three years of the Long-Term Plan implementation period).

4.6.2 Screening (Wetlands Stewardship) Committee

The comments received on the Wetlands Stewardship Committee, formerly referred to as the "Wetlands Screening Committee," were organized into four general categories:

- Committee composition
- Project size considerations
- Committee functions and project process
- A proposed Wetlands Recovery Project

Before discussing the comments that were received, the County will review its concept of the project development process and review.

Salt marshes throughout the County require active management, for a variety of reasons. SCVC, for instance, believes that there are ways to manage the marshes so that they will be less supportive of mosquito breeding. Other interested parties, such as the Town of East Hampton, for instance, believe that salt marshes can be managed so as to improve water quality in the associated estuarine waters. Other organizations would prefer to see a holistic approach to salt marsh management that results in increases to the biodiversity of these systems. NYSDEC has identified important functions associated with salt marshes, and, if these are sufficiently impaired, appears to be supportive of projects that might lead to increased functionalities. And others would like to see the salt marshes returned, physically and biologically, to a state that existed at some time in the past. All of these kinds of projects have been identified as "restoration" projects, although, as discussed just above, not all parties to the discussion would accept such a description.

The County believes that there are valid reasons for conducting any of these kinds of projects. However, as has been pointed out by critics of earlier versions of the Wetlands Management

Plan, as currently proposed, the County's approach to this issue lacks a context in which the need and value of a proposed project could be determined.

The County's original approach to assessing projects was fairly pragmatic. Projects to be considered under the Wetlands Management Plan could be of various scopes and overall intent, but would need to meet County mosquito control criteria to be supported with County resources. Small and less intrusive projects could proceed with reviews by local natural resource departments and, potentially, some oversight by interested experts. Larger projects or those using more intensive techniques would require policy review by the Wetlands Screening Committee and technical review by the Wetlands Subcommittee.

The County has been persuaded that a more inclusive framework for any wetlands projects needs to be created. The Wetlands Stewardship Committee is now charged with developing an overall conceptualization of wetlands health for County salt marshes. The County will essentially refrain from marsh management projects of any substance until agreement is reached on the goal (healthy wetlands) of projects to be undertaken in salt marshes.

This does not imply that all wetlands projects will be massive efforts designed to bring existing systems to some state of near perfection. Rather, the creation of a well-defined concept of marsh health will allow the interested parties in marsh management to evaluate projects in a consistent fashion, and to minimize chances that inappropriate projects that might result in marsh degradation are considered or even undertaken.

The County has increased the degree of formal review of projects, and the Wetlands Stewardship Committee can additionally review projects that appear to have elements that may cause interest or concern in its membership. The County realizes that this expanded role for the Committee, especially in the critical first three years as policy determinations are made, will require staff and technical support. The County is investigating means of funding the necessary work.

The collaborative process involving members of governments from all levels (Federal, State, County, and local) and local non-governmental organizations is expected to substantially change the original implementation process for the Wetlands Management Plan. It is likely that the processes presented here will be altered to more felicitous means as the Committee works through its plans and the first few projects. Nonetheless, the County will outline some initial ways of considering potential projects, and how they might be reviewed and implemented. This should not be considered to be final, but rather to serve as an initial guide to support vigorous dialog and discussion, leading to better and more amenable ways of considering and conducting projects.

(1) Composition of the Wetlands Stewardship Committee (G-16, I-41, I-42, J-7, J-8, P-54, Q-12, Q-15, Q-16, R-88, AG-109, AG-138, AG-140, AG-141, AS-6, AW-9, BA-22, BC-9)

The current proposed membership of the Wetlands Stewardship Committee is as follows:

Estuary programs:
- LISS representative
- PEP representative
- SSER representative

State
- NYSDEC Region I
- NYSDEC Bureau of Marine Resources
- NYSDOS

County
- County Legislature
- County Executive
- SCDHS
- SCDPW
- SCDEE
- Suffolk County Department of Planning
- Suffolk County Department of Parks
- Council on Environmental Quality

Local
- Town representative (based on project location)
- Trustees representative (based on project location)

Non-governmental Organizations
- Two appointed by County Legislature
- Two appointed by County Executive

This committee composition was made to address comments received that included:

- The original committee was weighted towards government, not environmentalists
- Add experts and environmentalists

- Add Town and trustee representatives
- Add more non-governmental organizations
- Add estuary program representatives

The committee was also to add members so as to increase scientific expertise (that will be addressed through staffing) and to change its focus towards wetlands health.

NYSDOS has indicated its willingness to serve on the Committee. NYSDEC is not yet sure if it can serve, although one comment (AG-109) indicated a willingness to participate. Other comments suggested there could be a conflict between its management functions and its regulatory role if it served as a voting member.

(2) Project Size Considerations (G-17, P-50, P-51, P-52, P-53, Q-17, AG-68, AS-7, AW-10, BA-23, BC-10)

The County had originally used a combination of size (all projects larger than 15 acres) and techniques used for the project (BMPs 10-15) to determine if a project would receive automatic consideration by the Screening Committee. Comments noted that use of a size threshold could lead to use of loopholes, or project segmentation to avoid review. NYSDEC suggested that a 10 acre threshold was supported by other SEQRA considerations; other comments suggested that BMPs 6 and 9 especially needed review, and perhaps that all projects should receive formal review.

The County is proposing that automatic formal project reviews be restricted to those that employ BMPs 10-15. However, all such projects would be reviewed. In addition, the Stewardship Committee will be formally notified of all projects that plan to use BMPs 5-9. “Notification” will include, at a minimum, project location, scope, and a detailed description of the goals and objectives of the project, the means to test them, and the way that the BMPs will allow the project to meet the project’s the goals and objectives. The Stewardship Committee will be able to call for a formal review of any project should its membership request such a review.

Therefore, the size threshold of 15 acres initially developed by the Wetlands Subcommittee has been abandoned. In its place is a more restrictive review policy, where all projects using BMPs 10 to 15 will be reviewed by the Wetlands Stewardship Committee. The Wetlands Stewardship Committee will have the ability to review any or all projects that its membership deems to require such review, and will be notified of all projects using BMPs 5 to 9. All projects using BMPs 5 to 15 will undergo further SEQRA review through the CEQ.

(3) Project Process and Committee Functions (Q-19, Q-20, Q-21, Q-22, Q-23, Q-24, R-5, R-6, R-7, AG-129, AG-142, AS-8, AS-9, AS-10, AS-11, AS-12, BA-7)

The project evaluation process and the Wetlands Stewardship Committee functions were discussed in more detail in Section 3.3. Comments received regarding these issues included:

- Evaluate the design of all projects

  The County has established a pathway that all projects can be evaluated. It was not believed to be an efficient use of Committee resources to evaluate all project designs, however.

- Evaluate project monitoring protocols

  When projects are evaluated, an important consideration will be review of project goals and objectives, and the means by which the project progresses towards those goals and objectives. This will require scrutiny of proposed project monitoring.

- Evaluate in terms of ecological restoration conformance

  Projects that are formally evaluated will receive review of their potential for ecological function enhancement. One of the reasons that project goals and objectives are included with every project description is to ensure that the Wetlands Stewardship Committee is aware of the purpose for each project.

- Evaluate the mosquito control efficacy of each project

As discussed in Section 3.3, it is assumed that most projects will be generated as a design partnership between SCVC and the land manager of the salt marsh. In most cases, it is assumed that some design features will be intended to reduce mosquito breeding opportunities, in order to accord with SCVC's mission, if such features do not appear to harm the overall health of the marsh. When project designs do not include SCVC participation, County participation in the implementation of the project will be predicated on mosquito reduction or neutrality. Some projects may come before the Wetlands Stewardship Committee without requiring County participation. The County will no doubt ask that mosquito control be considered in light of project goals and objectives; however, it is possible that projects may receive approval from the Wetlands Stewardship Committee without incorporating a specific mosquito control basis.

- Reject projects that damage marsh health

The County agrees with this principle without qualification.

- Determine which projects require no further environmental review

The Wetlands Stewardship Committee has been given the opposite responsibility. This committee is intended to determine which projects require further environmental review, especially in terms of making recommendations regarding SEQRA review to the CEQ.

- Consider non-vector control projects

As discussed in Section 3.3, it is assumed that most projects will come before the Wetlands Stewardship Committee as collaborations between SCVC and a land manager. Even in those cases, it is possible that certain projects will have little to no mosquito control purpose to them; however, SCVC involvement in the design ensures that, at a minimum, the project is neutral with respect to mosquito control. In addition, some projects may come before the Wetlands Stewardship Committee without any SCVC or County involvement whatsoever. As discussed in Section 3.3, these projects may desire the imprimatur of the Stewardship Committee to perhaps ease regulator concerns, or to garner support for grants or other funding opportunities, or to demonstrate to a constituency that the project plan is in accord with the overall County marsh management plan.

- Refine wetlands planning

  The County believes that the Wetlands Stewardship Committee has two vitally important tasks to address in its first several years. It must determine a broadly acceptable definition of marsh health. Such a definition will be the crux of the means of carefully evaluating individual projects. Secondly, using the definition of marsh health, the Wetlands Stewardship Committee should develop broad goals for the land managers of the County's wetlands to strive for. This overarching management program could focus on particular archetypical marshes, using them as examples for the way that land managers could implement wetlands projects. Or, the Committee might organize its plan in terms of geographical regions, or morphological types, or ecological function needs. In any case, the Wetlands Stewardship Committee should understand that it needs to create a framework in which individual projects can not only be compared to in terms of potential impacts, but how they can be evaluated in meeting the overall needs of the County (in terms of human and environmental ecologies).

- Focus on projects of real concern

  This is the intent of the County's reticence to have all projects evaluated by the Wetlands Stewardship Committee. The large membership, volunteer status of members, and travel requirements for certain members mean it is unlikely that this Committee would meet on a frequent schedule. If projects are to receive their proper due, sufficient time must be allotted to discuss them and to reach consensus regarding potential benefits, impacts, mitigations, and evaluation means. The resources of this Committee should be reserved for significant projects, identified by the County as those employing BMPs 10-15, and those where Committee members have concerns or interests in particular projects.

- Evaluate past and on-going studies

  The County believes this will be a staff function, but one where the Wetlands Stewardship Committee as a whole is briefed on these studies.

- Evaluate projects on a case-by-case basis

  The County believes that an overall structure to support decision-making must be established. The County believes this should be addressed through creating a definition of marsh health that is supported by stakeholders, and to create an overall management plan that considers all facets of salt marshes. However, it is clear that salt marshes are all set in differing environments, and are affected by all kinds of factors to varying degrees. This means that cookie-cutter approaches to marsh management are bound to be inadequate. This also means that each proposal for marsh management needs to be considered in terms of how it fits the contexts established for project evaluation.

(4) Proposed Wetlands Recovery Project (Q-35, Q-36, Q-37, Q-38, Q-39, AS-13, AS-18, AS-19, AS-20)

COPOPAW presented an "alternate" to the Wetlands Management Plan in its comments, echoed in individual comments prepared by the Nature Conservancy, a member of COPOPAW. The County believes that its revisions to the Wetlands Management Plan have largely met the comments presented here. Those comments called for:

- A regional marsh management plan that does not focus on mosquito control needs

  The County has acknowledged this as a good purpose for the Wetlands Stewardship Committee

- Set objectives for acquisition, restoration, and preservation of coastal wetlands

  The County explicitly has established the restoration and preservation of coastal marshes as a purpose of the Wetlands Management Plan. The County also has a very active land acquisition program that has purchased wetlands.

- Obtain funds from Federal, State, local, and/or private sources

  The County has always sought to leverage County tax dollars with funds from other sources.

- A collaborative approach with multiple stake holders

  The composition of the Wetlands Stewardship Committee signals the County's intention in this regard.

- Use science to develop wetlands health criteria

  The intent of using staff to address the technical issues associated with these questions recognizes the need for science to drive the definitions of health.

4.6.3 Classification of BMPs

As discussed in Section 4.2, one of the major alterations of the Long-Term Plan that resulted from the comments received in the EIS process was the reclassification of BMPs. The County added an impact category to the BMP classes, and generally has reviewed the BMPs more restrictively. Thus, BMPs 1 and 2 are now classified as generally having the potential for no-to-little impact, BMPs 3 and 4 are classified as having the potential for minor impacts, BMPs 5-9 the potential for significant impacts, and BMPs 10-15 as having the potential for major impacts. In addition, the County will closely review every project in terms of the NYSDEC wetlands functions identified in the regulations. These are:

- Marine food production
- Wildlife habitat
- Flood and hurricane and storm control
- Recreation
- Cleansing ecosystems
- Sedimentation control
- Education and research
- Open space and aesthetic appreciation

The County believes that the primary potential effects from most projects relate to marine food production and wildlife habitat, and that for some of the more aggressive techniques, issues such as open space and aesthetics, ecosystems cleansing, and sedimentation may be issues of interest. Projects that increase connectivity between the estuary and the marsh system may raise issues associated with storms and flooding. Generally, the County does not believe any of its projects will directly affect recreation and education and research functions of the marshes involved in any projects.

Nine comments (C-5, C-6, C-7, Q-18, AG-159, AG-172, AR-7, AR-11, AR-12) were received that classified as referring directly to the manner that some of the BMPs were assessed or other wise classified, or raised specific technical questions regarding a BMP.

One comment expressed a preference for natural reversion over pond creation as a management technique. The Wetlands Management Plan expressly defines the County's presumptive marsh management strategy as reversion, except where other considerations call for more active management. In terms of mosquito control actions, it seems unlikely that reversion would be effective. Salt marshes in Fire Island National Seashore, where no maintenance of the legacy ditch system has been conducted for decades, and where no other form of water management has been practiced, either, tend to have copious breeding of mosquitoes. When maintenance of the ditch system has lagged, either because of a mosquito control program reliance on pesticides (e.g., Suffolk County in the 1950s and early 1960s, with DDT, for instance) or because of budgetary cutbacks (e.g., Nassau County in the late 1990s), anecdotal evidence overwhelmingly reports increases in breeding. Therefore, where mosquito control has been identified as an important management goal, reversion is unlikely to be identified as a preferred management strategy.

Enlarging culverts to increase tidal exchange was also identified as being preferential to pond creation. Any marsh where a culvert may restrict tidal flows should be evaluated to determine if increases in tidal exchange is warranted. The BMP manual discussed means of determining if flows are restricted, and discussed the kinds of constraints that may need to be considered if such a project is being evaluated. Pond construction and culvert enlargement are generally considered in response to two very different sets of circumstances, and so it is difficult to directly address the concern.

One comment characterized BMPs 6 (ditch naturalization), 7 (construction of spur ditches), and 9 (construction of small ponds) as "controversial," and another requested that the County re-evaluate the impact level (a potential for "minor" impacts) associated with BMPs 6 and 9. The County notes that the construction of small, shallow ditches to allow fish to reach breeding pockets or the creation of small ponds are both important elements of the overall New Jersey approach to salt marsh mosquito source reduction. It is thought there are important ecological consequences to extending the habitat range of killifish in a salt marsh, and small ponds can also provide good habitat for water birds of various kinds (see Section 4.6.4 below). The jurisdictions that use these techniques have judged that the benefits associated with mosquito control and fish and bird habitat improvement outweigh any potential for negative impacts (primarily due to loss of vegetated wetlands, as the acreage converted from vegetated wetland in association with these actions is generally insignificant relative to the overall acreage of the marsh). Naturalizing grid ditches, either by trimming berms or by eliminating the right-angle, grid look to the ditch layout, is perceived as creating improvements to the aesthetics of the marsh. There are also potential improvements to mosquito control dynamics, by allowing for greater access to the marsh surface. If the curves are well-placed along the waterway, the natural flushing characteristics of the water flows along the ditch may be enhanced, and less maintenance may be required in the system (linear ditches tend either to fill or to expand; waterways that mimic natural curvilinear designs lead to erosion and filling along the waterway, which are intended to stabilize in a self-sustaining dynamic). However, in light of NYSDEC comments regarding its regulatory stance on the BMPs, the County has reclassified these BMPs as having the potential for some significant impacts; with this reclassification comes an understanding that a greater degree of further environmental review may be necessary than when the BMPs were classified as potentially having "minor" impacts.

Another comment was received expressing support for ditch plugging projects. Ditch plugging was identified as a potential tool for marsh management (BMP 12). The County, as with all of the BMPs, does not believe ditch plugging is appropriate under all conditions. In many instances, ditch plugging may have the potential for greater ecological impacts than a more open system approach, or may not have a potential to deliver as many environmental benefits as another project; or ditch plugging may not suit the management goals of the site land manager.

Several comments were received that related to BMP 14 (filling existing mosquito control ditches). The source of material to fill the ditches was a concern. The BMP manual points out that unless some excavation is conducted elsewhere in the marsh to generate autochthonous materials to fill the ditches, an allochthonous source of materials would be needed. Although restoration activities in Jamaica Bay used dredged materials generated away from the marshes as a fill source (Atlantic States Marine Fisheries Commission, 2004), it was the County's perception that NYSDEC was not enamored of using materials from outside a marsh for in-marsh fill activities (this perception was based on discussions regarding the materials balance for the Wertheim National Wildlife Refuge project). Therefore, BMP 14 noted that the use of materials from outside the marsh, while it was not completely ruled out, was unlikely due to regulatory approval difficulties. Materials to fill ditches would therefore almost certainly be generated by pond of other construction activities. Therefore, a comment noted that this material does not quite fit the accustomed definition of fill – that is, outside materials deposited in a marsh to generally obliterate the marsh and create upland. It was further noted that materials used in the beneficial manner described in BMP 14 should not be considered to be a liability, but an asset. The County regrets if it gave any other impression.

Finally, a comment was made noting that the term dredge spoil is no longer considered to be proper. The preferred term is dredge materials. The County agrees with the comment.

4.6.4 Evaluation of Existing Impact Assessment

This particular comment category had the most comments listed of any in this FGEIS Section 4 (231 comments were classified in this section). There were many concerns with the specific evaluations used by the County in the DGEIS to evaluate the potential for impacts from the Wetlands Management Plan. The comments range from supportive statements for general positions taken by the County, statements criticizing the general position taken by the County, statements of general facts regarding salt marshes or marsh management, identification of specific effects due to marsh management actions, comments regarding the efficacy of the proposed actions, statements that little to no acceptable evidence was presented for certain claims made by the County, and some less easily generalized comments. The County may agree or disagree, in part or in total, with certain of the comments. The County will present here a specific response to the comments, and provide justifications for its positions.

(1) General comments (geographically ordered, mostly) (A-2, A-3, L-1, L-25, L-27, L-28, L-30, O-7, O-11, O-12, O-13, P-14, P-87, U-73, AD-16, AD-17, AE-15, AG-112, AM-12, AO-6)

Several comments suggested that the BMPs were good. This approval was modified with an admission of lack of expertise in one instance, and in another, as it was merely a statement that the Long-Term Plan stated the BMPs were good. One comment explicitly stated that OMWM was an attempt to restore a lost habitat type.

NYSDEC made a request to expand the impact assessment so as to include all of the regulation-identified values and functions. This is an intriguing and somewhat reasonable request, in some fashion. Doing so would allow for NYSDEC to make regulatory determinations more easily. However, the scope of work required to meet the request is unreasonable, as it would require a major rewrites of the BMP manual and Wetlands Management Plan, and quite a bit of additional material for a FEIS reworking of the impacts associated with water management. As NYSDEC itself noted in a formal comment on the DGEIS, it had representation at committee meetings where drafts of the BMP manual and Wetlands Management Plan were presented. NYSDEC participated in Scoping, making some very specific suggestions about how it believed the environmental investigation should be conducted. Comments made at any of these forums could have been accommodated in the DGEIS. At this time, CEQ has determined that adequate information has been presented to allow for evaluation of the potential for environmental impacts. The County generally believes that enough information has been made available to reasonably ascertain the effects of the proposed Wetlands Management Plan. Having been made aware of NYSDEC's concerns regarding its regulation, identified values, and the functions listing, Suffolk County will ensure that all project presentations to NYSDEC address these issues clearly and cogently.

There was a difference of opinions expressed in comments on the Connecticut program. Comments submitted on CDEP stationary described 20 years of water management conducted for mosquito management with little to no negative impacts. Comments submitted by another commenter described a vastly different program. In these comments, the Connecticut program focuses on restoring open waters lost due to ditching impacts, and that ditch plugging and other mosquito control efforts have only been included recently in an experimental fashion at three specific sites (Guilford, Qunnipiac, and the lower Connecticut River). This description allowed other comments to describe OMWM as an experimental program. The unofficial comments may accurately reflect the experiences of the commenter; however, the County believes that the correspondence sent under the rubric of the Department accurately describes the official view of the State of Connecticut regarding OMWM ("Integrated Marsh Management"), and that the State, while sometimes altering techniques and trying to improve its efforts, does not believe it is "experimenting" with salt marsh mosquito source reduction techniques at this time.

An official from Delaware also described its program, explaining that this long-established program had treated 7,000 acres for a variety of property owners, and that the Division of Fish and Wildlife endorsed OMWM.

Several comments accurately noted that Maryland had dropped its use of OMWM. In the DGEIS, the County cited concerns regarding hydrological changes in the marshes as the reason the State no longer constructs OMWMs. The comments also suggested that impacts to black rail habitat were a concern. Another comment noted that "municipalities" had dropped OMWM, although the State of Maryland is the only known practitioner of progressive kinds of water management that is known to the County as having ceased the practice.

(2) General comments (mostly critical) (B-1, B-10, F-9, G-13, G-22, G-23, G-25, I-10, P-83, AE-9, AE-12, AE-13, AE-14, AE-17, AN-1, AN-10, AR-2, AR-4, BC-3, BC-15, BC-16, BC-18, BI-11, BV-8)

Several comments characterized the Wetlands Management Plan as intending to destroy the marshes where it is implemented. The County considers itself to be a steward of its natural resources and would not intentionally take action that might lead to such a negative result. The County does acknowledge that salt marshes are complex systems, and, as noted in the DGEIS, any action in such a system may have consequences that were not anticipated. The County believes that the 40 years of use of many of these techniques in marshes in New Jersey, and several decades of experience with other proposed techniques in other jurisdictions, gives evidence that these activities will not have consequential negative effects on the County's marshes. The intent of the discussion of other jurisdictions' efforts in the DGEIS (pp. 530-544) was to show that the County was taking the best elements of other areas' efforts so as to reap the benefit of their experiences. The County has created an extensive project review process to try to limit the possibility of negative impacts, and has populated the review bodies with an array of diverse voices to ensure that projects receive a full and fair vetting (see Sections 3.3 and 4.6.2).

Other comments also characterized the potential for the Wetlands Management Plan to degrade or damage the marsh, or that the marshes will be changed. The DGEIS impact analysis tried to make it clear that the County was aware that negative ecological results could occur if these techniques were not applied in a thoughtful, careful, and well-reviewed fashion (see pp. 883-942). The County has further mitigated the potential for impact by strengthening the review process, and reiterating its commitment to only conduct mosquito control when projects were forecast to be, at worst, environmentally neutral.

Two comments were concerned that the new marsh management program would cause more impacts than the existing ditch maintenance approach, albeit one couched the comment as the program may cause more impacts than the 1930s ditching, or that the implementation of the Long-Term Plan will cause many [additional] impacts in the marshes. The County evaluated this in its comparison of the existing program as a "no-action" option, in Section 8 of the DGEIS. Although arguments can be made that ditching has received more criticisms than may be warranted, careful observers of salt marshes believe that if mosquito source reduction is to be conducted in salt marshes, it is better to use more nuanced management methods, including those identified in the BMP manual. The County has allowed for possibilities of limited ditch maintenance under the Long-Term Plan. For instance, NYSDEC, which is a major land manager of Suffolk County's salt marshes, repeatedly commented that ditched marshes may be good functioning marshes. Because NYSDEC has generally been conservative in its evaluation of marsh management options (in keeping with its mandate to "maintain" salt marshes across the State), it is possible that the State may prefer to continue ditch maintenance for certain of its marshes for some time, or, indeed, as a selected management practice.

It was noted that it would be foolhardy to "reduce marshes." The County agrees. Its Wetlands Management Plan has the intent of maintaining, and potentially increasing the area of vegetated salt marsh across the County. This may result because the County intends that its projects will result in healthier marshes. Overtly this will be realized by increasing tidal circulation through marshes. Studies have linked increased marsh vegetation productivity to increased tidal inputs, including work conducted on Long Island [Steever et al., 1976; Teal, 1986]. Generally, it is intended that more active management of local salt marshes will enable problems to be identified and addressed, as is often not the case at this time. It may be that there are some immediate reductions in the area of vegetated marshes due to the design and implementation of particular projects. For instance, constructing ponds implies that some vegetated high marsh will be replaced by open water. There is no doubt that such proposals will receive a great deal of scrutiny at NYSDEC, as its current implementation of the tidal marsh land use regulations is to avoid any loss of vegetated wetland area. The County believes that, in cases where it will propose any such actions, mitigating factors will include the relatively small change in vegetated marsh areas. Even at the Wertheim National Wildlife Refuge Demonstration Project, which intentionally had large ponds constructed, the change in vegetated area was on the order of one percent, and the potential for augmenting important marsh functions through the construction of surface water features.

In another comment, it was noted that the implementation of the Wetlands Management Plan may not result in environmental improvements. This is indeed a possibility, as the systems involved are complex, and not all permutations of the systems can be predicted. However, long-term, albeit primarily qualitative, assessments of OMWM projects elsewhere generally find that certain marsh functions are enhanced with well-designed, carefully-implemented projects. Comments received on the DGEIS from Connecticut and Delaware are adamant that this is the case. Poorly designed or implemented projects may not work as well. The case studies discussed in the DGEIS (pp. 530-544) in other jurisdictions tend to support this. Local experience is similar. Although comments from NYSDEC expressed some dismay with the way the William Floyd Estate OMWM project was implemented (see comment AG-39), site managers are very pleased with the perceived ecological results, finding there is good use of the ditch-plugged marsh by water birds and fish and areas of greatest mosquito breeding have been abated (see the DGEIS, p. 552). At Seatuck, where modifications to the hydrology of the site shortly after project completion may have compromised the OMWM design, and where no post-construction maintenance or follow-up was made, any benefits from the project are much more difficult to ascertain.

Several comments focused on pond creation, and saw it as it means not to restore the salt marshes, but as a cause of further disturbance. In a sense, this is accurate, as constructing ponds will change the existing state of the marsh. Ponds are relatively rare on most Suffolk County salt marshes. However, studies in New Jersey (Lathrop et al., 2000) and across New England (Adamowicz and Roman, 2005) found that ponds are common features of unditched salt marshes. It may be that Suffolk County lost its ponds when the ditches were installed. Even if the ponds did not exist prior to ditching, these studies indicate that most northeast US salt marshes have more surface waters than are typically found in marshes in Suffolk County. Surface waters in the high marsh serve as good habitat for killifish and water birds; although this intersection of habitats can be fatal to the fish, if sections of the ponds are deep enough, they serve as refugia for the fish from predation. Deeper ponds can also help ensure that temperatures do not become a problem in summertime for the fish. This suggests that ponds expand the ecological services that might be otherwise somewhat lacking in a typical Suffolk County marsh. It may be that doing so negatively affects marsh bird guilds. The research associated with the DGEIS did not find any indication that was the case. In fact for sharp-tailed and seaside sparrows, observations seemed to indicate that unditched marshes were better habitat than ditched marshes for two potential reasons: ditched marshes were firmer and so allowed upland predators better access to nest sites, or that the unditched marshes had a greater variety of better forage sites, allowing the fledglings a greater chance of survival (Post and Greenlaw, 1975). Merriam (1983) found differences in the diets between sparrows on ditched and unditched marshes. He thought the sparrows in unditched marshes fed better, and attributed the difference to an absence of ponds in the ditched marsh areas. If these kinds of findings hold for other marsh species, then increasing habitat diversity (including adding ponds) across the high marsh would be beneficial for marsh guild birds, generally.

It was noted that rising sea level argues against experimentation in marshes. The increase in sea level increase rates, noted in the Literature Search (Cashin Associates, 2006a) is potentially another stressor on marsh health. However, especially if project designs are well-considered, there is no evidence that the kinds of marsh projects proposed in the Wetlands Management Plan will affect sedimentation rates. Conversion of high marsh to low marsh, or loss of vegetated low marsh along the shore front would be subtle evidence that sedimentation rates in an altered marsh are not maintaining the marsh against sea level rise. This is not generally reported in the studies of OMWM projects, as revegetation generally results in the return of high marsh vegetation (see the DGEIS, pp. 883-942).

Three very reputable wetlands scientists wrote to express their dismay regarding the reliance on OMWM as a management technique, and to express their opinion, based on current knowledge regarding marsh hydrology and ecology, that the proposed Wetlands Management Plan will not restore lost marsh functions, and that structural changes to the marsh systems will cause unnatural alterations of marsh functions. The County has the utmost respect for Dr. Bertness and his colleagues. However, in his extensive publications on salt marsh, Dr. Bertness has never discussed the effects of water management on salt marshes – although he has written about other potential drivers of marsh change, such as uplands land use. In conjunction with the non-specific nature of the comments offered, this suggests that the stance adopted by these experts is based more on philosophical and theoretical grounds, rather than close analysis of the evidence presented in the DGEIS. For instance, none of the apparent improvements in salt marsh functions associated with the many Connecticut Integrated Marsh Management projects were considered in these comments, although even projects without a mosquito control focus have made positive structural changes to the existing hydrology of the marsh. Analysis of the changes in Maine marshes associated with structural changes such as removing tidal restrictions or plugging mosquito control ditches, including publications by Roman and Adamowicz (Roman et al., 2002; Adamowicz and Roman, 2002), were not mentioned. These are the areas where these scholars conduct their work, and so it would be unusual for them not to be aware, at least in general, of some of the projects occurring there. However, because the comments are not specific, it is difficult to disagree entirely with the opinions that were expressed. For instance, because it is unclear exactly what is meant by “lost” functions, responding that most source reduction projects increase killifish foraging on the marsh, resulting in greater estuarine fish production (per Knieb, 1984, and Craig and Crowder, 2000), may be unresponsive to the issue of lost functionalities. In some instances, because of changes to surrounding uplands or estuarine systems, no changes made in the marshes themselves may serve to restore aspects of the overall system. However, in that the County's program does not propose to physically restore the marsh systems to pre-ditching conditions, it is probable that certain aspects of pre-ditched marshes may not be recovered, no matter how sensitively or carefully the projects are conducted. To that limited extent, the County accepts the intent of these comments.

(3) General statements of fact concerning marshes (B-4, B-5, B-8, E-16, E-17, E-18, F-8, G-4, I-7, I-13, I-14, Y-10, AE-1, AE-2, AG-6, AG-53, AG-81, AG-89, AG-98, AG-149, AG-166, AK-18, AK-19, AM-6, AN-4, AN-5, AN-8, AP-1, AP-2, AK-20, BI-1, BI-2)

It was noted that tidal marshes are inherently complex systems. This is a theme of the County's discussion of potential impacts from its program (see the DGEIS p. 881, for instance). However, the complexity of the system does not mean that they cannot be modified successfully. The key issue is to determine the fragility of the system with respect to the aspects that are to be modified. Experience in other jurisdictions has generally found that most high marsh settings are relatively robust regarding the kinds of manipulations undertaken as mosquito source reduction actions. Revegetation almost always is in kind; noticeable loss of resident species of fauna is not common, at least according to the anecdotal assessments that have generally been conducted. Suffolk County would like to try to ensure that its projects are well-planned and appropriate, and so to that end has established a very thorough review process (see Sections 4.6.2). The combination of use of proven techniques and exacting review by local parties is intended to avert any catastrophic impacts to the complex ecology and physical settings found in the salt marshes.

There were a series of comments that discussed hydrological issues. One stated that marsh hydrology is often misunderstood. The County quite agrees. Many notions regarding salt marshes seem to have been generated by analogy from upland fresh water systems. One obvious example is the use of ditching to try to dry out salt marshes. Salt marsh experts such as Chapman (1974), analyzing the issue in terms of peat hydraulic conductivity and the head changes that might occur due to tides, thought the concept fatally flawed. However, a long enough interval between flooding tides, with an overall marsh surface elevation above mean sea level, could result in net reduction of the marsh water table in the high marsh area because of decreased length of the flow pathways with ditches. Logically, if the peat all has similar hydraulic conductivity, the effect would be greatest near the ditches, and where the net head difference is greatest (i.e., where the tidal range is greatest). The practicality of this was shown through increases in *S. patens* extent in certain New England-type marshes when they were ditched to promote hay production (Teal and Teal, 1969). However, the easy and general logical comparison between draining fresh water systems and draining salt marshes fails to hold. Similarly, because many fresh water systems have a simple hydrological regime, where water enters from higher elevations and exits from lower elevations, many seem to believe that overall water flow in a salt marsh is from the uplands to the estuary. There may be a component of this when a stream or river flows through the marsh, or where storm water systems have been directed into the upper marsh; however, especially on Long Island, with its extremely permeable surface sands, there is often little direct flow from the surrounding uplands into the lower elevation marsh. The permeability of marsh peat and the low relief of the marsh also ensures there is essentially no surface flow across the marsh from any run-off that might enter the marsh. The poor hydraulic conductivity of the underlying peat means there is very little discharge of groundwater into the marsh system, which limits the indirect input of uplands fresh waters. Rather, it is clear that the dominant source of water to even the intermittently-flooded marsh is tidal flow. Therefore, the dominant flow to the marsh should be understood to be from off-shore to inshore and out again, with essentially no net flow gain or loss of water resulting. Despite this obvious hydrological regime, many observers of salt marshes seem to think that a lot of land-derived water flows across or through salt marshes. This may be the case for riverine systems; it also can be indirectly the case, if groundwater discharging into the near coastal environment is then carried up into the marsh by a rising tide. But, in a general sense, the hydrology of salt marshes is determined almost exclusively by tides.

Several comments relate to marsh hydrology. A number of comments related to marshes and the reduction of impact or intensity of storm surges or tidal effects. The Literature Search (Book 9 Part 2 [Cashin Associates, 2005g]) discussed this issue:

> Flood control is another function that has been ascribed to salt marshes because of their effective attenuation of wave energy (e.g., Crooks and Turner, 1999). However, Dale and Hulsman (1990) point out that there is little direct quantitative evidence to support this aspect of the physical functioning of salt marshes. Nevertheless, the idea of flood control by marshes is consistent with known

causes of storm-surge flooding. Storm surges are generated by two main processes:

- lowered atmospheric pressure
- wind-driven surface currents.

Marshes will have no impact on flooding caused by low atmospheric pressure, which accounts for about 1.5 cm of sea-level rise for every one mm drop in a mercury barometer. For the most severe storms, this process may result in 0.5 to 1.0 m of surge elevation. For the same storm, however, wind-driven surface currents can easily contribute another 3.0 m or more of surge, making it the dominant component of coastal flooding.

Thus, by absorbing wave energy and limiting wave development, the salt marsh grass canopy can be effective in limiting the height of storm surges. This specifically occurs because:

1) water ripples and waves provide the surface roughness that is needed for the efficient transfer of wind energy into the surface ocean;
2) wind energy absorbed by the surface ocean is mainly translated into water flow (i.e., surge waters) by the breaking of small waves, which is commonly indicated by white caps.

As noted by Dale and Hulsman (1990), the extent of protection that any given marsh can provide will depend on its fetch, width, and the composition of its vegetation. Without detailed quantification, it is safe to say that the absence of marshes where they formerly existed can only serve to exacerbate coastal flooding.

Thus, anecdotal and theoretical information tend to support the concept that marshes will serve to buffer the mainland from storms and tides.

Another set of comments related to marshes mitigating sea level rise. Technically, sea level rise may cause marshes to further impact the uplands. This is because if marsh surface elevations keep pace with sea level rise, the marsh may be able to expand onto topography that formerly was uplands (landward migration, as is described in the classic paper by Redfield [1972]). Nonetheless, if the marshes can sustain themselves, then they may continue to provide services such as flood and storm mitigation, which may offset some of the effects that might occur in the absence of the salt marsh. This depends on the very reasonable assumption that the area lost to growing marshes will be less than that impacted by unbuffered storms.

Several comments pressed the issue that marshes are good filters of upland pollutants and/or run-off. Unless the run-off is directed straight into the marsh, this seems to be unlikely. The DGEIS discussed this issue (see p. 496) in light of the hydrological principles of salt marshes, as discussed above. NYSDEC did remind the County, however, that USEPA Phase II does not require remediation of all direct discharges to surface waters, but only those discharges that contribute to a contravention of water quality standards.

A more subtle set of comments noted that marshes filter pollutants generally. This sentiment is often expressed as marshes being the kidneys of the estuary. That statement is a fairly accurate metaphor. As noted in the DGEIS (p. 496):

> Salt marshes, through marsh surface plant-sediment reactions, are often credited with water treatment capabilities. The accumulation of sediment in marshes generally indicates that nutrients and particle-associated contaminants will also accumulate in a marsh (Nixon, 1980). However, the effectiveness of the removal of contaminants and sequestration of various substances depends on various attributes of the marsh. Very roughly speaking, younger marshes that have more restricted connections to an estuary appear to accumulate materials more than older marshes with better estuarine connections (Valiela et al., 2000).

However, it is not clear if marshes are long-term sequestration sites for contaminants, or whether they merely serve as a way station (as kidneys, for example, are intended to filter contaminants from the blood stream but then release them through urine). Particularly for biologically active compounds, such as nitrogen, it appears that uptake and release in many settings are more closely balanced than is generally thought. Marshes will absorb certain compounds from tidal flows when they are at high concentrations, according to this concept of marsh filtering, but release them to the tidal flows when concentrations decrease. This was discussed in the Literature Review, Book 9 Part 2 [Cashin Associates, 2005g]. Thus, a marsh may not serve as a filter, per se, but more as a buffer. This nonetheless has important ecological consequences, as buffering substances that may have seasonal cycles, such as nutrients like nitrogen, may reduce eutrophication impacts.

Another nexus for comments in this section was marsh loss. It was reported that approximately 35 percent of the South Shore Estuary's salt marshes were lost from a 1930s baseline assessment. Some 7 percent of the losses were said to have occurred since the 1974 Tidal Wetlands Act was enacted. The reference appears to be to an additional 7 percent of the total amount of losses, based on a report issued by the Peconic Baykeeper (2006). Another comment noted that most of these losses were due to direct filling of the wetlands, or excavation (dredging) of them to provide channels for boats. These data are in line with the kinds of findings reported in the Literature Search (Book 9, Part 4 [Cashin Associates, 2006a]). It was further noted, however, that recently concerns have been raised regarding unusual, marsh losses, for which the cause has not yet been determined. The Literature Search discussed this very briefly; however, a recent article in the New York Times (Salzman, 2006)) brought the issue to a wider audience. Informal inquiries with involved parties (Ron Rosza, CDEP; Susan Adamowicz, USFWS) determined that no consensus regarding the cause of the sudden diebacks has been reached, despite a symposium on the subject in the spring of 2006. Mark Bertness was quoted in a wire service article (Henry, 2006) as suggesting that the observations of the dieback may not be well-founded, although experienced observers from reputable organizations have been among those making many of the claims. If sudden marsh die back, which appears to affect low marsh, does become common throughout the northeast, additional precautions may need to be taken to ensure that projects do not precipitate the problem. NYSDEC did take issue with statements in the Long-Term Plan that implied the marsh losses there are sudden. NYSDEC is correct in asserting that Jamaica Bay marsh losses have been occurring throughout the 20th and 21st Centuries; however, the phenomenon known as "Jamaica Bay disease," defined as the loss of island marshes from the interior outwards, has certainly accelerated through the 1990s. This was the subject of a Long Island Sound Study special symposium, held in 2004, which was reported on in the Literature Search (Book 9 Part 4 [Cashin Associates, 2006a]). Some researchers are concerned that Jamaica Bay is a harbinger for the future of other marsh systems in the area; there are some who have identified a trend towards increasing marsh impacts with greater proximity to New York City (see the NYSDEC web site, www.dec.state.ny.us/website/dfwmr/marine/twloss.html). However, it is true that other NYSDEC studies have determined substantial marsh losses in areas on Long Island other than in Jamaica Bay.

Several comments related to the nature of vegetation found in a salt marsh. One indicated that a *Spartina* monoculture exists in the low marsh. The County notes that this is true, that tall form *Spartina alterniflora* generally creates a monoculture across the regularly flooded marsh. This was discussed in the DGEIS (pp. 5601-506). The DGEIS (p. 506) also points out that in a New

England-style salt marsh, which is generally the form allocated to Suffolk County, *Spartina patens* tends to dominate in the high marsh, although not in as complete a monoculture as *S. alterniflora* is found in the low marsh. It was also suggested that disturbing the marsh may promote *Phragmites* expansion. A summary of the Literature Search (Book 9 Part 3 [Cashin Associates, 2004b]) findings on this subject was presented on pp. 508-510 of the DGEIS. Disturbance seems to be associated with *Phragmites* expansion, but other factors may be more important. Some of the jurisdictions using OMWM, especially when salinity can be increased across the high marsh, have found that marsh management leads to decreases in *Phragmites* extent (see pp. 533-544). As discussed below (section 4.6.5), that has been an initial observation at the Wertheim demonstration site.

It was noted that blue crabs share habitat with mosquitoes. This is partially true. Blue crabs are relatively ubiquitous across shallow estuarine environments. They were noted as using the marsh surface along with grass shrimp and mummichogs (p. 518 of the DGEIS) and to be users of creeks and ditches along with green crabs, shore shrimp and sand shrimp, among the larger invertebrates (see p. 520 of the DGEIS). Unlike mosquitoes, crabs do not breed on the surface of the marsh; they are there to forage, similar to mummichogs and grass shrimp. Therefore, their use of the habitat is somewhat different than the mosquitoes' use of the marsh.

NYSDEC noted that Matthew Draud of CW Post (LIU) is a good source of information regarding diamond back terrapins. The DGEIS discussed diamondback terrapins on pp. 521-522, and a fuller discussion was presented in the Literature Search, Book 9 Part 3 [Cashin Associates, 2004b], NYSDEC also questioned why McKay Lake was classified as a coastal plain pond. The DGEIS was following the identifications offered by the Natural Heritage Program [see MacDonald and Edinger, 2000].

Finally, NYSDEC noted that good functioning marshes may produce mosquitoes. The County remains perplexed by the NYSDEC determination of "good functioning" marshes or marshes that "function well." This is clearly not a reference to the Natural Heritage classification scheme for wetlands (to be made using reference wetlands) (MacDonald and Edinger, 2000). County program managers are finding more correlations between poor water quality in and around marshes and troublesome, persistent mosquito breeding. This concurs with the general finding that the presence of killifish throughout a marsh is counterindicative for the presence of mosquito larvae. This observation was also made by Smith in 1904, and has become something of a truism in OMWM reports and submittals. The County agrees that natural marshes (ones not anthropogenically manipulated) most likely also can breed copious amounts of mosquitoes, although studies on this subject were not found (see the discussion in Section 4.1.12, above). However, it is not clear that all "natural" marshes are, ipso facto, "good functioning" marshes. It may be that having interior marsh water quality of high enough quality to support killifish is not a necessary component of what is meant by good functioning, for instance, or that certain elements of the NYSDEC functions list can be readily identified as being acceptable through observation. The County reiterates its stance that improving important functionalities of a marsh, whether it is functioning well or not in its base state, may be an acceptable reason to consider conducting marsh management, if the risk determination regarding the potential for negative impacts is favorable.

(4) Marsh management statements of fact (B-2, E-13, G-3, G-14, G-15, I-5, I-11, L-21, L-26, O-3, O-8, O-9, O-10, O-17, AG-87, AG-150, AG-165, AG-169, AK-15, AM-3, AM-4, AN-2, AP-5, AP-6, AP-7, AP-8, AR-3, AR-5, AR-8, AR-10, BC-4, BC-5, BI-12)

Many of the comments that were received stated positions or facts regarding marsh management techniques. The County has reviewed these statements, and found that nearly all are at least somewhat accurate. However, in many cases the validity of the position is only partial, or other qualifiers need to be added to fully appreciate the facts involved.

Impacts from ditching were discussed in many comments. It was noted that ditches change marsh hydrology and promote the draining of pools and panes. The Literature Search (Book 9 Part 3 [Cashin Associates, 2004b]) and the DGEIS (pp.489-496) looked at this and other issues associated with ditching, and came to the conclusion that ditch effects appear to be marsh specific, although it is difficult to determine the impact of ditching in a general sense. Adamowicz and Roman (2005) determined the number of ponds and area of open waters in unditched New England marshes, and found that amount to be greater than found in ditched marshes. It is clear, from the Adamowicz and Roman results and those of Lathrop et al. (2000)

in New Jersey that Long Island marshes tend to have a lot fewer ponds than marshes in these other settings, and that the marsh has a lower percentage of open water (thus a higher percentage of vegetated marsh). It was noted that the re-introduction of tidal flows to marshes increases the amount of pannes that form on the marsh, and that panne formation may lead to pond formation eventually. Panne formation does decrease the area of vegetated marsh, however. It was further suggested that ditching alters habitat types (the Literature Search and DGEIS discussion note this is possible, but it does not always occur whenever ditches were installed). Some marsh managers have claimed that ditching tends to result in a very lush monoculture of *Spartina patens* across the high marsh. NYSDEC disputes this assertion, which was not based on any evidence other than repeated comments by long-time observers. High marsh is probably never a true monoculture, although generally *S. patens* is considered to be the dominant salt marsh plant in the northeast US (because high marsh areas generally exceed low marsh, and *S. patens* is the dominant high marsh plant in the northeast US [Nixon, 1982]), so the NYSDEC comment has validity.

The water management of the kind proposed in the Long-Term Plan was said to increase salt water in the high marsh. Many of the BMPs may increase either the salinity of water found in the high marsh, or increase the amount of standing water in the high marsh, or increase the amount of inundation or number of times the high marsh is inundated each month. But a project may do none of these things, to any measurable degree. It depends on the scope of the project. Small projects are likely not to have major changes on a marsh's hydrology. Major projects are generally intended to do so. Increasing salinity or salt water residence time can decrease *Phragmites* expansion, even reducing the extent of *Phragmites*. Standing water on a marsh has been linked to negative changes in marsh health but the intent of water management is not to flood the marsh with low levels of standing water for extensive periods of time, as reported in the Literature Search, Book 9, Part 4 (Cashin Associates, 2006a) (see Kearney et al., 1999) .

Ponds and channels were said to change marsh hydrology. Since they are indisputably elements of the marsh hydrology, adding ponds or channels necessarily changes the existing hydrology. However, whether the changes significantly affect the way that the marsh hydrology interacts with the marsh ecology or other environmental factors depends on the scope of the project. As was said above, small projects are likely not to have major changes on a marsh's hydrology, but major projects are generally intended to do so. Sufficiently small impacts that do not result in determinable changes in the functioning of the marsh, might in fact be characterized as not having changed the hydrology of the marsh. Connecticut has been restoring historical ponds identified on old aerials, which presumably also restores some degree of the former hydrology of the marsh.

Comments were submitted noting that marsh management will destroy or damage marsh peat formed over centuries or thousands of years, causing the loss of the marsh. A maximum depth of excavation for BMPs was to be on the order of three feet. At one to two mm deposition rates per year, this does suggest that the peat could be close to a thousand years old. The areas affected by the proposed work are generally small in comparison to the total area of the marsh. At the Wertheim National Wildlife Refuge Demonstration Project (classified as a major project), the total area excavated in each phase was less than 10 percent of the vegetated marsh. Topsoil tends to accumulate at slower rates than marsh peat; therefore, all suburban housing developments that remove a foot of topsoil also destroy materials that are hundreds to thousands of years old. This is generally not thought to be a grave impact, as the soils are replaced. For the marsh management projects, however, the intent is to have a resulting marsh with as much, if not more, ecological functions as it did when the project was begun, and so the sediments are made use of and not destroyed.

It was also noted that the area of excavation does not equal the areas associated with filled ditches. This is especially true because ditch filling is not intended to be part of most marsh management projects, while some amount of excavation is likely to be part of nearly every project. The disparity may result in slight decreases in the overall vegetated area of marsh. The State of Delaware notes that this is a habitat conversion, not loss, although NYSDEC does not recognize such “conversions” as generally acceptable to the letter or spirit of its regulations. A series of comments amplified on this general topic, noting that ponds, “dredging,” and water management generally all tend to reduce the amount of vegetated marsh. Generally, these statements are accurate. However, the scope of the project under consideration needs to be taken into account. Hypothetically, in a 10 acre marsh, it might be that the County might propose to dig two small ponds (say, 600 sq. ft., or 20 ft. by 30 ft. in size) with a 200 foot channel connecting them, and another 100 foot channel connecting the ponds to a tidal channel. With a nominal 3 foot width to the channels, the total area of excavation would sum to approximately 2,000 square feet. Suppose all the material were to be sidecast onto the surface of the marsh and so be "lost." Ten acres of marsh contain more than 400,000 square feet, so the project would decrease the vegetated marsh area by less than 0.5 percent. Larger projects would have proportionately larger impacts, of course, but some recognition of the relative impact of these projects must be understood.

Ditch plugs can theoretically increase the vegetated area of the marsh. Most plugs are not very substantial – the model for Long Island has typically measured less than 20 square feet. The BMP for ditch plugging (BMP 12) called for more substantial plugs to be created (on the order of 75 linear feet, or perhaps 200 square feet). Even if 25 plugs were to be installed across a marsh that would only account for around a tenth of an acre of marsh increase. The plugs may also cause an increase in open water, although theoretically they should not (plugs are only to be installed to marsh level, meaning that water retained behind the plug should be contained within the ditches). Careful measurements of the overall vegetation balance following a plug installation on Long Island has not been made, so far as the County is aware. Ditch plugging generally supports vegetation growth (not necessarily *S. alterniflora*, as noted in the comment, but rather low marsh vegetation if the project was in the low marsh, and high marsh vegetation if the project was in the high marsh). Because plugs retain water up on the marsh, they do tend to raise marsh water tables – although the impact of this is probably not widespread in all cases, just as ditching did not always radically change marsh hydrology in the first place.

Related to this topic is the comment that habitat will be destroyed with these projects. Delaware prefers to call the change habitat conversion; the County is not intending to lose ecological functions through these actions, but to augment them. The County expects there will be more bird use of the marsh, and greater fish production, following careful and appropriate water management projects. In fact, as the State of Delaware pointed out, well-planned projects also increase marsh aesthetics by making a rectilinear marsh (when grid ditched) less angular, and by inserting open water (something most people find pleasing).

A comment noted that deep ponds do not promote wading bird use. This is true. Deep areas are required for the ponds to allow killifish to escape predation pressures. However, the design for the ponds (BMPs 9 and 13) note that the bottom shape should be spoon shaped. This provides ample area for long-legged waders to utilize much of the ponds for forage. In New Jersey, ponds are constructed with only a one or two yard wide lip of shallow area, and drop off more steeply to deeper waters. Wading birds such as egrets were seen in these kinds of ponds during site visits in 2004 and 2005. Wading bird use of recently constructed ponds at Wertheim has been noted as well (see comment M-17). A recommendation from a study of egret foraging habits recommended that, if egret use of the marsh was a concern, that deep ditches and channels be modified so as to provide the shallower habitats these birds prefer (Trocki and Paton, 2006).

Ponds were also said to fragment marsh habitat ("break up the marsh"). Ponds are intended to be another kind of habitat available to biota on the marsh. The kinds of biota that use marsh ponds are generally considered to be indigenous to a marsh. Biota that needs broad expanses of uninterrupted high marsh already must adjust to the presence of ditches. There has been some work that suggests some birds, such as seaside and sharptailed sparrows, do not do as well in ditched marshes as in unditched marshes. There may be a trade-off, therefore, in that increasing water fowl, wading bird, and marsh fish populations results in declines in some other marsh bird species, and in mosquitoes. Land managers face such choices with trepidation, as easy solutions to the notion of trade-offs are difficult to find. Migratory water fowl, because they are game species, are sometimes favored over other guilds if choices need to be made. Definitive work showing declines in song birds and other non-water oriented marsh species following water management projects were not uncovered for this project, although the notion has some intuitive sense. There are many other observations of shore bird and water bird increases following water management work (especially pond installation), although not many are based on quantitative or objective data collection efforts.

(5) Specific effects from marsh management (B-3, B-6, B-7, B-9, E-14, E-20, E-21, E-26, G-5, I-6, I-8, L-11, L-12, L-13, L-14, L-15, L-18, L-19, L-20, L-23, L-24, P-69, AG-35, AG-99, AG-148, AG-154, AG-155, AG-156, AG-157, AG-160, AG-161, AG-164, AG-170, AG-171, AI-23, AI-24, AI-25, AK-16, AK-23, AK-28, AM-5, AM-7, AN-3, AN-6, AN-7, AN-9, AP-4, AP-9, AQ-4, AQ-5, AR-6, BD-15, BD-16, BD-18, BI-13, BI-14, BI-15, BI-16)

Many of the facts regarding salt marshes that were presented in the comments in #4 Marsh Management Statements of Facts, above were used to draw conclusions regarding the impacts of the Wetlands Management Plan.

Increasing salt water in the high marsh was believed to have negative impacts. Salt marshes, generally, are settings where salt water is not an impediment to biota. Indeed, because of evaporation, in many areas the salinity of the marsh exceeds that of the surrounding water. In some marshes, fresh and salt water mix, creating lower salinity conditions, however. One of the primary reasons offered by land managers for increasing salinity in a marsh is a potential control on *Phragmites*. *Phragmites* is an invasive plant that can rapidly expand across a marsh, sometimes expanding at a rate of acres per year. *Phragmites* propagates by rhizomes (underground runners) or seeds. Its seeds will not germinate above salinities of approximately 18 ppt. Rhizomal expansion has been shown to occur at higher salinities; nonetheless, although the reason for the occurrence is not as well-determined, higher salinities have been shown to stunt *Phragmites* growth, and also to prevent revegetation/reemergence from occurring if the plants are cut back or otherwise removed. Pesticides and controlled burns are other means that are commonly used to control *Phragmites* expansion. Burning is often ineffective for long-term control, unless repeated at short intervals along with herbicide use. Roundup is the most often used herbicide and can have non-target impacts. It may also have poor long-term effectiveness, unless the conditions that allowed for expansion are changed. Something in the environmental setting apparently gives *Phragmites* a competitive advantage over naturally occurring marsh vegetation (see the DGEIS, pp. 508-510).

Increasing salinities across a marsh could have negative impacts on brackish marsh plant communities. A more robust tidal circulation, which is generally the means by which salinity is increased, is generally thought of as being advantageous to the health of "salt" marshes (see Roman et al., 1984, and Roman et al., 2002, for instance). Because most Suffolk County salt marshes do not have a permanent upland fresh water input, brackish marsh fringes are not as common here as they are in some other areas (where stream and river settings predominate). However, the presence of a brackish marsh fringe at a Suffolk County site should be an element in considering the project design for the site. The intensive review process should allow for a consensus to be developed regarding potential tradeoffs in considering project elements.

Comments were submitted that argued that marsh alteration will affect sea level rise mitigation. The comments submitted by Delaware directly contradict such claims. The analysis presented in #4 above tended to find that marshes had a relatively small contribution to sea level rise. It was noted that installing large ponds might be especially troublesome in terms of decreasing the marsh's ability to absorb storm energy. This may indeed be a problem in particular settings. As noted in the Literature Search (Book 9 Part 2), much of the mitigation of storm impacts that occurs on a marsh has to do with friction associated with vegetation. A large pond that was poorly located (close to the marsh edge facing a large fetch over which storm waves might be generated, for instance) might have some effects on the ability of the marsh to reduce the power of storm waves. This should be considered as a project constraint. However, it is not reasonable to assert that every inch of the marsh is critical to providing this service, as stated in several of the comments.

A comment was offered that care in conducting these projects needs to be made, especially with regard to spoils management. In many instances, spoils may be sidecast across the marsh (or backbladed to fill hummocky terrain). The experience of the State of Delaware has been that it is possible to spread too much spoil, and excessively raise the marsh surface so as to cause negative impacts to the vegetation (and changing flooding frequencies). The County intends to limit spoil deposition to one to two inches at any one area (see BMP 8).

Comments were made that marsh management (especially installing ponds and channels) might have a negative ecological effect, by changing the marsh hydrology. The comments from Delaware echoed this comment, noting that open systems can dewater a marsh. The County also noted this in its assessment of the potential impacts of marsh management (see the DGEIS, throughout pp. 883-942). The County believes that it is possible to select particular BMPs and implement them so as to minimize the potential for unintended changes in marsh hydrology. This is not always simply accomplished, and the County expects that its oversight process, and through very close analyses of proposed projects, will result in optimized projects where risks have been mitigated as much as is practicable.

A number of comments were concerned with how projects might affect species diversity or composition. It was stated that making physical changes to the marsh will threaten the existing diversity or species composition. Changes in species composition may occur, indeed. However, the County does not intend to decrease biodiversity through these projects – quite the contrary. Susan Antenen (TNC), chair of the Wetlands Subcommittee, was the author of the goal that eventually became Goal #2 of the Wetlands Management Plan. She noted that a mosaic of diverse habitats generally increases overall biodiversity. This has also been a consistent principle espoused by the Long Island Wetlands Initiative. This concept supports the ecological determination that adding surface waters to somewhat surface water deficient Suffolk County marshes is likely to result in more species diversity on those marshes. Not every marsh needs to have every habitat since it is recognized that some species need uninterrupted swaths of particular habitat kinds in order to thrive. But generally, increasing habitat types across the totality of the 17,000 acres of salt marshes in Suffolk County should result in a more robust biodiversity. It is the case that open water may favor water birds over marsh birds, as noted in several comments. However, the Wetlands Management Plan does not propose to change every marsh in Suffolk County to one particular habitat model. Indeed, the Wetlands Management Plan focuses on only one 4,000 acre subset of County marshes for priority project consideration (and consideration of a marsh does not require that the project be implemented). Surface water increases at most marsh management projects in Delaware resulted in open water covering 3 to 5 percent of the marshes. This did lead to greater seabird, wading bird, and water fowl use of the marshes.

Quite a number of comments were received regarding potential impacts or effects on some specific biota (such as fish and invertebrates). NYSDEC was particularly vocal regarding perceived statements or assertions in the DGEIS, or the lack thereof.

Comments from both the Connecticut and Delaware natural resource agencies noted that marsh management either created good habitat for invertebrates and fish, or created habitat that was used by invertebrates and fish. Questions were raised regarding whether ditch plugs created optimal invertebrate or fish habitats, and whether reversion might also foster fish populations. Because reversion eliminates habitat, by and large, by allowing ditches to fill, it is not likely to increase fish populations. Similarly, the County believes that invertebrates and fish are generally favored when water quality is best, with temperatures lower and DO at optimal levels. This is not clearly the case, however, as predation by birds or foraging nekton may be increased, too, by particular project elements. Since ditch plugs are intended to limit some tidal circulation, it is likely that a project choice for ditch plugs would result in lower water quality than might be achieved with an open system design. This may mean that the created habitat is not as good with ditch plugs as might have otherwise been achieved. On the other hand, ditch plugs will ensure that the habitat does not drain on each tidal cycle. This may, therefore, mean that more overall habitat has been created in terms of volumes available for biota. If tidal exchanges with the plugs are vigorous enough, it is possible that a lot of acceptable habitat might be created through the use of ditch plugs. The tradeoffs involved do not appear to have been studied much, however. Nonetheless, the assertion that ditch plugs produce suboptimal habitat for invertebrates and fish may not hold under all conditions.

The discussion that was presented in the DGEIS focused on killifish for several reasons. The presence of killifish has been repeatedly shown to correlate with the absence of mosquito larvae (Smith, 1904; Taylor, 1938; Shisler, 1978; Dale and Hulsman, 1990; Wolfe, 1996), although most gut analyses admittedly do not show many mosquitoes in the killifish (Harrington and Harrington, 1961; McMahon et al., 2006). Enhancing mosquito control and discussing impacts associated with that objective is a clear and obvious need for the environmental analysis, and so a focus on killifish seems to be reasonable. Additionally, much of the focus of the study is on nekton associated with the marsh surface and very small channels running up into the marsh. Use of the marsh surface as a forage area appears to be limited to shrimp, blue crabs, and killifish (Yozzo and Smith, 1998). Most commercially important and non-resident fish appear to limit their use of the marsh to the fringe areas and deeper tidal creeks (Teal and Howes, 2000). Where water quality in the ditches and small creeks is relatively poor due to little tidal circulation, the dominant fish is *Fundulus heteroclitus* (over 90 percent of sampled fish). If water quality is improved, these habitats will support many other species, although only sheepshead minnows and alewives become numerous enough to contest the dominance of killifish (Able et al., 2004).

The notion that the County might be creating some kind of "attractive nuisance" for fish by creating apparently good habitat that may become less inviting due to summertime rigors was raised. Fish that investigate the fringe of the salt marsh either have some mechanisms to determine what kinds of habitat may be unsuitable, or run the risk of finding themselves in such unsuitable habitats whether or not water management has been undertaken. USEPA estimates that over one-quarter of all estuarine waters from Cape Cod to Cape Hatteras becomes hypoxic over the course of a summer at one time or another (USEPA, 2000). Fish that use this environment are subject to these kinds of stresses, generally, and, if they are to survive, must develop coping mechanisms. Most observers tend to identify avoidance of narrow, shallow waterways as the primary means of avoiding peril. Fish that are prey to larger foragers use the less favored creeks and ditches as refugia (Deegan et al., 2000). The process of natural selection for these species has resulted in behaviors that trade off decreased predation risks for increased risks of habitat deterioration. Tolerance for poor conditions was also developed, although killifish have been exceptionally favored here. Mass fish kills in water management structures are not raised in discussions of them; it may be that scavenging of any dieoffs limits the opportunities for observations, however. Still, most installed ponds and ditches appear to consistently support killifish. The nickname for small ponds is "champagne pools." This partly comes from the overall shape of the ponds, with a narrow connector leading to a bulbous waterway; but it also springs from the constant disturbance of the surface of the water by resident fish.

Unlike other introduced predators, it does not seem likely that killifish will require food supply augmentation. Killifish are omnivores, and will consume whatever is present. Isotope and gut analyses tend to show that the killifish feed several levels above primary production. This may mean that they are consuming invertebrate grazers (or their predators) from the marsh surface, or that they are consuming degraded organic matter from the decomposition pathway (Currin et al., 2003; McMahon et al., 2006). The DGEIS (p. 519) noted how it has been suggested that accessing the relatively infrequently flooded marsh surface may offer opportunities for uncompetitive food collection or accumulated materials and organisms. This provides a rationale for risk taking by killifish in very shallow waters when the marsh surface floods.

The provision of areas in ponds or plugged ditches of deeper areas have been shown to be successful in providing fish refuges from predation by wading birds. Similarly, the isolation of the ponds or use of ditch plugs are both successful in keeping predators from the killifish populations, generally. However, one of the claims of the DGEIS is that the expansion of foraging areas by killifish will not only control mosquitoes, but should lead to an increase in these fish populations. Increases in marsh resident fish populations may result in enhancement of trophic transfer from the marshes to the estuaries, primarily by predation by transient fish, but also potentially though wading bird predation (which is, admittedly, a much weaker link). This was discussed in general in the DGEIS (pp. 565-568). Valiela et al. (2004) further suggests that given diminishment of estuarine nursery resources, salt marshes may require enhancement to try to replace some of the lost functionalities. Therefore, the County does not believe that there is a zero-sum fish production situation in the salt marshes, where changes may lead to diminished conditions for those individual fish that frequent the marsh.

An issue that received several comments was whether marsh management projects would affect the filtering and pollutant absorption functions of the marsh. Two common threads were offered:

- Decreasing marsh surface area must decrease absorption processes
- Increasing water circulation with the estuary will decrease absorption by decreasing water retention time in the marsh

Both seem reasonable; however, the County believes that the potential for impact is overstated because of the way these processes occur on the marsh. For instance, marsh management projects, even the most extensive ones, usually do not change the amount of vegetated marsh substantially (most settings have less than 1 or 2 percent conversion of vegetation to open water for the more extensive projects, although comments from Delaware suggested a maximum conversion of up to 5 percent is possible). Therefore, unless the projects preferentially remove vegetated areas where absorption is occurring more efficiently, the net impact on marsh absorption properties (due to surface effects) is likely to be minimal. Similarly, most of the absorption of pollutants and nutrients is thought to occur through the surface of the marsh. This means it tends to occur when tides overwash the marsh. Construction of channels and other waterways may convey water out of the marsh somewhat more efficiently, and therefore reduce some of the retention time. It is unclear, according to the Literature Search (Book 9 Part 3 [Cashin Associates, 2004b]) whether the construction of ditches served to drain the marsh more efficiently. However, evidence was also presented that new waterways in a marsh may promote tidal flows further into the marsh. This suggests that although the waterways may, in some settings, decrease retention time, they may also increase the area of the marsh that is regularly flooded. Increasing the area of the marsh that is flooded should support greater absorption of contaminants.

Site specific modeling may help to resolve these issues for specific marshes (Robert Wilson of MSRC, Stony Brook University, has generated a "wetting-drying" model for the South Shore Estuary that, theoretically, could be expanded to address individual marshes; it should be noted that this model has not be validated or verified in settings where such small channels need to be accounted for), in terms of determining if large changes in the amount of water "treated" by the marsh might result from an individual project.

Related comments focused on whether ponds and channels would promote export of nutrients and contaminants, and whether ditch plugs might therefore be a better choice for this issue. Furthermore, the notion that grid-ditching reduced the ability of marshes to conduct contaminant filtration was again raised. A Southampton College Estuarine Research Program paper (Reisenauer, 2006) was cited as a source for a contention that ditched marshes provided approximately one-quarter of the nitrogen load to Flanders Bay. The paper was thought to support the notion that some forms of marsh management might also reduce contaminant absorption. The County has strong reservations regarding the use of that paper (see below, #7). Note that the DGEIS (pp. 495-496) summarized a longer discussion found in the Literature Search (Book 9 Part 3 [Cashin Associates, 2004b]) that did not find much support for this point of view. In addition, some limited sampling by the Town of East Hampton (2001) found that fecal coliform counts and nitrogen compound concentrations were not different from one side of a ditch plug to the other; these results have some reasonableness, in that ditch plugs are not meant to be impervious, and that the greater source of these contaminants is washoff from the marsh surface. Discharges from the marsh water table, which may be enhanced with the addition of more waterways, may contain more reduced nitrogen compounds because anoxic biological processes may result in nitrate-nitrogen being reduced to ammonia (Valiela and Teal, 1979). Overarching theoretical considerations regarding marsh imports or exports of nutrients and other material to the estuary have tended to focus on the "maturity" of the marsh, rather than the specific hydrology of the marsh waterways (although the density of the stream network in the marsh is a measure of its maturity) (see Odum, 1979, as modified by Odum, 2000). This suggests that the controls of this process will not be greatly affected by water management work.

Several comments were received regarding the potential for the machinery used in these projects to damage the marshes. Marshes subjected to extensive machine modification, even with the low ground pressure tracking used on the machinery, often are unsightly immediately following the work. Some jurisdictions are more forgiving regarding this; in New Jersey, for instance, it is not uncommon for barren areas to persist for as long as three to four years post construction. However, even at these sites, revegetation is expected to be complete within five years. Suffolk County does not intend to have these kinds of impacts on its marshes. The County is generally not as aggressive in its project implementation as New Jersey is, and will keep to wintertime construction windows (impacts are limited when the peat is frozen) and will avoid spreading sediments very thickly. Nearly all of the Wertheim project site had revegetated in the second post-construction growing season. The County also intends to use construction monitors to ensure that plans are being closely followed, and to monitor for excessive wear on the marsh surface to further mitigate the potential for impacts. These lessons were reported by Delaware in its comments to the DGEIS.

(6) Efficacy concerns (E-15, AK-17, AO-12, BC-3)

Three of these four comments addressed whether ponds and creek construction could control mosquito populations. Testimony from mosquito managers in Connecticut and Delaware, submitted as part of the comment process, affirmed the effectiveness of marsh management as source reduction. The DGEIS (pp. 553-555) also presented examples of projects that succeeded in reducing mosquito populations.

Two studies are sometimes used as showcases for failures of water management. One is the Seatuck demonstration project. A post project survey there found that mosquito breeding continued to cause problems (Guirgis, undated). The official project report only found some very patchy mosquito breeding post-project (Lent et al., 1990), although some other observers suggest that was a somewhat rosy view of the actual conditions. Others have noted that other projects conducted at or about the same time as the ditch plugging at Seatuck may have undone any potential positive impacts from that project, and that the general alterations in the environment at Seatuck from effects such as roads, berms, and dredging may not have been mitigated by the marsh management project (Cashin Associates, 2006b). NYSDEC also cites failures to maintain the ditch plugs as a potential reason for failure by the project to achieve its intended ends. Secondly, the three-year, multi-site USGS-USFWS OMWM impact study in USFWS Region 5 (see James-Pirri et al., 2001; James-Pirri et al., 2002; James-Pirri et al., 2003; James-Pirri et al., 2004) apparently found few to little signs of differences in mosquito breeding between control and treatment sites. These results may stem from a non-standard mosquito surveillance protocol used in the study. James-Pirri et al. (2001) described how mosquito breeding was to be tested for across transects using standard station location techniques (based on randomized selection along the transects). But mosquito breeding tends to be tremendously patchy. Professional mosquito control agencies identify likely breeding locations and sample those for larvae. Since almost all parts of a marsh do not breed mosquitoes, using a randomized breeding testing approach is very likely to have the same result (few to no detected larvae) at all stations, whether in the treated or untreated marshes. The study design was also flawed in that nearly all of the ditch plugs were installed before the sampling program began, so that before-after data for the treatment sites were unavailable at nearly every site.

The fourth comment claimed that the 600 miles of mosquito ditches in County wetlands are ineffective at mosquito control. That is not quite accurate. Many of the ditched sites do not have mosquito breeding problems (albeit, most do not have records indicating whether or not mosquito breeding was a problem prior to ditching). Many of the ditched marshes have no mosquito breeding problems when the ditches are maintained, according to anecdotal reports from SCVC. This was also reported to be the case in the mid-1930s when the ditches were first installed (Taylor, 1938). However, the County believes that it can manage mosquitoes with fewer environmental impacts, and more ecological benefits, by using more progressive management techniques than ditch maintenance.

(7) No or insufficient evidence presented to support claims (G-9, J-1, J-2, N-3, N-4, N-24, P-63, P-64, P-65, P-66, P-67, P-68, P-85, P-86, P-91, P-97, S-52, AD-6, AD-7, AD-8, AD-10, AD-11, AD-12, AD-13, AD-14, AD-15, AD-21, AD-22, AD-23, AE-9, AE-10, AE-11, AG-3, AG-78, AG-79, AG-102, AG-119, AG-146, AG-147, AG-168, AI-15, AO-7, AO-9, AO-10, BC-2, BD-11, BD-12, BD-13, BD-14, BI-3, BI-4, BI-5, BI-6)

The County collected as much information as is generally available regarding the effectiveness of marsh management, its potential impacts, and its potential benefits. Many comments were received regarding the sufficiency of the evidence. It is true that salt marshes tend to be stable systems. This being the case, longer term studies would be useful to determine if impacts eventually occur following marsh management projects. Environmental monitoring is also expensive. This is especially true when an ecosystem is being considered, so that a variety of different biological, chemical, and physical attributes should be measured. As discussed earlier in Section 4.1.6, government agencies may believe they are exempt from requirements to closely assess their own actions, and also have frequently been subjected to budget restrictions. Therefore, due to internal and external structural weaknesses, many marsh management projects have not received quantitative, objective evaluations. Rather, they have been evaluated on more qualitative and subjective means, very often based on anecdotal and observational reports from in-house marsh experts. This does not mean these reports are inaccurate; in fact, the County believes that reports regarding the long-term success of marsh management are made in good faith and correctly report conditions as they have been perceived. However, such tests do not meet more rigorous standards as would be associated with university research studies. However, the scope of the monitoring required to assess marsh management exceeds most of the available resources at many well-regarded institutions where salt marshes are studied, Furthermore, few academic projects extend for the ten or more years that NYSDEC (for example) has been suggesting is needed to assess marsh management.

These kinds of projects exceed available resources for most agencies and academic institutions. There are some areas where long-term research is accomplished, such as the National Environmental Research Reserves or at places such as Sapelo Island. Even at such sites, it is rare to find extended monitoring over such a wide range of parameters. Therefore, it is not surprising that the adequacy of the information available to determine the impacts of the proposed Wetlands Management Plan is in question.

However, Suffolk County has made difficult decisions based on even less information. Just because the available information does not meet academic standards does not mean it is not sufficient to make a decision. The long-term anecdotal information presented by responsible government agencies should be deemed as acceptable by similar government agencies. It is generally impossible to hide that a major program is not meeting its stated goals, given the transparency associated with most modern government agencies. For agencies that have environmental responsibilities, there is no long-term benefit in continuing a program that wreaks ecological havoc.

Governmental agencies have tended to evaluate marsh management as follows:

- Local and state mosquito control agencies uniformly support it in terms of mosquito control, and find it to be cost-effective and environmentally sound, resulting in reductions of pesticide use.

- Local and state natural resource agencies find implementing marsh management for mosquito control requires some decisions regarding environmental trade-offs, but that it is effective in terms of mosquito control, and provides benefits in terms of an overall ecological evaluation, and can be part of a comprehensive marsh management program (the State of Maryland appears to be an exception to this more general rule).

- USFWS appears to be cautiously in favor of marsh management, especially in light of the alternatives (more mosquitoes or more pesticide use), but is struggling with recent policy changes that appear to require wildlife refuges to be more like wildlife preserves (more resource protection with less human exploitation of the resources), which means that alterations to the natural environment are less favorably reviewed than they formerly were.

- The National Park Service still places its management emphasis on natural processes, rather than human determined ones, and so manipulations of salt marshes are not believed to be in its best interests.

The County believes that deference should be made to the findings of these groups, considering the public stewardship responsibility associated with their missions and public obligations. Differences in the overall missions and responsibilities of the agencies do affect the way they perceive marsh management; nonetheless, most of these agencies would agree there is sufficient evidence to determine whether or not the techniques considered here meet whatever goals and objectives that need to be considered.

The workplan for the project and Scoping for the DGEIS made it clear that gray literature, conference reports, and similar kinds of information would be used as important means of determining the potential for impacts. Nonetheless, several comments were made regarding a lack of long-term studies or peer-reviewed work relating to ecological improvements. It should be understood that the Journal of the American Mosquito Control Association, and its predecessor, Mosquito News, is a peer-reviewed journal. It is not accurate to assert that peer reviewed articles tended to be ambiguous regarding marsh management effects. Most of the "ambiguous" information presented in the DGEIS was developed as the County tried to infer the potential for impacts from related studies. This was criticized as blurring the discussion by considering activities other than those immediately under review. Personal inspections of project sites, assumed to be honestly reported, are very important adjuncts to written reports, as are observations by reputable government biologists. These kinds of observations were also criticized. Then, the same commenter that complained about the lack of references stated that "scientists believe" that marsh management is only praised by mosquito control officials, has not been sufficiently studied, and has caused considerable damage to marshes. The letter stating these opinions offered no evidence to support these statements beyond the signatures of the three involved people.

The County does not consider marsh management to be a panacea. Some BMPs are appropriate in particular settings; others are not appropriate at those sites. There are sites where it seems to be the case that no BMP (except reversion) is appropriate. And there are other reasons to conduct marsh management besides mosquito control. Nonetheless, the County believes it has established a process where sufficiently justified actions can be considered for implementation, and that enough information exists to determine whether a proposed project should be considered for implementation at a particular site, and if it is likely that the proposed project will succeed or fail. Therefore, the County tends to disagree with the conclusions of the following sets of comments, which generally suggest that not enough information is available to determine impacts, or that the County should have considered other information (which would have resulted in different decisions being reached).

It was suggested that the tabular presentation of information on water management (Tables ES 1 – 4, 2-18 – 2-21) was a good example of balancing benefits and potential impacts, but that this discussion was lacking in the impact assessment itself. The County concedes that much of the impact assessment was drawn on the potential for successful implementations – and suggests that, from the comments received criticizing the selected BMPs, the effort could have been greater to be more persuasive. However, the County also made sure that each BMP discussion included at least one example of when the implementation might not be appropriate. This was intended to create a balance between advocacy of the BMPs, and the County's awareness that the BMPs are not universally good for all marshes for every reason.

A general comment was received that "peer reviewers" and "previous comments" had revealed potential impacts that were not discussed in the DGEIS. The County does not believe that is the case. The County, for instance, used pre-DGEIS release comments to fine-tune its discussion of the potential impacts of the Long-Term Plan. The County was able to convince the CEQ that it had taken such comments under consideration as it re-did the DGEIS from the December 2005 draft to the version accepted by CEQ on May 17, 2006. The "peer reviewers" of the Wetlands Management Plan, presumably Drs. Bertness, Ewanchuck, and Konisky, made no specific comments regarding the substance of the DGEIS, but rather disagreed generally with its conclusions. Therefore the County does not believe this specific comment is accurate.

Comments were made that no information was presented supporting the use of ponds as a wetlands restoration. Material was presented showing that ponds can increase ecological functions on a marsh, such as support for water birds and to increase fish habitat in the marsh. As discussed immediately above (#7), there is evidence that increasing various wetlands functions can lead to healthier estuarine ecosystems. Therefore, it is possible that pond creation in the overt service of mosquito control will serve to augment important ecological services, which is one definition of ecological restoration.

Two comments were received that were somewhat similar, noting that little information was presented on ecological impacts associated with BMP 8 (Backblading) and requesting an expanded discussion of the ecological role of potholes and pannes. The DGEIS did not uncover much information regarding these habitats, which are impacted by the intentional spreading of sediments across the high marsh. Potholes and pannes serve as good habitat for larval mosquitoes, and for other invertebrates, and tend to support algal growth. In-marsh non-vascular plant primary production is receiving more and more attention as an important basis for marsh and, ultimately, estuarine ecosystems (e.g., Kreeger and Newell, 2000). Backblading, per se, does not affect phytoplankton growth except as it encourages the spread of *S. patens* and other vascular plants to cover "bare" spots. The high marsh invertebrate community could be affected by these filling operations. It is unclear if there are any direct trophic links from these environments. There seems to be little direct predation in the potholes, although pannes do tend to support foraging by a variety of shore and marsh birds. It is difficult to determine if larval invertebrates that might develop in the potholes become important prey or predator species on emergence, as the ecology has not been well discussed in the reviewed literature (see the very brief discussion in Nixon, 1982). The best indication of a lack of serious impacts from this BMP is that it has been implemented in many marshes on the East Coast, either through the use of directing ditching machine slurry, or through active backblading. There have been no noted ecological shifts beyond mosquito control noted at these sites. It is possible that some shifts in bird guilds or marsh insects beyond mosquito losses did occur, but that has not been reported to date.

The Department of State commented that it found it difficult to support BMPs 10-15 without presentation of material discussing their effectiveness and ecological risks. NYSDEC noted that information regarding the loss of habitat associated with BMP 14 should be presented. Material discussing the successful implementation of all of these activities was made in Section 5 of the DGEIS, under the history of marsh management in other jurisdictions and in Suffolk County (pp. 533-553), and the following section that discussed the evidence for and against particular benefits and effects (pp. 553-573). Then, the BMPs were discussed in the particular context of Suffolk County settings, an admittedly theoretical discussion, but one that grounded the potential for impact under real conditions relevant to the County (pp. 915-929). The discussion on pp. 926-927, in the context of a hypothetical project at West Gilgo Beach for BMP 14 in particular, discussed the potential for loss of habitat associated with filling ditches, among other potential impacts. For that reason, specified ditch filling would most probably only occur in conjunction with other water management techniques that enhanced tidal circulation and consequently generated appropriate habitat. It was further noted that large-scale projects lack support at this time. The County recognizes that many of its concerned and involved parties do have reservations regarding the proposed Wetlands Management Plan, especially larger scale projects, and so has adopted a "go slow" approach whereby the Wetlands Stewardship Committee will develop amenable approaches to this issue of concern over the next three years.

There was a request for more information in the DGEIS on marsh loss, beyond that presented on pp. 488-489. The DGEIS should have included more of the information available from the Literature Search report (Book 9, Part 4 [Cashin Associates, 2006a]) which is incorporated into this report by reference, and explicitly as Appendix 10.

There was a request to expand the discussion of reference marshes (p. 500), as identified by MacDonald and Edinger (2000). The discussion in the DGEIS was brief, as it is not absolutely clear how the Natural Heritage Program intended the product to be used, especially for salt marshes. For fresh water habitat types, a great number of comparative sites were listed for each kind. Fewer sites were associated with the habitat types for salt marshes, and high quality examples were not available for "high marsh." It seems that staff intended that natural resource professionals could compare the qualities of particular marshes to the reference sites, and determine how deficient the sites in question might be. This then could be used as a guide to drive restoration projects, therefore. However, most of the descriptions of the reference sites were species catalogs, and were non-quantitative and general in nature. It is far from clear exactly how the subjective letter grades for sites were derived, and also not clear if the results would be replicated should others assess the same sites. Because the reporting was far more comprehensive for fresh water sites, the report was much more useful for them, and so it was more widely relied upon in the discussion in the DGEIS from pp. 580-600.

There were some statements made that no studies have been made that show these kinds of activities increase fish populations or enhance fish habitat. In addition, it was stated that no mechanism was presented allowing for enhanced fish habitat following these modifications. Enhancement of fish habitat occurs, the County believes, by expanding opportunities for baitfish such as killifish to access the marsh surface by extending good water quality for fish deeper into the interior of the marsh through various waterways (plugged ditches, channels, ponds). This expands the available forage for these fish. This will allow for greater production of baitfish. Sampling at Wertheim, for instance, has shown that killifish breeding is occurring in the newly dug ponds and channels, as was not the case when there were relatively stagnant ditches in that marsh. A greater mass of baitfish leads to more foraging opportunities for larger fish, and should therefore lead to more fish in the desirable commercial species that feed in the marsh fringes. It is true there are relatively few studies that directly address this conceptual depiction of how marsh management can improve local fisheries; however, Able et al. (2004) is on point, demonstrating that a once depauperate marsh setting could be restored to match a control site in terms of fish presence and speciation following construction of appropriate waterways to increase water quality in a marsh and increase access to the marsh interior.

Quite a number of comments were received recommending use of SCERP reports to understand salt marsh impacts and processes, with one report in particular commonly referred to (Reisenauer, 2006). Cashin Associates and the County have closely reviewed the report. The amount of work accomplished by an undergraduate student is very impressive (note that one comment attributed this report to Dr. Chris Gobler, but he is not listed as an author, nor did he take responsibility for the report when queried by Cashin Associates). However, the reasons that undergraduate research is not generally published in scientific literature or relied on for governmental policies are apparent in this report. A great deal of sample collection and analysis was undertaken; it is assumed that the chemistry was correctly managed, although the author has no credentials as a chemist. Contract and government laboratories are required to take and pass proficiency examinations as part of their certification process. Research laboratories tend not to do so (although the laboratories involved in the Caged Fish pesticide analyses did so, as reported on p. 769 of the DGEIS). Research chemists rely on either institutional or personal reputations, and replicated results by peers or reviews of submitted papers. The work published here was not explicitly supervised by Dr. Gobler, although that is an inference of the publication. The report is also marred by a lack of relevant information that might allow for independent verification of calculations and other determinations. These are, all in all, minor problems, and would not affect the acceptance of the presented conclusions. There are two major errors, however, which prevent use of the study as a means of discussing the impacts of ditched marshes on the estuary.

One, the study intends to report on the flux of material from ditches into the estuary. To this end, samples were taken of water leaving the ditches, and calculations were then made of the contributions of ditches to various compounds of concern in the Peconic Estuary. However, the source of the water leaving the ditches was, predominantly, the tidal inflow from the estuary. Absent measures of cell counts and concentrations of the water entering the ditches, the contribution of the ditches to the flux cannot be determined. Some mention is made that the estuary as a whole tends to have much lower nutrient and coliform concentrations than was measured; however, it may be, as discussed just below, that there are other nearshore or marsh sources for these substances than the ditches themselves. It is far from clear that the proposed prescription, plugging the ditches, would therefore reduce the counts and concentrations of concern. Indeed, as a conceptual fault, it is very clear that the water behind ditch plugs also exchanges with the estuary from time to time. When and how this occurs, and the potential contribution of such exchange to the identified flux, is not included in the analysis.

The other major fault with the paper is the lack of understanding of the context of the issue. Ditches are said to contribute 25 percent of the nitrogen to some portion of the surrounding estuary. However, it is a tenet of marsh ecology, albeit one that has been subjected too much debate that marshes serve as sources of important compounds to the surrounding estuary (see Nixon, 1980, and Childers et al., 2000, for two perspectives on this issue). Teal and Odum in the 1960s referred to carbon, and carbon tends to be the ecological trait that is most often tracked. Valiela has been concerned about nitrogen for several decades, however, and his work suggests that in at least some cases marshes serve as buffers to the system, releasing nutrients when concentrations are low and absorbing them when concentrations are high (see Valiela et al., 2000, for example). His early work suggested that marshes tend to absorb nutrients as macrophytes spout and grow (spring to early summer) and then release them as the plants fruit and grow older. The citation in the Reisenauer report that relates to nitrogen fluxes (Howes and Goehringer, 1994) is not exactly on point; however, that paper does begin its report with a brief discussion of the conceptual issues associated with carbon and nitrogen fluxes from salt marshes. The Howes and Goehringer paper also concludes that although some substantial fluxes of nitrogen were determined to occur as a result of porewater discharges to creeks in salt marshes, these releases were not significant when compared to the overall discharge of nutrients from the marsh. This conclusion appears to be relevant to how the County might like to interpret the Reisenauer data sets, although in the absence of inflow terms or some other measure of fluxes from the marsh itself, such interpretations would merely be informed speculation. It is interesting and relevant that the Reisenauer paper itself did not discuss this conclusion from Howes and Goehringer. Similar to other work released under the SCERP imprint (see just below), this paper instead strained to make conclusions that are unique, and to present findings that may not be adequately supported by the actual work that was undertaken.

The County is somewhat concerned that the same critics of the Caged Fish experiment and other project work should embrace this kind of unreviewed work conducted by a non-professional. The Reisenauer report was said to contradict the ditch run-off experiment conducted as an Early Action project (see the DGEIS, pp. 788-809). However, the intent of the run-off experiment was to determine if ditches preferentially conveyed potential pollutants in excess of unditched marshes, and if changes in land use affected the quality of any water conveyed in the ditches. The Reisenauer report, on the other hand computed the annual nitrogen flux to the Peconic Bay on the basis of data from four ditches sampled three times over a six week period. This may be more ambitious than the experimental results can support.

SCERP also released a report on the effects of pesticides on caged fish (2004), in advance of the research conducted by the County in its Caged Fish experiment. The results of that experiment seemed to show that adulticides caused non-lethal impacts to fish (reduced growth) and that larvicides caused mortality in fish. It is clear from the County's Caged Fish experiment that low DO may have played a role in both of these results; indeed, methoprene, the larvicide in question, has rarely been identified as having lethal impacts on fish, and reduced growth rates had not been previously noted as an effect associated with exposure to pyrethroids. This suggests that these results may be somewhat suspect. Cashin Associates has, on behalf of the County, reviewed several other papers released by SCERP that relate to salt marshes. One report (Vilbas, 2003) found that ditching had extensive impacts on salt marshes by comparing one part of Goose Creek that was ditched to another part that was not. However, land use and the general layout of the marshes in question appear to be very different (the sites for the study were poorly identified, and so Cashin Associates had difficulty determining exactly where the study was conducted; the most reasonable sites for the work have very different land use and marsh morphologies, which probably also affected the reported results). Another report traced run-off impacts through a mosquito ditch network to the Peconic Bay under storm conditions (Patelli, 2003). A key experimental element was the use of clementines, which were reported to have the same specific gravity as estuarine water, and so to float just below the surface of the water as a good tracer of surface flows. Cashin Associates attempted to replicate this, but found clementines may be more dense than estuarine water. Results reported from sampling of an apparent fresh water lens in the marsh using hand-held instrumentation are also difficult to replicate.

Several comments suggested that OMWM (water management generally) was presented as a panacea. The County cannot deny that a more ecologically sensitive approach to source reduction, which holds the promise of reducing pesticide use as well, is very attractive. This is why it is a centerpiece of the Long-Term Plan. However, the County has also clearly and carefully enunciated throughout the impact assessment the potential for these techniques to have considerable impacts on County resources. Water management is a very powerful technique; the power of the technique means that there can be undesirable effects if it is not applied appropriately. The County believes it has stated this often and thoroughly throughout the DGEIS (see pp. 877-943). The review and oversight process established with the Wetlands Stewardship Committee is intended to help ensure that the County's projects will be carefully selected so as to minimize the risks associated with water management.

(8) Other related comments (Y-5, AG-90, AG-91, AG-92, AG-93, AG-94)

A series of comments were received regarding the Primary Study Areas (PSAs). One was why these marshes were selected. As related in the DGEIS (p. 612):

> Tidal and freshwater wetlands were selected from the north and south shores of Suffolk County for study as "Primary Study Areas" (PSAs). These 21 wetlands were chosen because of their exceptional environmental quality or for their value as archetypes for other sites in the County. In addition, they have also been used to illustrate and demonstrate examples of generic impacts associated with some of the proposed management actions under the Long-Term Plan. … Each PSA was also important to the County's vector control program as a known mosquito breeding area, a site managed by the Division of Vector Control, or a control site for the purposes of this project. The Wertheim site is included in this discussion because it was also used as an exemplar for some of the generic impacts discussed in this Environmental Impact Statement.

It was also noted that the discussion of the PSA characteristics would make much more sense if aerials and/or maps of the sites and relevant sampling points had been included in the DGEIS. These were included by reference to the PSA report (Task 7 [CA-CE, 2005a]), where they were attached as a separate Appendix due to the large file size associated with high-quality images. However, the PSA Report Appendix has been attached to this FGEIS as Appendix 11 for the sake of completeness.

Several technical issues were raised with regard to the PSA reports. No DO was included in the report on Captree due to a meter malfunction the day sampling was done. The data tables for Pepperidge Hall are accurate, and the text is incorrect.

Secondly, it was noted that inclusion of data sets and maps/aerials for the Wertheim-Seatuck Retrospective Study (Section 6 of the DGEIS, pp. 772-788) would assist in interpreting the information presented in that portion of the DGEIS. The County agrees; the information was included by reference to the on-line document (Task 12, Wertheim-Seatuck Retrospective Early Action Project [Cashin Associates, 2006b]), but was not attached to the DGEIS because of the large file sizes associated with the photographs of the marsh cores. The appendix to the text of the report has been appended to the FGEIS as Appendix 12 for completeness sake.

4.6.5 Wertheim Demonstration Project

Two very different kinds of comments on the Wertheim National Wildlife Refuge Water Management Demonstration Project ("Wertheim") were submitted in the wake of the DGEIS. One was a description from USFWS, the Wertheim sponsor, of its perspective on the project and its outcomes as of the late spring, 2006. The others were comments critical of what was, by and large, perceived as the County's too rapid reliance on preliminary results as signifiers of larger, grander conclusions regarding water management in Suffolk County. A total of 35 comments were classified here.

It is clear that the County needs to clarify certain events. The County wished to develop at least one and preferably several marsh management demonstration projects as part of the Long-Term Plan development process. It had an existing grant from USEPA through the Peconic Estuary Program, jointly with Ducks Unlimited, to develop a project in Flanders as a continuation of earlier ditch plugging along Goose Creek. The County had also been having discussions with USFWS, as part of the holdover Long Island Wetlands Initiative (see p. 551 of the DGEIS for a brief discussion of Goose Creek and the Wetlands Initiative) regarding USFWS desires to reduce or eliminate larvicide applications at Wertheim National Wildlife Refuge. Discussions among SCVC, USFWS, and Ducks Unlimited were subsumed into the Long-Term Plan, as it became clear that USFWS determinations to reduce larvicide usage allowed for a good opportunity to address marsh management demonstration needs associated with the Long-Term Plan. At that time, it appeared that the County might have three demonstration projects for the Long-Term Plan development: one at Wertheim, one at Goose Creek, and a site to be determined by Cashin Associates.

Grant applications for support for the Wertheim project, conceived as a way to test efficiencies associated with various kinds of ditch plugging in four areas on the east bank of the Carmans River (full plugs, sill plugs, and runnels – a kind of shallow ditching used effectively in Australia – with a control area set aside), were submitted to various State agencies, and the project description was submitted to NYSDEC as a permit application. This was rejected quickly by NYSDEC, as it did not understand why a test of plugging effects over such a large area of marsh should be allowed without further careful project specifications, much pre-project monitoring, and more collaboration between the County, USFWS, and NYSDEC. The response from NYSDEC made it clear that three marsh management projects were clearly impossible given NYSDEC project requirements. Comprehensive monitoring, based on the USGS-USFWS protocols (James-Pirri et al., 2001) but further supplemented to address what were obvious deficiencies in the USGS-USFWS approach, was begun in the late summer, 2003.

Very little progress was made through the winter of 2003 to resolve disagreements between the County and NYSDEC regarding the potential Wertheim project. The scope and extent of monitoring was a major issue, but other sticking points existed. These included definitions of project goals, and NYSDEC insistence on clear definitions of "project success."

The County and its consultant team were continuing to research marsh management as part of the Long-Term Plan development process. Visits to New Jersey to observe OMWM projects there, and discussions with and visits from CDEP officials were watershed events. USFWS hired a Regional salt marsh biologist, Susan Adamowicz, with a background in marsh management. In Spring, 2004, the consultant team, Dr. Adamowicz, and Paul Capotosto (CDEP) had a two-day planning event at Wertheim. That event crystallized some developing ideas among the marsh planners, and a new design was conceived. One of the important features was recognition of the environmental goals of USFWS at Wertheim. These included improving migratory bird habitat, reductions in expansion of *Phragmites* across the marsh, and improvements in the aesthetics of the marsh. These needs led the designers to adopt a much more aggressive approach to the project. Two 40 acre sections were selected for modification, and two were to be set aside as control sites. The modifications would include elimination of most of the grid ditches (only those ditches that still effectively conveyed water through the marsh were retained), naturalization of several of the retained ditches by adding curved features to their paths, creation of a major tidal channel around the northernmost area to potentially increase salinity in an area being overrun by *Phragmites*, and also to convey tidal water into other important water features on the marsh; and creation of ponds of various sizes, some quite large (far larger than needed for mosquito control purposes), to improve duck and other water fowl habitat on the marsh. The design was finalized for NYSDEC by placing the ponds where breeding was most dense, and when a materials balance showed that excavated soils from the ponds would exceed needs to fill the ditches, the extra sediment was to be placed in other areas of the marsh where hummocky terrain also supported much mosquito breeding.

USFWS was identified as the primary project sponsor, and it was clear that this project constituted a major restoration of ecological values across the marsh, not just a mosquito control plan. NYSDEC tweaked the design, asking that all ponds have a direct connection to open water to increase the potential for fish habitat – despite successes in New Jersey, NYSDEC was not confident that semi-monthly tidal inundations would be sufficient to maintain fish in isolated ponds.

A formal permit application was submitted in October 2004, and a permit was issued by NYSDEC in early January 2005. Failure to adequately consult with the US Army Corps of Engineers and some delays associated with receiving a sign-off from National Marine Fisheries Service meant that construction was not begun until Marsh 1, 2005. USFWS and NYSDEC both agreed that bird returns to the site in April meant that construction should cease April 1. The short construction window meant that only Area 1 was completed in 2005, with minor touch-up work done in 2006. Work in Area 2 was undertaken in February and March of 2006.

Data reports have been filed annually on the monitoring program, although no analysis of the collected data has been made yet. Observations at the site have shown qualitative increases in the species of birds and fish using the marshes that were modified. Mosquito breeding was generally eliminated in Area 1. Some areas of Area 2 still seem to be breeding on a somewhat regular basis, although the extent and amount of breeding where marsh management was undertaken is clearly greatly reduced. Adult mosquitoes are still a problem in the marsh, but this is thought to be the result primarily of breeding elsewhere in the marsh. Nearly all of the marsh has revegetated, and generally with the same guild of plants as was found in the area prior to construction. There are three exceptions to this general rule:

1. where ditches were filled, if *S. alterniflora* had grown there, it was generally replaced by high marsh plants (predictably, due to changes in local hydrology)

2. *Phragmites* areas were targeted in construction as good roadways. Post-construction in Area 1, *Phragmites* was often replaced in the east and north of the site by brackish marsh

plants; the vigor of *Phragmites* that did return has been greatly reduced, even after two growing seasons (it was hoped that increasing water circulation through the *Phragmites* might result in impacts to it, but the appearance of brackish marsh plants where the salinity was intended to be increased was a surprise – perhaps increased inundation is washing out some accumulated soil salts, as the salinity of the main river body tends to be approximately 15 ppt or less)

3. as mentioned, the diversity of the high marsh was greatly increased by the spread of brackish marsh plants where formerly *Phragmites* had dominated

The County has carefully noted that all of these observations as preliminary. It is unclear whether or not these conditions will be sustained. However, the County does note that these kinds of results are exactly in line with the expectations of marsh managers at other areas in the northeast who have conducted these kinds of activities. Each site is different, and the Wertheim project has provided some unexpected results. These include some the County would classify as major – such as the *Phragmites* control, and the unexpected brackish marsh plant community success. Other are relatively minor, such as problems at some of the old ditch sites where haste in 2005 meant sediments were not packed as well as they might have been, and so some areas remain soft and are not revegetating as well as most of the rest of the marsh, and some minor erosion and filling in watercourses as natural hydrological forces reframe the man-made streams.

The County repeats that it does not consider Wertheim to be the determinant of whether marsh management is acceptable for the County to implement. The evidence from other jurisdictions makes it clear that marsh management can be effective as source reduction for mosquito management. In addition, evidence from other states clearly shows that marsh management projects conducted for mosquito management purposes, if considered in a progressive fashion, should provide ancillary ecological benefits by augmenting marsh functionalities. Nonetheless, the Wertheim project is an important demonstration project, in that it seems to show that Suffolk County is not exceptional in terms of its marsh processes compared to other areas of the northeast, in terms of how projects can be conceived, altered, and adapted to meet needs of involved parties, and in terms of how a ditch maintenance agency can demonstrate its ability to become a more rounded marsh management agency.

Comments were classified in one of five categories.

(1) Pre-project (M-1, M-2)

USFWS noted that its major issues were conformance with USFWS guidance and especially to reduce the need for pesticides for larval control.

(2) Project planning (M-3, M-4, M-5, M-6, M-7, M-8, AG-38, AG-96, AG-113, AG-127)

USFWS noted that it entered into a partnership with the County to address the project, and agreed with the general description of the project offered above and in the DGEIS (pp. 742-743). NYSDEC claims that the construction of ponds at the site constitutes an alteration rather than restoration of the site; such a definition is consistent with terminology used by Niedowski (2000), but is not how the project was characterized by NYSDEC staff in 2004 when the project design was being finalized. NYSDEC also objected to the phrase "holistic and progressive" as applied to the project at this stage. The County was, at that point in the text, referring to the process that resulted in the design of the project. The County believes that the revision of an initial design through a collaborative process to meet objections offered by involved parties is a good template for how future project designs should proceed.

(3) Construction (M-10)

USFWS provided details regarding the construction of the marsh project.

(4) Post project (M-11, M-12, M-13, M-14, M-15, M-16, M-17, M-18, S-44, S-45, P-88, P-89, AG-17, AG-23, AG-95, AG-96, AG-128, BV-4)

USFWS comments regarding project results to date can be summarized as the marsh has largely revegetated with appropriate marsh plants, mosquito control goals have been achieved, fish are numerous and relatively diverse in the constructed waterways, shore bird, water fowl, and wading bird use of the marsh has been expanded, and certain RTE species are using the altered marsh. Another comment offered that the project showed the County could reduce pesticide use and control mosquitoes. Another comment recognized that the project served to demonstrate the logistical ability of the County to conduct a complicated, involved marsh project.

Other comments strongly believe it is too early to determine the ecological effects of the project. NYSDEC requested that a full data set evaluation is necessary before the project can be judged a success or a failure. NYSDEC is on record as requiring 10 years of post-project monitoring. Certainly the success or failure of the project over a mid-range time scale should suffice, if the signals are as clear as they have been to this time. It may indeed be the case that the effect of the modification does not last forever; nonetheless, the project would still have provided some incremental benefits over the duration of time that it was a success. The County believes that the short-term results speak for themselves, and that positive impacts have resulted from this project to date.

(5) Monitoring (M-9, M-19, M-20, AG-130)

USFWS notes that it and the County have committed to long-term monitoring of the site. The County has also noted that the current scope of monitoring requirements, which have annual costs in excess of $100,000 for outside consulting alone (exclusive of in-kind County sampling and analytical support), do not appear to be sustainable for 10 years. The County intends to analyze its sampling effort in the winter of 2006-2007, and approach NYSDEC with a revised scope of monitoring that will allow long-term effects to be determined, but in a fashion that can be afforded by the involved agencies. The County will not compromise the quality of the investigation, however, as this project is very important to the future of water management in Suffolk County. NYSDEC notes that the permit requirements hold for 10 years.

4.6.6 Monitoring (J-6, AG-14, AG-15, AG-18, AG-24, AG-39, AG-40, AG-80, AG-100, AG-104, AG-131, AG-137, AG-139, AG-144, AG-145, AG-162, AO-13)

17 comments, mostly from NYSDEC, were classified as relating to marsh management (or general wetlands) monitoring.

NYSDEC noted that major projects will require monitoring, which the County agrees with; as another NYSDEC comment implies, all projects will require some form of monitoring, as it is essential to be able to determine project success. It was noted that the lack of sufficient monitoring data for other, earlier projects hampers NYSDEC's ability to judge these earlier projects well, and also limits opportunities for identifying ways to limit future requirements for monitoring. This is because if it was apparent what provided good information to evaluate a project, and what did not, then it could be possible to streamline future monitoring and project evaluation requirements. The accumulation of data from projects such as Wertheim may allow for future changes in how NYSDEC approaches these issues. The County appreciates the logic of this position.

It was suggested that smaller projects might need five years of pre-project and five years of post project monitoring; NYSDEC believes there should be three years for pre-project monitoring. The County is unsure if projects with control locations need that much pre-project monitoring, and would like to explore these issues further with NYSDEC. NYSDEC also suggested that all projects include pre-project fish and wildlife surveys, especially for RTE species. The County agrees this is a common sense approach.

NYSDEC suggested that reversion sites need close monitoring to ensure that "doing nothing" does not lead to marsh problems. The County notes that currently many marshes in the County do not receive any active management, and that no monitoring is generally undertaken. The County had proposed (p. 500 of the DGEIS) an initial cut at a County-wide marsh monitoring scheme, which would require also a remote sensing component (see just below). NYSDEC was not entirely certain that the proposed approach was optimal, but other than noting fish other than killifish would need to be sampled, did not provide any specific criticisms. The County notes that this monitoring program is "indicator" based. Monitoring using indicators does not try to be comprehensive, but rather assesses a system by looking at a few components. Killifish presence in a marsh was thought to be a minimal measure of overall marsh quality. In many other marshes, other fish are not present, which is why the focus was on the hardy killifish.

The Department of State noted that details regarding marsh management monitoring were lacking. The description of the Wetlands Management Plan project process (see above, Sections 3.3 and 4.6.2) included the need to identify appropriate monitoring. Each project is likely to require a slightly different scope of monitoring; the County intends to propose, for discussion purposes, the kind of scope for monitoring that appears to be required for projects likely to be conducted in the near future. The Wetlands Stewardship Committee has responsibilities for ensuring that this aspect of the project is properly considered, and the County is fortunate that the Department of State has agreed to serve on that committee.

NYSDEC strongly suggested that Suffolk County will always be required to have some monitoring responsibilities. However, elsewhere NYSDEC notes that the landowner will be required to be the permit holder. The County expects to be involved in monitoring for most projects; however, it is possible that in some instances the County will primarily be involved in the project as an interested party and as the contractor-in-general (providing necessary equipment and project know-how). In such cases, where the County has not initiated the project, does not have a direct stake in its outcome (i.e., it is not a mosquito-control oriented project), but only is "involved" in the project, the County may not assume any substantial monitoring responsibilities.

NYSDEC also noted that it will not assume any monitoring responsibilities. NYSDEC misunderstood the thrust of the County comment. The County believes that NYSDEC, as the State resource agency responsible for the marshes of the State under the statutes, has a responsibility for inventory and impact assessment in connection with the marshes. NYSDEC has not been able to fulfill this role because it does not have the resources to be a regulator and resource manager at the same time. The County was expressing its opinion that should NYSDEC acquire the resources it needs for all its roles, then some of the work conducted by the State could be used by various permit holders in fulfilling site-specific monitoring. For instance, if NYSDEC were to conduct comprehensive fisheries sampling in the estuarine waters near the County salt marshes, those data might prove to be useful in assessing impacts from changes made to the salt marshes (following the hypothesis that marshes and their estuaries have an ecological connection).

The County has intended, as part of this project, to develop a means of tracking marsh vegetation trends using satellite photography. Administrative problems prevented this portion of the project from coming to fruition. However, the County believes that the preliminary work accomplished to date will allow a contractor to step in, and develop a Suffolk County-specific algorithm for translating satellite photographs to useful GIS representations. The GIS output is expected to be interpreted into areas of vegetated marsh, areas of low marsh (*S. alterniflora*-dominated, areas of high marsh (*S. patens*-dominated), mixed low and high marsh stands, and *Phragmites* areas.

These should be computable for individual marshes, and for the County as a whole. The intent would be to acquire imagery on a regular basis (one or two year intervals) to serve as a cornerstone of a County-wide marsh monitoring program, but also as a means of keeping tabs on individual projects in terms of vegetation regrowth or changes. As part of the algorithm development, extensive field verification would be undertaken. However, if the algorithm were to be accepted, verification would be infrequent, due to the costs associated with careful mapping of large marsh areas.

4.6.7 Project Design Procedures

Many of the comments classified as relating to this section might have just as easily been classified for other sections, especially 4.6.2. A total of 54 comments were so classified, and were put into two broad headings: more generalized and more specific comments. Section 3.3 and 4.6.2 elucidate the means by which projects will proceed through the design process. The BMPs also outline some attributes that make certain sites better candidates for particular actions. This section tends to focus on (but is not exclusively devoted to) principles that underlie particular choices regarding marsh management projects.

(1) General comments (E-7, E-8, F-6, F-7, I-15, I-16, J-3, J-4, J-5, L-29, N-12, N-22, P-81, R-3, R-4, S-12, S-37, AG-8, AG-9, AG-10, AG-11, AG-125, AG-153, AK-9, AK-10, AV-3, BA-25, BH-7, BI-10)

Several comments noted that mosquito management is not an appropriate or sufficient reason to alter marshes. The County respectfully disagrees. The County believes that it has demonstrated that, in the absence of mosquito management, serious illness and death would result to residents of the County. The County believes that these numbers are not trivial, and could be more than 10 deaths and 100 serious illnesses per year from WNV alone. The County believes it has shown that mosquito control is one (if not the paramount) reason that such a toll is not occurring at this time. The County further believes that mosquitoes inflict other kinds of damage to the health and public welfare of County residents. Source reduction of mosquito populations is preferable to pesticide use, for a number of reasons. Source control is more effective, and avoids added risks to people and non-target impacts to biota, even if the risks are slight and the non-target impacts appear to be non-significant. Source control in salt marshes consists of water management. Water management, when implemented appropriately, has been shown to have the potential not only to control mosquitoes, but to potentially provide ecological function augmentation. Thus, the use of water management can not only achieve mosquito control goals that the County finds to be beneficial, but it may also result in additional ecological benefits by, as some have phrased it, restoring marshes.

Related to this comment was one that suggested that reductions in mosquito habitat were not warranted because they required changes to the marshes. The County has asserted that the results from other jurisdictions, conceptual considerations, and limited local data all suggest that the changes to the marshes that result from well-conceived water management projects do not harm the marsh, but rather may augment at least some critical marsh functions. The commenter also noted that reductions to mosquito habitat were not warranted because of the potential for impacts to the marsh from the proposed actions. The County is aware of the potential for impacts from its BMPs, as shown in the impact assessment section of the DGEIS (pp. 883-943). To mitigate the risks of negative effects, the County has established a review and oversight process to help to ensure that projects are carefully and thoroughly analyzed prior to implementation. The gauntlet of committees, permits, and reviews required for projects is not so much an "approval" process as one designed to reject those projects where necessary elements are not well considered (see Sections 3.3 and 4.6.2).

A comment was offered that nuisance management is not a sufficient rationale for the marsh management program. This implies that the sole intent of the County Wetlands Management Plan is nuisance control. This is not the case, as discussed in Section 4.1.1, above.

It was noted that mosquito population reduction should not be the paramount rationale of a marsh management program, but that marsh health and biodiversity should be. The County tends to agree. For example, NYSDEC, in its tidal wetlands regulations, does not explicitly include mosquito control as part of the rationale for marsh management. Connecticut explicitly identifies mosquito management as just one of many elements of its Integrated Marsh Management program. The Wetlands Stewardship Committee has been given the task of developing such overarching goals and objectives for the County and other interested parties to consider adopting. Related to this comment was another, which wanted the current program, embedded in a larger regional planning effort. The County has been amenable to such a concept, but not as part of this planning process that is being reviewed here. This will be a main discussion point for the Wetlands Stewardship Committee.

A comment was made that the alterations to be considered to control mosquitoes, in a good functioning marsh, should be the least amount required. The County appreciates this viewpoint. However, there may be other considerations that affect the scope of the project. The Natural Heritage Program, for instance, identified the Wertheim National Wildlife Refuge as a reference marsh for Long Island (MacDonald and Edinger, 2000). Despite this general identification of the marsh as a good example of various salt marsh functions, the land manager (USFWS) found many ways that functions at the marsh could be improved through alterations. Thus, this general notion of doing the least amount required, while a good programmatic guide, may not hold in many settings.

Comments suggested that modifications to marshes should only be conducted to restore ditched marshes. Other jurisdictions have also suggested that unmodified marshes not be subjected to marsh management (see comment L-28, for example). However, if mosquito control is identified as a need for such sites, it is also noted that having this policy encourages the use of pesticides – which is contrary to a major goal for this program. The County does not believe that the only restoration or management work required in its marshes is to undo ditching effects. There are a myriad of problems affecting marshes. To note only one, invasive *Phragmites* appears to require active management to forestall it from dominating swaths of high marsh, but this problem does not seem to be one that stems from the legacy ditches (see the DGEIS, pp. 508-511). Thus, modifications to marshes appear to be justified for reasons other than undoing marsh ditching impacts.

Similarly, comments suggested that marsh alterations only be conducted to restore marsh health. The work proposed under this project was identified to primarily serve the cause of mosquito control; however, the Long-Term Plan explicitly states that projects need to consider environmental factors as well as mosquito control in assessing the need for a project. The County has determined that, at a minimum, its projects should do no environmental harm. The County believes, as it has expressed with some regularity throughout the FGEIS, that evidence from other jurisdictions, conceptual understandings, and limited experiences here in Suffolk County all suggest that many projects will serve to augment marsh functions of one kind or another, and thus serve as marsh restorations of a kind.

Another comment suggested that the need to preserve marsh health may sometimes outweigh potential public health benefits associated with marsh management. The County agrees, to a point. By and large, the County believes that there are ways to reduce mosquito breeding in marshes that have little to no ecological impacts, and that will not threaten the health of the marsh. These techniques may involve trade-offs, and evaluations of the trade-offs will determine which are to predominate. Site specific analyses are intended to identify potential benefits, and what actions must be taken to achieve those benefits – and the consequences of taking the steps. The reason for the large membership of the Wetlands Stewardship Committee is to allow for robust discussion regarding the valuations that may need to be made to determine whether a project should be shelved, or whether it should continue to be considered.

Furthermore, it was noted that perhaps the three major estuary systems have distinct ecological processes, and so each needs to be considered differently. The County is not entirely persuaded that the surrounding estuaries are the drivers of marsh distinctiveness. There are a myriad of factors that influence differences between marshes, and that will drive the ways that the County (and others) consider design processes. Upland development, hydrological categories (stream or riverine systems, fringing mainland systems, island systems, back marsh systems, for instance), degree of previous alteration activities (bulkheading, ditching, off-shore channelization), tidal connectedness, amount of *Phragmites* invasion all of these will, as noted in another comment, apparently require each marsh to be evaluated on a case by case basis.

The Department of State was concerned that no substantive details were listed regarding project consideration. The County has established a process, by which the land manager, local government, and interested parties can review projects. In general, the County will seek to reduce mosquito populations, enhance natural resources and maintain marsh quantity and quality, and seek to control *Phragmites* (where appropriate and possible), paraphrasing the Wetlands Management Plan goals. As suggested by NYSDEC, this is best managed on a case by case basis. For NYSDEC, standards associated with project design will include a need to minimize impacts, and also to ensure sufficient monitoring for project success evaluation is associated with the project. These are reasonable goals that accord with the County view of project evaluation. The County, at various places in the various documents, has suggested that the County review process might be streamlined so that it may proceed more expeditiously, or with less resource expense. NYSDEC notes that it finds the review process to be adequate for its current needs. The County had its focus more on the content required for project review, however. NYSDEC has, in other comments, suggested that its requirements for water management projects can be optimized based on the County providing adequate demonstrations that remaining requirements will be sufficient to meet all regulatory and review needs.

The Department of State was concerned that no substantive details regarding project design were included. The County has noted (see Sections 3.3 and 4.6.2) that the designs for projects will be selected from the BMP manual, based on the input from the land manager, local officials, and the Wetlands Stewardship Committee, and other reviews and input from interested parties. The BMP manual contained generic design information for each BMP, generally to the level found in documents such as those generated by the Massachusetts Audubon Society (Hruby and Montgomery, 1985), in New Jersey (Shisler, 1978), or by New York State (Niedowski, 1990).

The Department of State was concerned that no substantive details regarding project implementation were provided. In general, each BMP was discussed in terms of its implementation in the BMP Manual, and for each BMP factors that needed to be considered to limit impacts were discussed in the DGEIS (see pp. 883-943). Each project will be conducted on a site specific basis, and so it is difficult to determine what particular factors may need to be considered carefully for each and every project. The County believes there will be a learning curve regarding the implementation of projects, even when trying to leverage experiences of other jurisdictions. Thus, the fashion in which projects are exactly addressed will likely change over time through experience with local conditions. It is to be noted that one comment noted that for Fire Island, special surveys need to be conducted by FINS for every potential water management project in the communities.

A comment noted that the kind of work considered under the Long-Term Plan had a distinct emphasis on salt marsh mosquito control. The salt marsh land use regulations explicitly allow for human health issues to be considered in determining what is allowable under the regulations. Fresh water wetland regulations are more restrictive, and the kinds of activities that are made in fresh water wetlands in other jurisdictions appear to be classified as P(X) (permit required, incompatible with the regulations) under 6NYCRR Part 664. The County likewise is of the opinion that water management in fresh water wetlands would inextricably alter these wetlands, and that ecological benefits resulting from the change might be difficult to determine. Therefore, salt marshes would be the sole arena for source reduction activities. Control of mosquitoes generated in a salt marsh has value. Many of this mosquitoes are scourges for people living near the coast, and research presented here (see 4.10.2, below) and in the DGEIS (pp. 76-96) clearly showed that salt marsh mosquitoes can and do transmit diseases to people.

Many usages of the term "salt marsh mosquito" mean specifically *Ochlerotatus sollicitans* in particular, and not all species of mosquitoes that breed in salt marshes. Much of mosquito control in the County, historically, has focused on this species. It is a very aggressive and persistent biter of people. This means it has been a major cause of human discomfort. Studies have found this mosquito to be a competent vector of WNV (Turrell et al., 2005), and testing of local mosquitoes in 2005 found a pool of *Oc. sollicitans* to be positive for WNV. It is true that not many pools of *Oc. sollicitans* have been positive for WNV; partly, this is a self-reinforcing result, as the limited testing accomplished by the County tends to focus on those species that have tested positive for WNV or that are identified as major risk factors to spread WNV (such as *Culex pipiens* and *Oc. japonicus*; as it is being better separated from other *Culex spp*. mosquitoes, *Cx. salinarius* is also being tested more). However, it is plain that *Oc. sollicitans* is the primary vector for human cases of EEE in New Jersey (see the DGEIS, pp. 328-332), and so it is a cause of deep concern here because of that potential. For these reasons, the County believes that control of *Oc. sollicitans* in many instances is entirely appropriate.

NYSDEC requested an estimate of the ownership of tidal marshes in Suffolk County. The County does not have that information readily at hand, and it would be difficult to generate it because of the need to identify GIS land ownership records. The County does track ownership of lands where it applies pesticides, for NYSDEC reporting requirements. Therefore, the County knows that the acres of aerial larviciding (which is close to but not directly proportional to the acres of marsh that is larvicided) are distributed as in Table 4-8 (based on 24,230 acres of treatment in 2004).

Table 4-8. Distribution of Marsh Ownership for Acres of Aerial Larviciding

Landowner	Acres	Percent (based on 24,320 acres)
Suffolk County Parks	4,766	19.6
NYSDEC	4,175	17.2
NYS Parks	3,248	13.3
USFWS	2,910	12.0
Other Private	2,332	9.6
Town of Babylon	2,306	9.5
TNC	1,006	4.1
Islip	769	3.2
Town of Southampton	588	2.4
Post-Morrow	227	0.9
Riverhead	49	0.2

(2) Specific comments (C-9, I-12, I-17, I-18, I-19, I-20, I-21, I-22, I-23, P-71, Q-40, S-63, AG-22, AG-122, AG-123, AG-124, AG-134, AG-151, AG-152, AR-9, AS-21, BD-17, BH-6, BV-1)

A basic point of agreement is that the County and NYSDEC realize the importance of landowner involvement in project development and determination of the overall scope of the project. However, it should also be understood that in some cases the landowner itself might not have the knowledge, expertise, or time to be fully involved in all aspects of a particular project. NYSDEC, by reminding the County that permit acquisition is a landowner responsibility, also is indicating that the landowner will assume responsibility for the project.

NYSDEC notes that the creation of new kinds of habitat is most appropriate in marshes that are substantially degraded. The County tends to agree, but notes that the overall determination of project scope depends to a large degree on land manager preferences. For instance, at the Wertheim site, the land manager (USFWS) was very aggressive in the way it approached the project, seeing this as an opportunity to make some fairly substantial changes to its marshes. NYSDEC, which is a major landowner of Suffolk County marshes, appears to be likely to be much more conservative in considering changes to its holdings, judging from the tenor of its comments on this DGEIS. The County realizes that NYSDEC is also establishing a preference in terms for how it is likely to consider projects in terms of the regulations, in that alterations of habitat type will need careful and persuasive justifications to be permitted. The County understands that one potential justification would be to identify degraded values or functions at a particular site, and to demonstrate that the project plan addresses those issues.

It was suggested that artificial ponds would be required under the County program, and furthermore noted that ponds would be inappropriate for the Town of Southold. Project design is to proceed on a site by site basis. The County does envision that constructing ponds may play an important role in its overall program. However, no cookie-cutter approach has been adopted for the program. Ponds are not a necessary element of every design. The County wishes to work closely with local natural resource managers as it begins to develop marsh management projects. If the Town of Southold, with full knowledge of the County's perspective on potential impacts and benefits associated with particular BMPs, determines that one or more BMP is not applicable for its marsh management needs, the County would accede to that position – assuming the landowner is of like mind. Should a conflict between such primary interested parties arise, the County will try to find a means to reach common ground. It is likely that a serious difference between the local natural resource experts and the landowner regarding project direction will lead to rejection of a project by the Wetlands Stewardship Committee, in any case.

The Southold trustees, in general, would prefer that the kind of project that Town of East Hampton has been implementing be the standard model for projects in Southold, too. The elements of East Hampton projects that were identified included:

- Ditch plugging (the County notes this is BMP 12)
- Enlarging culverts (BMP 5)
- Remove dredge spoil along ditches (part of BMP 6)
- Allow reversion (BMP 1)
- Remove *Phragmites*

Phragmites control is not a specific BMP in the Wetlands Management Plan, but rather is a goal to be accommodated in every project where practicable. *Phragmites* control is also specifically identified as a project element of all major marsh restorations. It was the County's intention to select from the BMPs in designing marsh management projects, with input from the landowner and local environmental officials. Other interest groups and the Wetlands Stewardship Committee would also review projects and provide guidance to ensure projects minimize the potential for environmental impacts while also meeting other identified mosquito control and ecological goals. Therefore, it is entirely appropriate for the Trustees to identify the kinds of projects they would prefer to see for the Town. The County cautions that limiting the choices a priori may not be optimal, as there appear to be advantages, in the right settings, to using other BMPs besides those selected by the Trustees. The County will, as projects are identified in Southold, engage the Trustees in further dialog to refine these kinds of issues.

One comment suggested that ditch plugging is warranted in the western Peconic Estuary. The basis of this comment was a report by SCERP (discussed above in Section 4.6.4). The County, as related there, does not believe that the quality of the SCERP research is sufficient to reach such a conclusion. However, the County does note that ditch plugging is a BMP (BMP 12), and so any project for which such an alteration appears to be reasonable could have this BMP used. The County would develop such projects in conjunction with the landowner and local environmental officials, and the review process would involve the Wetlands Stewardship Committee and other interested parties. If, following this process, it was determined that ditch plugs were the best means of managing the salt marshes, then that would be the kind of projects implemented in this area.

NYSDEC identified the restoration of tidal flows as an aspect of the Wetlands Management Plan that it endorsed. The County is delighted with this endorsement, but also cautions that those BMPs that increase tidal exchange still have the potential for ecological change and potential damage to the marsh and its functions. It is possible to too enthusiastically employ even a good principle, and so all projects should be subject to review prior to implementation.

NYSDEC also indicated that projects must demonstrate there will be no impacts to finfish diversity or productivity. The County generally agrees with this concept, but is unsure how this will be practically achieved. Especially on a local scale, there are very little data regarding finfish diversity or productivity; collecting such data for every project is not practical.

Addressing the issue from a conceptual standpoint is much more likely, but could lead to disputes regarding the potential impacts of particular activities. Furthermore, the County notes that there may need to be tradeoffs among various marsh functions and values whenever existing conditions are changed. Even for a "true" marsh restoration (a return to identifiable previous conditions at a site), these changes are likely to result in habitat disruption for some species or ecological guild that currently uses the site. A restoration that filled ditches may result in slightly less open water to support finfish foraging, for example, might increase vegetated marsh and support the return of more natural hydrologies and vegetation distributions. NYSDEC had earlier suggested that projects need to be evaluated on a case by case basis; the County agrees with this as a more flexible approach, as even seemingly commonsense directives like this may have instances where other considerations are determined to be more important.

Fire Island Pines requested that three ditches be cleaned, as had been the practice. This will be subject to FINS approval, and such approval probably depends on the completion of the special permit process for mosquito control activities in FINS. The resolution of that process will detail how water management projects in the FINS communities will be managed in the future.

One comment requested that the County use modeling as it designed its water management projects. The County is aware of models used at MSRC (out of the Robert Wilson laboratory) that could be of use. These models, called wetting-drying models, are unusual in that they account for differences in the areas flooded by tides due to increasing or decreasing basin sizes. They thus account for tides overwashing beaches, or changing the area of a harbor as they withdraw. Such models work best when based on very detailed hydrographic surveys of the water bodies in question. Dr. Wilson has developed a general wetting-drying model for the South Shore Estuary. He has indicated that, given appropriate data to work with, the amount of effort necessary to extend the model into the marshes of the estuary would not be overwhelming, on a site by site basis (R. Wilson, MSRC, Stony Brook University, personal communications, 2004, 2005, 2006). Presumably, such modeling could be used to test potential hydrological effects associated with potential water management projects. Issues that would need to be resolved would include how much effort would be required to acquire the needed information, and how sprightly the modeling refinement process might be – if long time periods are needed to adjust the model for each iteration, the concept may be of little practical use.

NYSDEC requested, as one way that potential projects might be identified, that County surveillance personnel report failing marsh structures they might identify in the course of their normal activities. SCVC notes this is a standard operating procedure.

There were specific requests that the water management program be managed through the Suffolk County Department of Energy and the Environment, or another agency with environmental responsibilities and concerns. Currently, SCDPW is the prime manager of water management, through SCVC. The County has thought that internal reviews through SCDHS and its Office of Ecology have been sufficient to date. It is clear that SCDEE and SCDHS will remain active in County water management reviews and overall project direction. However, whether budgetary and other managerial responsibilities will be shifted from SCDPW, which after all has the equipment and other infrastructure for design and execution of such projects, has not yet been determined.

Finally, NYSDEC noted that a streamlined approach to project review may be developed, but only if the changes have no impact on the determination of failure or success. The County heartily agrees that it is extremely important to have a means of determining the success (or failure) of every project that is implemented, and so will not propose anything that will interfere with such determinations.

4.6.8 BMPs efficacy

Comments were received regarding the effectiveness of the proposed marsh management techniques. In a sense, this category is similar to some of the others discussed in this section. It is certainly reasonable to suggest that some of these comments could have been classified as relating to other comment categories, or that comments in other categories should have been classified here. The intent of the County, however, is to provide a reasonable response to every question. With that issue in mind, 62 comments were classed as relating the effectiveness of the BMPs. They were sorted into two very broad subcategories: general comments, and those that were more specific.

Many of the comments suggested that little information was presented to demonstrate the effectiveness of the BMPs, or to show that the claims made for BMPs actually occur. Other comments, especially those made by officials from Delaware and Connecticut, report that marsh management is very effective when properly conducted, and does provide the benefits claimed in the DGEIS. As discussed above, there is some truth to the comment theme that no long-term studies have examined impacts from marsh management, and those studies that have been conducted often are not published in scientific journals. However, the County also believes that the testimony of well-trained, credentialed public servants should carry a great deal of weight on these matters.

(1) General comments (A-4, E-22, F-3, G-18, G-24, L-31, P-78, P-79, P-80, S-13, S-34, S-35, S-36, U-17, U-24, U-74, AD-18, AD-19, AI-18, AI-21, AK-24, AW-11, AW-17, BC-11, BC-17, BD-19)

Several comments noted that OMWM is experimental or is unproven. CDEP noted that it has conducted OMWM for 18 years.

Audubon New York declared in a resolution that water management has not been proven to be effective. The County appreciates the input from such concerned groups, but is concerned regarding their perspective on the issue. Cashin Associates contacted Massachusetts Audubon, which had published a manual of water management techniques (Hruby and Mongomery, 1985). Robert Buchsbaum responded with the following comments:

> Your email on OMWM was forwarded to me, since I worked on some OMWM sites early in my career at Mass Audubon, following up on some of the work of Hruby and Montgomery that you cite. Mass Audubon initially worked on OMWM as an alternative to pesticide use and grid ditching. We supported it in grid ditched marshes because it provided such an alternative while also acting to create of the pre ditching hydrology, since the New England version involved plugging the ditches to create habitat for fish. In particular, it helped to recreate pannes that were drained by grid ditching. We have not supported it in unaltered, relatively "pristine" marshes because those are few and far between in Massachusetts so we supported keeping those in their natural state.
>
> The data from Hruby suggested that OMWM was effective in reducing mosquitoes, and we believed that the overall impact birds and invertebrates was neutral or positive, however we and others never really carried out a thorough analysis of the long term ecological impacts. More recently, as you may be aware, the USFWS has been examining OMWM in wildlife refuges along the east coast in a multiyear study. They have been looking at effects on birds, vegetation, hydrology, marine invertebrates, and mosquitoes. I have heard several talks at

> conferences on the results, and the conclusions are unclear. In one site, they did not even find a reduction in mosquitoes. I do not think all their data is in yet, so we'll need to withhold judgment for awhile longer. Some OMWM sites seem to have lower overall diversity and there are shifts in the types of species present.
>
> An issue to think about is whether making the marsh surface wetter with OMWM makes sense now in a time when sea level is rising and the marshes are becoming naturally wetter. There is a concern here in New England about increases in standing water and the break up of the vegetated platform due to rising sea levels.
>
> Clearly OMWM increases the amount of open water on marsh surfaces, so it makes sense that the impact on birds will depend on the guild of birds. Although the pools created by OMWM are probably good for wading birds and shorebirds, particularly migrants, the higher water table would not be good for Salt Marsh Sharp-tailed Sparrows or breeding by shorebirds such as Willets.
>
> Like most management activities, so much depends on the specifics of the site.

These comments are mostly in accord with the way that the County has presented its understanding of impacts associated with the actions being considered. It is possible that a more thorough look at what the County has proposed – not what is assumed that the County has proposed – will lead to more tempered views of the potential for negative impacts from water management.

As noted just above (by Buchsbaum), the results of the USGS-USFWS study sometimes did not show reductions in mosquito breeding, which will thus require less pesticide use. This appears to be the result of non-standard surveillance techniques, among other study problems (as discussed above, Section 4.6.4), and so may not be an accurate reflection of the effectiveness of water management.

There was a request for determinations of the overall efficacy of each of the BMPs. Data to support that kind of analysis are not available. This is at least partially because, when properly conducted, all water management tends to be extremely effective. If the water management allows fish to access mosquito breeding sites, or prevents mosquito breeding through physical means, then the effectiveness is as near to 100 percent as can be determined. If breeding sites are not targeted or the construction does not adequately address problems, then efficacy is not 100 percent. It may be more useful to consider the life spans of the techniques as a measure of their effectiveness. Here, too, it is difficult to compare individual BMPs, as the length of time a BMP lasts will tend to be determined by site-specific factors, rather than general BMP attributes. Nonetheless, those BMPs that are most natural or use natural processes are the ones that are most likely to last longer. Ditches are less natural than ponds; channels are more natural than ditch plugs.

Several comments noted that there is no compelling evidence that the BMPs will serve as effective restoration techniques. Another comment noted that the Long Term Plan claims that the BMPs are effective, and suggests that at least some of them may result in restoration of marsh health. A comment quoted William Meredith, PhD, Delaware Division of Natural Resources, as noting that he would like to be able to conduct some long-term impact studies. Dr. Meredith has indicated that such work would be beneficial in demonstrating the overall effectiveness of marsh management techniques. Part of the difficulty in obtaining funds for such work is the general assumption that the project will indeed prove what has already been noted anecdotally (for a lot less money). Delaware CDEP noted that its experience shows the BMPs will reduce mosquito populations while minimizing environmental change and enhancing natural resource values.

A comment suggested that it isn't true that water management is necessary to reduce disease risks. In a sense, it is true that water management is not necessary for disease risk reductions. However, the County believes that water management, as a source reduction methodology, is more effective than larviciding in reducing mosquito populations. Relevant to this point was a review of Peterson et al. (2006). Peterson et al. (2006) claim that adulticiding is an acceptable mosquito control technique because the very low risk of impact from adulticides is much less than the benefits accrued from reductions in WNV risks. Schofield et al. (2006) note that because adulticiding occurs in the context of integrated mosquito control, it is necessary to account for the effectiveness of other elements of the program in making claims regarding risk reduction. The County believes that its program reduces risks from disease substantially; there is some evidence that water management is an important element of the overall risk reduction. Dr. Meredith states that OMWM reduces disease risks, from the Delaware perspective. Peer Reviewer #2 also stated that based on Connecticut and other New England results, water management was likely to reduce disease risks.

It was noted that the Long-Term Plan claims that reductions in pesticides will occur under this proposed water management plan; Connecticut noted that indeed its larvicide use has dropped due to water management and the DGEIS cites similar claims in Delaware, New Jersey, and Massachusetts. The Long-Term Plan specifies a goal of 75 percent larvicide use reduction; comments inquired regarding the basis of this claim. Aerial larviciding accounts for approximately 75 percent of larvicide use in the County. Water management in other jurisdictions has been shown to eliminate the need for routine use of larvicides. Therefore, it was anticipated that conducting water management at the aerially-larvicided marshes so as to eliminate the need for larval control there would eliminate the associated 75 percent of current larvicide use.

(2) More specific comments (E-23, E-24, E-25, G-7, G-10, G-11, G-12, I-9, L-2, L-3, L-4, L-5, L-6, L-7, L-8, L-9, L-10, L-22, P-70, P-84, Q-14, S-40, U-18, AI-17, AI-19, AI-22, AG-133, AK-25, AK-26, AK-27, AO-11, AR-1, AW-4, AW-5, BC-4, BC-5)

Comments were offered that there was no compelling evidence that the water management practices would control mosquitoes. As evidence of this, problems associated with the Seatuck OMWM were offered (as reported in Guirgis, undated), and according to a site visit to Wertheim, there was no difference in adult mosquito populations between treated and untreated areas. All reduction data are said to be anecdotal. It was also stated that there is no evidence ponds are effective at controlling mosquitoes. It is also said that there are debates regarding the effectiveness of OMWM among scientists. On the other hand, CDEP offered that water management provides effective long-term mosquito control, which is why it had been installed at over 2,000 acres of Connecticut's marshes; that it was effective was also thought to be the case by Peer Reviewer 2, with regard to salt marsh mosquitoes in particular. One comment reported that OMWM had been successful in New Jersey, Connecticut and Rhode Island for mosquito control purposes. A Delaware scientist noted that the effects there are nearly instantaneous, and that it is the most effective salt marsh mosquito control available, with efficacy exceeding 95 percent. It is said to eliminate nearly all need for larviciding, and to last for `15 to 25 years.

These views are diametrically opposed. The County notes that those with the most awareness of the literature and experience with marsh management described the techniques as effective.

Sites where water management is not effective are rare, and so are notable. It is not exactly clear why the Seatuck project did not succeed. Currently, SCVC analysts lean towards the notion that in a salt marsh such as Seatuck where tidal inputs are limited, ditch plugs may not be the best approach. The County believes that evidence points to more effectiveness when water quality is better, and this usually is supported by good tidal circulation so that low DO/high temperature conditions do not become common. Higher DO will allow killifish to thrive on the interior of the marsh, and so allow for greater penetration of the marsh by these mosquito larvae predators. As noted by Dr. Meredith, marsh management for mosquito control purposes removes breeding sites and promotes habitat for larvae-consuming fish. Ditch plugging, generally, is not a process that removes much larval habitat. Therefore, it is likely that the project failed to support an adequate killifish population near enough to breeding sites. To be fair, it should also be noted that Lent et al. (1990) said that the project succeeded in controlling mosquito populations.

The site visit to Wertheim experienced no adult mosquitoes, to speak of, across the entire marsh. That had to do with the time of year, weather conditions, and a lack of earlier good breeding opportunities. As Cashin Associates personnel are willing to testify to, it is true that there is little to no difference in the adult mosquito populations across most of the Wertheim marsh – especially when adults are plentiful. The project did not address all breeding on the marsh. There is approximately 600 acres of marsh at Wertheim; this project addressed 80 acres. The intent of the marsh management is to reduce mosquito breeding. Therefore, if the visitors had observed conditions in water bodies across the marsh, they would have noted a difference. According to sampling records, the treated areas breed no to only a few mosquitoes. Many areas elsewhere in Wertheim prolifically breed mosquitoes, which then may infest treated and untreated areas alike. As noted by USFWS (see comment M-13), breeding is clearly reduced in the treatment areas.

Delaware further noted that OMWM reduces the need for adulticides. The County is more reserved than this; the County would prefer to state that water management should reduce the need for adulticides, as there is a link between risks for disease and large numbers of mosquitoes; therefore, large numbers of mosquitoes are sometimes sufficient reason to adulticide, and effective water management will reduce adult mosquito numbers. However, disease risk is also somewhat decoupled from sheer numbers of mosquitoes, in that inordinate disease presence can require treatment even if mosquito numbers are not very great. Therefore, the County prefers not to state definitively that water management necessarily reduces the need for adulticide treatments.

Both Connecticut and Delaware note that water management is more cost effective, in the long-run, than larviciding. The County again notes that this determination may depend on the level of monitoring that is required. Monitoring at the level of Wertheim for long periods of time, while this will provide invaluable, incomparable data sets to clearly demonstrate impacts associated with marsh management, will make the costs of conducting such projects insupportable. The County believes that better targeted monitoring can still produce data to support determinations of project success or failure, at a much more acceptable price tag. The County will present such information to NYSDEC in the winter of 2006-2007, following compilation of the 2006 Wertheim data sets.

Comments were offered that there was no compelling evidence that the water management structures resulting from implementation of the BMPs would be effective at absorbing pollutants. As discussed in the Literature Search (Book 9 Part 3 [Cashin Associates, 2004b]), the evidence for absorption of pollutants in the literature seems to indicate that this occurs primarily through surface sediments when tides overwash the marsh. Designs in other jurisdictions generally increase open water on the marsh by less than five percent. The County's Wertheim project increased surface waters by less than two percent. This suggests that there will be no large difference in the marsh's ability to absorb pollutants.

Comments were offered that there is no compelling evidence that the reconfigured marshes following implementation of the BMPs through projects will be effective at absorbing storm water. The County believes that there will generally be no change in the ability of a marsh to absorb storm water. However, the County does not believe this is an important function of County marshes at this time, so the point is somewhat moot. It is true that the County found little evidence that either manipulated or unmanipulated salt marshes are effective at absorbing storm water. This is often an important function for fresh water marshes, however (see Mitsch and Gosselink, 2000). Along these lines, it was offered that installing ditch plugs eliminates flow in ditches – which is usually thought to represent a pathway for storm water through a marsh (this has been a consistent assertion of the Peconic BayKeeper, for instance). Ditch plugs do not entirely eliminate flow in the ditches. Several tides (six to eight a month, usually) will overtop the marsh and cause there to be a great deal of exchange out of a plugged ditch (even with the 50 to 75 foot long plugs espoused in BMP 12). Smaller plugs often allow direct percolation through their two to three foot thickness (one reason they tend to fail). Therefore, flow will be greatly reduced, but not eliminated, by the use of ditch plugs. It was noted that the construction of ponds, thought to be a problem for storm water absorption, is most beneficial for marshes in Delaware that were dewatered by ditching.

NYSDEC asked for a source for the "truism," that "there are no mosquitoes when killifish are found." Smith (1904) quotes William Seal, Delair, New Jersey (identified as an expert on New Jersey fish) as stating "[a]ny waters to which these fish have free access will be searched in vain for mosquito larvae" (p. 94, top paragraph), the predecessor to "these fish" being "tide-water minnows, killies, killifish, mummies, mummichogs, etc." and a posterior reference being made to "*Fundulus*." Several pages of text follow that support the predation on mosquitoes by killifish.

4.6.9 Mitigation of water management

An extremely important comment was received from NYSDEC. It wished for identification of mitigations of project failures. This comment is important because the topic was not well discussed in the DGEIS or the Long-Term Plan. The BMP Manual and the Wetlands management Plan were specifically revised to address this fault. Four other comments were received on this topic. They noted that it is true reversion can be "undone", that major projects may require maintenance, and that training helps field workers to identify problems. Most importantly, Dr. Meredith noted that mitigation of problems is possible.

Mitigation of potential problems is a three step process. One is problem identification. The second is identification and implementation of an appropriate mitigation. The third step is continued monitoring to determine mitigation success or failure.

Problem identification will be the product of project monitoring, or continued routine mosquito monitoring. The problem might be a failure of the water management project to address the mosquito problem. Continued monitoring for breeding would determine this condition. Failure to meet environmental standards for the project would be another cause for the need for mitigation. This would be determined by site specific monitoring.

Once the problem is identified, appropriate mitigation steps must be identified. This will most probably include revisiting the implementation of the original design, to determine if the planned project was properly constructed. It could also include revisiting the scope of the selected water management approach, to determine if needed modifications were made to all areas of the marsh, or, conversely, if the project was too extensive and thereby altered areas of the marsh that would have been better to leave unaltered. Or, it may be that the overall project approach is reconsidered. Ditch maintenance, or ditch plugs, or the creation of an open water management project may not have been optimal for the particular setting. Technical support from the Wetlands Subcommittee and other outside experts may be useful at this juncture of the process.

Once a diagnosis of the problem has been made, then project managers must develop a mitigation strategy. To best achieve a reasonable approach, it would be good to return to the original design process used for the project site originally. Local natural resource specialists should be consulted, NYSDEC and other permit organizations should be involved early, and clear and concise goals and objectives for the mitigation plan should be developed. It is likely that mitigation plans will be reviewed by the Stewardship Committee; it also seems likely that review by the Wetlands Subcommittee leading to concurrence with the proposed remedial plan would assist in gaining Stewardship Committee support for the mitigation.

Depending on the scope of the proposed mitigation, permitting and SEQRA issues may need to be revisited prior to implementation of the mitigation.

It is obvious that continued monitoring is required to assess the efficacy of the mitigation steps. The scope of this effort depends on the original project goals and determinations made by project reviewers, as modified by any mitigation changes.

4.7 Concerns Regarding Biocontrols

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Biocontrols. Comments were divided into three major sections: triggers for use of biocontrols, issues associated with the choice of fish for biocontrols, and native-non-native-invasive species issues.

4.7.1 Triggers (K-2)

A comment was received regarding the environmental conditions that fish can be introduced. This was discussed in Section 2.10 of the DGEIS. The Biocontrol section concluded with a précis of triggers for use:

> Fish will only be used in settings where they have expectations of survival (persistence of water and adequate water quality), and where native organisms will not be negatively impacted (as when there is a predator-naïve settings). Fish will only be used in settings where it is clear there is no opportunity for them to escape into broader ecosystems. In addition, in case this low probability event does occur, the County is to begin using organisms that are already widespread in County waters (where they appear to be causing no ecological impacts).
>
> Copepods, if New Jersey research confirms their effectiveness, would only be used in underground drainage systems that are isolated from larger fresh water or salt water settings.

The use of such predators would only be considered when source reduction is not possible. In other words, if structural changes are possible that ensure breeding will not occur, the introduction of non-native predators into a setting is not necessary. However, biological controls such as fish are potentially less environmentally damaging than pesticide use, and probably will be more effective. Fish would be considered less damaging only if they do not result in a disruption of a pre-existing ecosystem.

4.7.2 Fish choice discussion (K-3, K-4, AG-43, AG-111, AH-9)

Several questions were raised regarding the potential use of fathead minnows.

At a meeting of the Monitoring Committee on March 19, 2004 (see p. 22 of the DGEIS) that was primarily devoted to discussing how to best conduct the Caged Experiment, Cashin Associates personnel discussed biocontrols with a member of NYSDEC. It is believed that this staffer was Greg Kozlowski (Freshwater Wetlands), although it could have been Chart Guthrie (Freshwater Fisheries). Meeting minutes indicate both attended. At that time, it was related that other choices besides *Gambusia* really should be considered by the County. Fathead minnows were suggested, since fathead minnows were identified as a common species in Long Island waters that should be an effective mosquito predator.

FINS noted that the use of native species (and native species only) as biocontrols would be acceptable on Fire Island, if it could be demonstrated there would be no disruption of existing natural systems.

4.7.3 Invasive species (AG-44, AG-45, AG-111, AH-9)

FINS noted that no non-native species would be allowed as biocontrols in the National Seashore.

NYSDEC noted that the native or non-native status of a species should be identified with biocontrols. This was not done in Section 2 of the DGEIS, but it was in the impact assessment section (Section 7, p. 946).

The County selected fathead minnows for several reasons. One was that they were thought to be relatively common in Suffolk County waters, although being non-native. They were described as not being "invasive," that is, their presence as non-native fish did not seem to cause large species shifts or changes. This meant that if they were to escape from their inoculation site, impacts might be minimal (compared to, say, *Gambusia*). Fathead minnows are known to be hardy fish that can withstand changing environmental conditions. This means they should survive in less-than-optimal waterways. They have a good reputation as consumers of mosquito larvae – although they are identified as being primarily bottom-feeding fish, and most larvae prefer to remain near the surface. Thus, they might be a good fish to introduce into some recharge basins that support mosquito breeding.

The County is not actively reviewing predaceous copepods at this time. New Jersey is. New Jersey is seeking alternatives to pesticide use for catch basin mosquito control. Some southern mosquito control agencies have reported some success with copepods. These are fresh water species and reproduce very quickly. This means that their population can grow to a level allowing effective consumption of larvae before all the larvae hatch. The research in New Jersey has progressed far enough so that the copepods have been identified as potential biocontrols, but the researchers (and State) are not yet ready to allow their use (Wayne Crans, Rutgers University, personal communication, 2005; Dominick Ninivaggi, SCVC, personal communication, 2006).

4.8 Regarding Larval Controls

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with larval control. Most of the comments were related to the use of methoprene as a larvicide.

4.8.1 Methoprene Impact Assessment

Please note that Table 7-11 of the DGEIS was incorrectly transferred from the quantitative risk assessment. The values reported as chronic hazard quotients were, in fact, the acute hazard quotients. FGEIS Table 4-9 should be understood to replace DGEIS Table 7-11.

Table 4-9. Corrected Summary of Refined Chronic Aquatic Life Risks, Replacing DGEIS Table 7-11.

Table E-2
Summary of Refined Estimates of Chronic Aquatic Hazard Quotients for Adulticides and Larvicides By Study Area

			Davis Park - HQs$_{chronic}$			Dix Hills - HQs$_{chron}$		Manorville - HQs$_{chronic}$			
			Aquatic Setting								
			FW	M/ES		FW		FW			
Chemical	Freshwater Aquatic Life Receptors	Marine/Estuarine Aquatic Life Receptors	Freshwater Pond/Depression in Target + Runoff	Coastal Wetland/Marsh in Buffer - Drift + Runoff	Coastal Embayment in Buffer - Drift + Runoff	Freshwater Pond/Depression in Target + Runoff	Freshwater Wetland in Target + Runoff	Freshwater Pond/Depression in Target + Runoff	Freshwater Wetland in Target + Runoff	Freshwater Lake in Target + Runoff	Freshwater Stream in Target + Runoff
Methoprene											
	Fish	Fish	NC	NC	NC	5E-05	7E-05	6E-05	8E-05	6E-05	6E-05
	Amphibians	Crustaceans	NC	NC	NC	2E-05	3E-05	2E-05	3E-05	2E-05	2E-05
	Crustaceans	Mollusks	NC	NC	NC	6E-04	8E-04	6E-04	9E-04	6E-04	7E-04
	Mollusks	Aquatic insects/l	NC	NC	NC	7E-05	1E-04	8E-05	1E-04	8E-05	8E-05
	Aquatic insects/l	Aquatic plants	NC	NC	NC	3E-03	3E-03	3E-03	4E-03	3E-03	3E-03
	Aquatic plants		NC			NC	NC	NC	NC	NC	NC
Bti											
	Fish	Fish	NC	NC	NC	1E-08	1E-08	1E-08	1E-08	1E-08	1E-08
	Amphibians	Crustaceans	NC	NC	NC	6E-08	8E-08	7E-08	8E-08	7E-08	7E-08
	Crustaceans	Mollusks	NC	NC	NC	3E-07	3E-07	3E-07	4E-07	3E-07	3E-07
	Mollusks	Aquatic insects/l	NC	NC	NC	3E-07	3E-07	3E-07	4E-07	3E-07	3E-07
	Aquatic insects/l	Aquatic plants	NC	NC	NC	5E-07	6E-07	6E-07	7E-07	5E-07	6E-07
	Aquatic plants		NC			NC	NC	NC	NC	NC	NC

			Mastic Shirley$_{Aerial}$ - HQs$_{chronic}$								Mastic Shirley$_{Truck}$ - HQs$_{chronic}$							
			Aquatic Setting															
			FW				M/ES				FW				M/ES			
Chemical	Freshwater Aquatic Life Receptors	Marine/Estuarine Aquatic Life Receptors	Freshwater Pond/Depression in Target + Runoff	Freshwater Wetland in Target + Runoff	Freshwater Stream in Buffer - Drift + Runoff	Freshwater Stream in Target + Runoff	Coastal Wetland/Marsh in Target + Runoff	Coastal Embayment in Buffer - Drift + Runoff	Tidal Stream in Buffer - Drift + Runoff	Tidal Stream in Target + Runoff	Freshwater Pond/Depression in Target + Runoff	Freshwater Wetland in Target + Runoff	Freshwater Stream in Buffer - Drift + Runoff	Freshwater Stream in Target + Runoff	Coastal Wetland/Marsh in Target + Runoff	Coastal Embayment in Buffer - Drift + Runoff	Tidal Stream in Buffer - Drift + Runoff	Tidal Stream in Target + Runoff
Methoprene																		
	Fish	Fish	2E-04	3E-03	3E-04	3E-04	6E-05	2E-06	6E-06	7E-06	5E-05	7E-05	NC	6E-05	1E-06	NC	NC	1E-0
	Amphibians	Crustaceans	8E-05	1E-03	1E-04	1E-04	6E-02	2E-03	6E-03	7E-03	2E-05	3E-05	NC	2E-05	1E-03	NC	NC	1E-0
	Crustaceans	Mollusks	2E-03	3E-02	3E-03	4E-03	2E-01	7E-03	2E-02	2E-02	6E-04	8E-04	NC	6E-04	4E-03	NC	NC	3E-0
	Mollusks	Aquatic insects/l	3E-04	4E-03	4E-04	5E-04	1E-01	6E-03	1E-02	2E-02	7E-05	1E-04	NC	8E-05	3E-03	NC	NC	3E-0
	Aquatic insects/l	Aquatic plants	1E-02	1E-01	1E-02	2E-02	NC	NC	NC	NC	3E-03	3E-03	NC	3E-03	NC	NC	NC	NC
	Aquatic plants		NC	NC	NC	NC					NC	NC	NC	NC				
Bti																		
	Fish	Fish	2E-07	3E-06	3E-07	3E-07	3E-06	1E-07	3E-07	3E-07	1E-08	1E-08	NC	1E-08	1E-08	NC	NC	1E-0
	Amphibians	Crustaceans	9E-07	2E-05	2E-06	2E-06	8E-05	3E-06	8E-06	8E-06	6E-08	8E-08	NC	6E-08	3E-07	NC	NC	3E-0
	Crustaceans	Mollusks	4E-06	8E-05	8E-06	8E-06	8E-05	3E-06	8E-06	8E-06	3E-07	3E-07	NC	3E-07	3E-07	NC	NC	3E-0
	Mollusks	Aquatic insects/l	4E-06	8E-05	8E-06	8E-06	1E-04	5E-06	2E-05	2E-05	3E-07	3E-07	NC	3E-07	6E-07	NC	NC	5E-0
	Aquatic insects/l	Aquatic plants	8E-06	1E-04	2E-05	2E-05	NC	NC	NC	NC	5E-07	6E-07	NC	5E-07	NC	NC	NC	NC
	Aquatic plants		NC	NC	NC	NC					NC	NC	NC	NC				

Notes:
HQ > 1 = Acute hazard quotient of 1 is exceeded
FW = Freshwater setting
M/ES = Marine/estuarine setting

Many (104) comments were classified as relating to the discussion of the potential impact of methoprene. Some were general complaints, but many were very specific and detailed. This means that many comments will be responded to on an individual basis, and when possible on technical basis.

The County believes that there are three issues that lead many people to have concerns with methoprene. One is a study by Hershey et al. (1997) in Minnesota, which found changes in ecological structuring at sites where larvicide applications were being made versus control sites. Secondly, testing has found that low concentrations of methoprene at low ppm to mid ppb concentrations can be fatal to various aquatic organisms. This means that methoprene is properly labeled as being highly toxic to aquatic organisms. Finally, experiments in the Horst laboratory, working with crabs (Horst and Walker, 1999) and lobsters (Walker et al., 2005b), have shown that certain life stages of these crustaceans appear to be more sensitive than others to methoprene. The sensitivity may result in death, or could lead to developmental changes. The Horst laboratory has also been the first laboratory to document bioaccumulation of methoprene in lobsters (Walker et al., 2005a).

Although it is no longer considered to be the case today, methoprene as have other pesticides has been linked to deformities in frogs (Ankley et al., 1998) (as have other pesticides). A USGS summary of the issue suggested that most probably no one factor caused the deformities, and most probably, methoprene was not the primary agent (USGS, 2001). Further research on the cause of frog deformities has seemed to identify a virus as the proximate cause (Johnson et al., 2003), although the possibility that pesticides contribute to frog susceptibility is still an active research arena (Relyea, 2005). This has also contributed to the understanding, however, that methoprene has negative environmental impacts.

The County would like to stress several concepts that it believes have been mostly overlooked regarding these three cornerstone issues. There have been follow-up studies after the work reported by Hershey et al. Some of this work was conducted in the very same wetlands used by Hershey et al. The follow-up studies did not find that certain insect group diversity or numbers were decreased in sites where larvicides were applied. Because many of the same sites were resampled, it appears that the impacts that were measured by Hershey et al. were no longer measurable several years later. Hershey et al. noted that their study was begun under drought conditions, and that diversity and abundance were reduced at treatment and control sites at the beginning of the study. The impacts were found because treatment sites did not recover to the extent control sites did once the drought ended. The follow-up work was made over two years where rainfall was greater than normal. Under these conditions, there were no differences between treatment and control sites, and the depressed abundances and diversities at treatment sites had all recovered to match the control site conditions (Balcer et al., 1999). Treatment with larvicides was not halted over the interim period or during the experiments. Therefore, larvicides usage may be more likely to have some non-target effects when other stressors are important, or weather could simply be the dominant factor for insect diversity and fecundity. The latter is likely to be only partially true, as the control sites did recover more quickly from drought. It is also interesting to note that these wetlands received a combination treatment of Bti and methoprene; rarely if ever is Bti also identified as having potentially played a role in the non-target impacts.

As reported in the Literature Search (Book 7, CA-IC, 2004), low ppm concentrations of methoprene can be toxic to a variety of aquatic organisms. However, the exposure of organisms, as determined in modeling and some limited environmental testing, has been shown to be much less, especially over the time scales (typically, 48 to 72 hours) that toxicity was determined. This was reported in the DGEIS (pp. 975-992) and is the basis for the claim that non-target impacts from methoprene are unlikely to occur, and so the potential for increased risks to aquatic organisms from its use is slight.

Dr. Horst has been trying to expand perceptions of toxicity associated with methoprene. Because methoprene has, from Dr. Horst's perspective, a different mode of action than most other pesticides, he believes that different means of evaluating its toxicity are warranted (see comment AB-16). The crux of his argument is that methoprene does not directly cause mortality in its target and non-target organisms. Rather, it prevents organisms from maturing, and potentially has other, unforeseen impacts on non-target organisms at concentrations below those that cause fatalities. There are a number of instances where it has been hypothesized that endocrine system changes lead to unexpected or unwanted effects.

However, even using non-fatal endpoints as indicators of impact, it is not clear that Dr. Horst can make the case that methoprene concentrations in the environment achieve the concentrations necessary to cause the impacts measured in the laboratory. His studies continually cite "environmental" concentrations of 50 ppb or more; it is not clear what the basis of these claims are, as no citation for such concentrations is ever listed (see Horst and Walker, 1999; Walker et al., 2005a; Walker et al., 2005b, Horst et al., submitted). Additionally, it is not clear that the concentrations measured as peak concentrations are sustained long enough to cause the impacts identified in the laboratory. Some of the potential effects identified by the research may not be relevant. For instance, impacts to larval blue claw crabs from methoprene are interesting, but not very meaningful since larval crabs do not use salt marsh habitats (Virginia Sea Grant Program and Virginia Institute of Marine Science, 1993) where methoprene concentrations are highest. Also impacts to adult tissues occurred when the cells were bathed in pesticide (Horst and Walker, 1999). Similarly, lobsters prefer to use waters away from the immediate shoreline and avoid salt marshes, which are habitats where methoprene concentrations might be highest. It was only by using extraordinary estimates of pesticide inputs by assuming that all of the pesticide applied over a three month time period in each zip code bordering Long Island Sound was transported without any degradation or absorption to the estuary. It was then that modelers associated with the Long Island Sound Lobster Initiative were able to make concentrations of any mosquito control pesticide exceed toxicity levels – and then only in certain shoreline areas. Methoprene was found to have a maximum concentration of 500 parts per quadrillion, well below the concentrations hypothesized to have effects on lobsters (Miller et al., 2005). Research has shown that lobsters absorb methoprene, and that concentrations within the lobsters exceed ambient concentrations. However, it is not made clear how long the lobsters maintain the accumulated methoprene, as discussed in Walker et al. (2005a). It is true that the Horst laboratory has measured effects on lobster endocrine system functions from the concentrations that result from exposure to 50 ppb, and found that gene expression is changed following exposure to methoprene. However, actual impacts to adult lobsters were not directly measured. Instead, a convoluted pathway involving continued uptake from presumably methoprene enriched sediments was involved. This led to female lobsters suffering from molting defects, and also led to bioaccumulation of pesticides, with the presumption that pesticides were distributed to eggs, with subsequent impacts. All of this is very reasonable, as hypotheses to be tested, but none have yet been shown to hold. The work published on bioaccumulation itself is very preliminary. The report notes that five lobsters had been tested, but the only results presented were from one "representative" organism. A more complete testing regimen may or may not bear out these preliminary results. From the County's perspective, it is not absolutely clear that if the concentrations of pesticide are not maintained in the water column that the effects would occur nonetheless. The concentrations are not found in the water column in marsh areas or even in more open waters of the estuary, according to limited sampling data (for instance, Cashin Associates, 2005b, and Johnson and Kinney, 2006).

Dr. Horst and his laboratory have determined the potential for unforeseen impacts to crustaceans. The concept that pesticides that affect endocrine systems need more detailed review is an important insight. However, especially in the 2005 papers Dr. Horst seemed to be determined to inflate his findings into a determination of impact. Methoprene, at lower concentrations than those that affect lobsters, can impact organisms, as is clear from the impact to mosquitoes. It may be that organisms with endocrine systems that are closer to a mosquito's system may be potentially adversely affected by environmental concentrations. The County believes the scientific data do not show that to be the case for crustaceans, and, as is suggested in his conclusions in Horst et al. (submitted), Dr. Horst may be not as sure of the impact as well:

> After reviewing the outcome of our own research along with those of others, we have concluded that a combination of harmful events and exposures led to the reduced lobster population in WLIS [western Long Island Sound]. Nonetheless, methoprene may have played a part in this economic and environmental calamity.

(1) General comments (I-32, N-2, Q-56, P-72, S-3, S-4, S-64, S-66, S-68, S-70, S-71, U-61, X-8, Z-8, AA-9, AA-19, AA-22, AA-24, AA-25, AB-1, AB-2, AB-4, AB-7, AB-13, AB-16, AG-107, AP-11, AR-17, BB-3, BB-4, BI-19, BI-23)

It was noted that the primary pesticide used by SCVC is methoprene. This is not accurate, although measurements of pesticide use are not simple. SCVC has become accustomed to relating pesticide usage by the numbers of acres treated with specific compounds. This avoids translation problems due to changes in formulations or dilution rates for a particular product, or differences in how active ingredients are expressed. Carriers for different pesticides may be very different; for example, many of the products containing Bti are delivered using corn cob fragments. The effectiveness of the various active ingredients may differ from one compound to another, so that one might be delivered in "grams per acre," and another in "kilograms per acre." The County believes that defining the treatments in terms of acreage receiving pesticides is more informative. On that basis, resmethrin typically is the most used pesticide. Adulticide and larvicide acreage typically are approximately equal. The most commonly used larvicides are methoprene and the biological products, Bti and Bs. They are generally applied over approximately the same acreage. The adulticide resmethrin is generally applied over many more acres than the other commonly used adulticide, sumithrin. The DGEIS (pp. 36-37) expressed the larvicide treatments by the number of sites treated, but the acreage calculations would be approximately the same, as well.

It was noted that methoprene is routinely applied to marshes in Suffolk County. That is true for a subset of the County's marshes, to a certain degree. Approximately one-quarter of the salt marshes in Suffolk County commonly receive repeated applications of larvicides over large enough areas to warrant helicopter applications. The factors that weigh on decision-making for larval control, including the choice of pesticides, are discussed in the DGEIS (pp. 188-192). These applications are always made on the basis of surveillance that shows there is mosquito breeding occurring over a large enough extent of the marsh so that an application might be necessary. Evaluations of environmental conditions that affect the success of mosquito breeding, including whether or not the marsh is drying down, temperature trends, general weather forecasts, are used to determine if treatment is required to control a potential brood of mosquitoes. At that time, the actual larval stages and several other factors are used to determine which larvicide is used. This results in the use of methoprene approximately half of the time larvicides are applied. Therefore, the comment is partially correct, but also not entirely accurate.

It was noted that previously submitted comments (prior to release of the May 3, 2006 DGEIS) had disclosed greater impacts than discussed in the DGEIS. The DGEIS, as acknowledged by CEQ in its acceptance of the document as complete, made great efforts to address all previously submitted comments. The presentations made in the DGEIS may not have agreed with the interpretations offered in previously submitted comments, but the DGEIS made a large effort to include all relevant information.

Similarly, it was noted that there is no basis for stating methoprene poses no threat to human health. All relevant USEPA documents, discussed in the Literature Search (Book 6 Part 1 [CA-SCDHS, 2005]), found no credible evidence that methoprene has any human toxicity. This made calculation of any risk increase posed by methoprene use to human health technically impossible. This was identified by Peer Reviewer 2 as a sufficient basis for the observation, although alternate language was suggested.

It was also noted there is no basis for stating methoprene poses no significant environmental risks. Reviewers of the DGEIS may disagree with the conclusions that the document reached, and several did (noting the discussion was inadequate and the review deficient) but a large amount of work was conducted and presented to demonstrate the point that risks to organisms were minimal, because the calculated doses received by all organisms were less than critical values (see pp. 949-988, summarized in Tables 7-10 and in FGEIS Table 4-3, which corrects DGEIS Table 7-11). Other evidence was reported, too, from field work and literature reviews (pp. 988-1019). In all, 70 pages of material regarding the potential for impacts from larvicides were presented. Much of the work focused on methoprene. Another comment, somewhat similar in vein, was that the County should use caution in its use of methoprene, as it has been identified as having the potential for impact. The County is aware of the literature identifying relatively low concentrations of methoprene as having toxic impacts on organisms. The County has an interest in continuing sampling to add to its understanding of the environmental fate of methoprene. However, at this time the County is confident that a conservative risk assessment and site-specific field work confirm conclusions reached in other jurisdictions that the potential for harm is not realized.

There were some comments suggesting that methoprene impacts could be more completely characterized with the publication of the special issue of the Journal of Shellfish Research (V.24, No.3) reporting on the research conclusions of the Long Island Sound Lobster Research Initiative which was conducted by New York and Connecticut Sea Grants and not as part of the Long Island Study efforts as was mischaracterized. Comments were also received stating that Dr. Horst's research was not well represented. The County notes that the official characterization of the conclusions of the study was:

> The results indicate that the physiology of the lobsters was severely stressed by sustained, hostile environmental conditions, driven by above-average water temperatures. A new lobster disease, paramoebiasis, was identified as the proximate cause of death for the majority of lobsters identified by pathologists. Laboratory studies demonstrated that the pesticides used for mosquito control have sub-lethal or lethal effects on lobsters, based on concentration and time of exposure; however, modeling exercises indicate it is unlikely that the concentrations of individual pesticides in western Long Island Sound were high enough to cause the mortality effect.
>
> (Balcom and Howell, 2006)

The County further notes that modeling of methoprene made it the least likely contributor to the potential problem. Furthermore, unlike the post-Floyd (September 16) initiation for the die-off cited by some researchers, including Walker et al. 2005a, and Walker et al., 2005b, the Sea Grant report emphasizes that unusual mortalities were reported to State agencies in August, and also had been reported in other years including 1997 and 1998 (Balcolm and Howell, 2006). This confirms the County's opinion that the lobster die-off issue had little relevance to the issues at hand regarding the potential for methoprene impacts. The sections below on specific comments and on crustaceans should satisfy all concerned regarding the confluence of Dr. Horst's research and the County's assessment of potential methoprene impacts.

Comments were also made regarding the content of the Literature Search (Book 7, CA-IC, 2004). It was said that the Literature Search ignored 16 studies on methoprene cited in a comment by the Peconic BayKeeper. That issue was addressed in the DGEIS on pp. 993-1019. It appears that the list of citations was transparently culled from a data base review, and that no analysis of the listed papers was made by any commenter to date or even an attempt to show their relevance to environmental conditions in Suffolk County. NYSDEC, requested reconsideration of the papers. The County stands by its analysis of their contents, and is willing to discuss how its understanding of the contents of the papers is flawed. Book 7 of the Literature Search did not, it is true, account for the Long Island Sound Lobster Initiative effort. However, Book 8 Part 2 (CA-CE, 2004) did account for this effort and no reviewers have come forward to identify deficiencies in that analysis.

The Literature Search (Book 7, CA-IC, 2004) was also noted to have identified the potential for bioaccumulation with permethrin but not to have included bioaccumulation as a potential property of methoprene. Walker et al. (2005a) discussed this as an issue. However, the

Literature Search had been released at the time the article was published (late in 2004); in fact, the Literature Search was undergoing internal reviews for approximately five months prior to its release in November, 2004. That made it difficult to include information not yet available when the study was being written.

It was noted that Book 7 of the Literature Search (CA-IC, 2001) did not make note of "negative" reports contained within a review of methoprene conducted for the Massachusetts Pesticide Board Subcommittee Antunes-Kenyon and Kennedy, 2001, a study itself that was not peer reviewed. The report is rife with descriptions of the toxicity of methoprene, and, while not relied on in the Literature Search, was used to confirm findings developed independently by the researchers, or as were reported in the Westchester DGEIS. Because no specifics are listed in this comment, it is difficult to respond to its concerns.

A comment was raised regarding the concentrations expected for methoprene for the risk assessment. The quantitative risk assessment used a one-time modeling run by RTP Environmental (reported on in the Task 8 Task Report, Cashin Associates, 2005a) to confirm there would be insignificant drift from low altitude applications of methoprene, and also assumed that all hand-held applications of methoprene would deposit all of the pesticide into the target wetlands. Then, as described in the DGEIS, especially pp. 970-980 and in the Appendices of the Ecological Risk Assessment as part of the Task 8 Report, standard degradation and transport models were used to determine the fate of the applied methoprene. The concentrations might vary somewhat depending on the settings that were reviewed, especially the depth of the water column, as that determines dilution rates. As noted by Peer Reviewer 2, this approach resulted in modeled concentrations that are less than those required for impacts. The chronic assessment of methoprene for the risk assessment used a concentration of 3.3 ppb, culled from federal regulatory filings made by the manufacturer, as a maximum water column concentration associated with sustained release products.

It was further noted that Antunes-Kenyon and Kennedy determined that the environmental concentration of methoprene in the environment would be 5-10 ppb. That is not strictly accurate. The researchers reported what others said, as related in Table 4-10.

Table 4-10. Environmental Concentrations of Methoprene, from Antunes-Kenyon and Kennedy (2001)

Citation	Concentration	Comment
LeClair et al., 1998	4.4-6.0 ppb	Label application rate for a 0.25m deep pond, no degradation or absorption
Degitz et al., 2001[1]	10 ppb	"typical" field application rates
No citation	10 ppb	"maximum expected concentration" from labeled application rates (p. 13)
Horst and Walker, 1999	300-1,500 ppb	Concentrations likely to be seen in the environment[2]
Ross et al., 1994a	10 ppb	"Expected environmental concentrations"
Chu et al., 1997	<50 ppb	No impacts to water fleas if "environmental concentrations are less than 50 ppb, as is expected"
Ross et al., 1994b	10 ppb (maximum)	4 fl. oz./acre (label rate), 0.5 ft. deep pond
Ross et al., 1994b	<10 ppb[3]	No sample of 186 over 35 days
Ross et al., 1994b	<1 ppb	85 percent of samples over 35 days
Ross et al., 1994b	2.2 ppb (maximum)	Day 1[4] sample for liquid Altosid
Ross et al., 1994b	4 ppb (maximum)	30 day briquet, Day 7
Ross et al., 1994b	2 ppb (maximum)	30 day pellet, Day 7
Ross et al., 1994b	0.7 ppb (maximum)	150-day briquette, Day 2
Ross et al., 1994b	0.2 ppb	150-day briquette, "consistently" over 35 days

[1] No citation for this "poster presented at the 2001 Society of Toxicology annual meeting" was included, nor was it searchable on the Web
[2] Antunes-Kenyon and Kennedy called this "inaccurate and misleading"
[3] Actual reported highest concentration in the paper was 6 ppb, although Antunes-Kenyon and Kennedy reported the results as "less than 10 ppb"
[4] Antunes-Kenyon and Kennedy report this as a Day 1 and Day 3 result, but it actually was from a Day 1 sample

The commonly cited 10 ppb number was often used in association with toxicity values that were much higher, suggesting that it is an estimated "ballpark" value to place results in context. For instance, a toxicity value of "100 ppb" is not especially ecologically relevant if environmental concentrations are in the neighborhood of "10 ppb." The only actual environmental values (Ross et al., 1994) were not defined in terms of setting tested, although it appears a 6 inch deep pond was used. It is clear that the depth of the waterbody to which the pesticide is applied will determine the theoretical maximum concentration for methoprene. It should be noted that the time-release formulations are intended to not entirely dissolve into water immediately. Therefore, even the liquid Altosid should not have its application rate/acre divided by depth of pond concentration at any one time. These data are in line with the findings of the County's Caged Fish sampling effort, where samples collected at the water-air interface within 30 minutes of the application found concentrations greater than 1 ppb (the maximum measured was 3.3 ppb), but all others were much less (Cashin Associates, 2005b). Results reported from Washington

State also always found concentrations to be less than 1 ppb (the maximum reported concentrations were 640 and 520 parts per trillion, measured for the degradation product methoprenic acid, one week following the applications) (Johnson and Kinney, 2006). However, as has been noted earlier (Section 4.1.3), several reviewers found the testing of methoprene under environmental conditions to be inadequate.

It was noted that the estuary is an important breeding ground for the food chain. This is true, and the County is very protective of environmental quality in its immediate offshore area. The implication of the comment is, however, that since methoprene impacts certain organisms' ability to mature from larval stages, its continued use will have negative impacts on the aquatic food chain. The County notes that there are few instances of testing finding impacts to larval organisms, although it is true not many such organisms have been tested, and that no impacts have been shown for concentrations likely to occur in the estuary. Estuarine concentrations are likely to be very low, much smaller, due to dilution, than the maximum concentrations discussed in Table 4-4. Modeling in association with the Long Island Sound Lobster Initiative, testing for worst case potential concentrations using unrealistic input terms, estimated the maximum estuarine concentration would be 500 parts per quadrillion (0.0005 ppb) (Miller et al., 2005).

It is true, as noted in one comment, that the risk assessment does not adequately address synergy between environmental stress and pesticide exposures. There is a growing realization that, for example, poor water quality can exacerbate other stressors so that effects occur at lower concentrations. One of the conclusions reached by the Long Island Sound Lobster Initiative was that conditions in Long Island Sound created a "perfect storm" for the lobsters. The elements of the storm that summed to greater than its parts included low DO, elevated temperatures, higher than background sediment toxics releases, and an outbreak of a potentially novel disease in an artificially-sustained population. Inputs of pesticides could have contributed to this mix, although it is not clear they did, or that they had to in order for a die-off to occur (Valente and Cuomo, 2005). Similarly, stressed frogs have been shown to be more susceptible to parasites (Johnson and Chase, 2004), and methoprene has been shown to have more toxicity to mud crabs when the crabs are stressed under low salinity conditions (Costlow, 1977). However, there is no clear way to incorporate such information into standard risk assessments. Assumptions could be made regarding the confluence of expected environmental conditions and pesticide applications, but there are too few data sets at this time to infer expected additional effects. Additional margins of error/safety could be introduced to address the issue, it is true. However, that is not case at this time under standard procedures.

Finally, as discussed in the introduction to Section 4.8, Dr. Horst's comment that perhaps pesticides that have a mode of action through the endocrine system need to be addressed in a different fashion. As noted above, the County tends to agree with Dr. Horst, but is unsure of how to accomplish the desired work. As noted in another comment, there is a dearth of hormone-inhibitor non-target impact studies in general, let alone regarding methoprene. However, the County further notes that, in nearly every instance, the concentrations detected in salt marshes, and calculated in the risk assessment, are less than those identified to date as being concentrations of concern. Where the concentrations of concern are exceeded, they are not sustained for any length of time. Therefore, no matter what means of impact is at issue, it appears that environmental concentrations of methoprene do not exceed levels of concern.

(2) Specific comments (I-33, I-35, S-65, S-72, S-73, S-76, T-20, X-17, X-18, X-20, Y-13, Y-14, Z-1, Z-2, Z-3, Z-7, Z-9, Z-10, Z-11, Z-12, Z-13, Z-17, Z-18, Z-20, Z-22, AA-6, AA-7, AA-20, AA-21, AA-23, AB-3, AB-8, AB-14, AB-15, AB-17, AB-18, AB-19, AG-59, AG-70, AG-71, AG-115, AP-13, AP-14, BI-22, BI-24, BI-20)

Comments were received regarding the County's description of methoprene. It was correctly noted, for instance, that methoprene is not specific to insects, and that the hormone it mimics, juvenile hormone, is not specific to insects but also is found in other arthropods. Furthermore, corrections were offered to the description of the mode of action of methoprene, including a detailed description that

> [m]ethoprene binds to receptors in the nucleus of cells and alters the transcription of mRNA as well as the rate of translation of mRNA into proteins. These changes are generally classified as alterations in gene expression. Each hormone has a unique set of genes that it turns on while it turns off others, depending on the number of receptors present and the type of cell involved … [creating] the ability to trigger a wide variety of molecular alterations within specific tissues of the organism. … [In addition] methoprene has the ability to act directly on membrane bound transporters such as the sodium potassium ATPase, which is critical for neuronal activity.
>
> (Comment AA-6)

These comments are noted as being precise and correct. However, in using the terminology that it did, the County was merely following general practice. For instance, methoprene was described in a peer-reviewed journal article as

> belong[ing] to the group of pesticides known as insect growth regulators (IGRs), which, in general, exert their toxic effects by disrupting insect development and/or reproduction.
>
> (Horst and Walker, 1999)

Because of the common usage that seems to restrict its impacts to insects, the potential for non-target effects may have seemed to be inadvertently minimized. The County did not intend for any such conclusions to be reached.

It was also noted, to be very accurate in discussing methoprene, that there are two methoprene isomers. Isomers are chemicals with identical molecular formulas and atomic arrangements, but different molecular shapes, due to chemical bond flexing, and only (s)-methoprene has pesticidal properties. Most discussions of methoprene tend to ignore these distinctions, and the point is well-taken.

It was noted that methoprene "impacts the larval stages of other insects, mosquito predators, and crustaceans, including dragonflies, a variety of beetles, ladybugs, crabs, and shrimp." The County recognizes that most, if not all, of these organisms have toxicity values for methoprene. However, the concentrations at which methoprene is measured in the environment do not exceed the concentrations of the toxicity values. As reported in DGEIS Table 7-10 and Table 4-9 of the FGEIS (which corrects Table 7-11 of the DGEIS), the hazard quotients (the predicted environmental concentration divided by the effect concentration) for all scenarios in all four risk assessment areas for acute impacts all are less than 0.02, and for chronic exposures are all less than 0.1. For acute impacts to occur, actual concentrations would need to exceed the predicted concentrations by 50. In order for there to be any chronic impact whatsoever, the concentration would need to exceed the predicted value by 10. For most scenarios, the gap is much, much larger. This gives the County confidence to assert that its best evaluation of potential risks clearly shows that no impacts are to be expected.

Thus the County asserts that there is little risk of impact to non-target organisms at environmental concentrations, which is disputed. It was noted that impacts to organisms at concentrations as low as 3 ppb have been observed. Effects at concentrations this low were determined over exposures of some duration, normally 72 hours. The County's data indicates that sustained concentrations of methoprene are not measured at even 1 ppb. Peak concentrations have been reported at or even slightly above 3 ppb (see Ross et al., 1994b, and Cashin Associates, 2005b), but these are not maintained long enough, apparently, to cause the impacts that are found with sustained exposures.

It was asserted that slow release forms can cause concentrations that exceed 15 ppb; but no citation for this assertion was provided, and, as related above, no information to support such an assertion is available.

It was asserted that concentrations lethal to mosquitoes may have non-target impacts. Antunes-Kenyon and Kennedy (2001) indicate that 1 ppb was identified as being lethal to all mosquito species. This concentration is below the levels of concern found for all non-target species to date. The effective concentrations at which methoprene impacts mosquitoes may be much lower, if sampling data from the Caged Fish experiment (Cashin Associates, 2005b), Washington State (Johnson and Kinney, 2006), and Wellmark (Ross et al., 1994b) is accurate. These data showed environmental concentrations are almost always well under 1 ppb, and yet efficacy data for methoprene indicates it is very effective are preventing mosquito maturation (Campbell et al., 2005). Thus it does not seem true that the concentrations that kill mosquitoes will have non-target impacts; however, concentrations that may have non-target impacts will certainly be effective against mosquitoes.

Several comments assert that the Material Safety Data Sheet (MSDS) for methoprene shows it to be "toxic." Review of the MSDS for liquid Altosid (Wellmark International, 1997) and Altosid briquets (Wellmark International, 2003) did not find any such designation. USEPA concluded in its review that

> exposure to Methoprene will not reach levels that are toxic to aquatic non-target species either after acute or chronic exposures.

However, in 1996 USEPA concluded that it was warranted to

> Add the label warning "This product is toxic to aquatic dipteran (mosquitoes) and chironomid (midge) larvae" to all briquette and pellet labels.
>
> (USEPA, 2001)

Therefore, although the document reference was incorrect, the sense of the statement is somewhat justified. USEPA closed the report, however, by noting that its concerns regarding non-target impacts of methoprene had been alleviated by data provided by Wellmark, demonstrating that there is a 200-fold margin of safety between measured toxic concentrations and measured environmental concentrations. Work by Dr. Horst's laboratory, in particular, has reduced that margin of safety, however. Still, for organisms that may be exposed to methoprene in marshes, there have not been considerable changes in the toxicity reports since 1996.

Several misstatements have been made regarding the New York City DGEIS and methoprene, and the NYCDOH decision regarding methoprene use. Comments were received stating the NYC DGEIS identified methoprene as toxic. This is not strictly accurate. The NYS DGEIS proper only discussed methoprene in terms of past uses (see pp. 1-20 and 2-23 - 2-24). The Executive Summary (pp. S-44 - S-45) discussed how an environmental review by the City of its "Routine Program" (separate from its West Nile Virus Response DGEIS) had found

> Methoprene targets mosquito larvae in aquatic habitats but may also be toxic to other invertebrates. … Because of this potential to affect non-target organisms, methoprene will only be applied to systems (sewers and catchbasins) that do not discharge to surface waters or ground water. … When applied at rates recommended for mosquito control, methoprene has been found to affect aquatic stages of other dipterans, but populations have between (*sic*) temporary.

This is not a finding of ecological impact, as defined by this environmental assessment, although it might be interpreted as a finding of toxicity – although it was not in the DGEIS itself. In addition, the DGEIS suggested that New York City had made its decision in the face of Region II NYSDEC pressure (or, at least, inferences that a permit to apply methoprene more broadly might not be forthcoming). Cashin Associates was unable to find anyone in New York City government who would attest to such a decision-making process, and so Cashin Associates apologizes for the inference that the New York City (and potentially, Westchester County) decision was not made on the basis of internal review of the environmental data available to those decision-makers. There is no doubt that both New York City and

Westchester County determined that methoprene would only be used in stormwater systems, and not in estuarine environments, as noted by several comments.

Antunes-Kenyon and Kennedy (2001) discuss the fact that in 2001 the only state with an explicit restriction on methoprene use was New York. They explained that NYSDEC had conducted a risk assessment, and determined that the teratogenic reports for methoprene were of concern. This, combined with some evidence that 150-day briquets were observed to physically last as long as 18 months (although no efficacy was reported for these residual briquets), led NYSDEC, according to Antunes-Kenyon and Kennedy, to determine that the 150-day briquets might remain through a winter and cause effects on fish and amphibian eggs and larvae in the spring of the year following an application. Therefore, NYSDEC has required a special label for the methoprene 150-day briquets that bans their use in open waters (the Antunes-Kenyon and Kennedy reporting was on the basis of a personal communication with Tim Sinnott, Ecotoxicology and Standard Unit Leader, in 2001, not any written report). It should be noted that later research has tended to downplay methoprene and retinoic acids as teratogens (see just below), but NYSDEC has not revisited its decision. It may also be noteworthy that this risk assessment did not find reports of non-target impacts for other open water applications of concern, although it appears to have been made after publication of Hershey et al. in 1998.

It was also noted that methoprene briquets may last 1-3 months. That range is the intended effective time period for the pesticide, and the 150-day briquette is intended to last much longer (nearly 5 months). Research cited in Antunes-Kenyon and Kennedy (2001) and used by NYSDEC in its risk assessment showed that the briquets may physically last as long as 18 months.

It was also noted that methoprene may have impacts to frog development. Those concerns were raised in the late 1990s (Ankley et al., 1998). The preponderance of evidence is that the primary cause of frog development problems is trematode parasite infections (Johnson et al., 2003). There is some evidence that exposure to pesticides (among other stressors) may make frogs more susceptible to infection with the focus on agricultural pesticides (Relyea, 2005), Agricultural pesticides are generally present in rural settings at concentrations far in excess of those associated with methoprene applications for mosquito control (Ross et al., 1994b; Cashin Associates, 2005b; Johnson and Kinney, 2006). Related to this issue was the notion that retionoids may be causing frog deformities. Antunes-Kenyon and Kennedy (2001) reported that there was some information that certain retinoids cause deformities in frogs – although not loss of limbs, which is the charismatic impact supposedly caused by methoprene exposure. However, Degitz et al. (2003) determined that before deformities can be produced, retionoic acids are toxic to very young frog larvae. This implies that retinoic acids cannot be causing developmental problems because it kills the larvae before deformities can be produced – which Degitz et al. identify as meaning other processes are more sensitive to contaminants than skeletal formation. Methoprene is in the same chemical class as retinoic acids (retinoids). Degitz et al. found the toxic effects at lower concentrations than had otherwise been found (0.24 ppb) by using a flow through system and testing very young (Stage 8) organisms. This implies that a margin of safety for methoprene use might be gained by avoiding using it when amphibian eggs and very young larvae are present. This is the intention of the County's pursuit of ecological information from local environmental agencies and groups.

It was noted that the Literature Search (Book 7, CA-IC, 2004) mentioned the potential for impacts to bees, but did not pursue this issue further. This is because the simplifying assumption was made that terrestrial animals and insects would not be exposed to methoprene. This is not entirely accurate, as bees and other terrestrial organisms might drink from methoprene-contaminated water bodies. This pathway was not explored in the risk assessment. The exposure is generally much lower than aquatic organisms might receive, however, and the lack of impact found for aquatic organisms and the large margins of safety found in the analyses indicate that no impact would have been found if the pathway had been traced.

It was noted that the Literature Search (on p. 3-8) (Book 7, CA-IC, 2004) does not account for time-release formulations. It is true that the particular section does not mention time release formulations. However, the quantitative risk assessment did discuss the potential for use of time release formulations (see the DGEIS, pp. 477-478). It appears all environmental fate calculations (see Table B-8, Ecological Risk Assessment Appendix B [part of the Task 8 Task Report, Cashin Associates, 2004a]) were made assuming that only liquid Altosid would be used in open water settings for acute effects determinations. However, chronic impacts were tested for using steady-state 3.3 ppb concentrations. This concentration is higher than the values used for acute exposures, which is one of the contributing factors to the calculations showing higher Hazard Index values for chronic exposure as compared to acute exposure.

A comment was received regarding sediment concentrations detected for methoprene. These were reported in the DGEIS (p. 765, Table 6-7) as a range. Table 4-11 reproduces the methoprene data from Table 6 from Cashin Associates (2005b) where the data were presented.

Table 4-11. Pesticide Concentrations Measured in Sediments by SBU

Date collected	Sample description	Methoprene ng/g
Johns Neck Creek		
8/7/04	4 day post-spray subtidal	**17**
8/7/04	4 day post-spray intertidal	**25**
8/11/04	Surface	**68**
8/18/04	subtidal pre-spray	< DL
8/18/04	supertidal pre-spray	**20**
8/19/04	1 day post-spray subtidal	**15**
8/19/04	1 day post-spray subtidal	**24**
8/19/04	1 day post-spray supertidal	**21**
8/22/04	4 day post-spray subtidal	**9.1**
8/22/04	4 day post-spray subtidal	**9.6**
8/22/04	4 day post-spray subtidal	**18**
8/22/04	4 day post-spray supertidal	**57**
8/22/04	4 day post-spray supertidal	**50**
8/25/04	pre-spray subtidal	**14**
8/26/04	1 day post-spray subtidal	**17**
8/26/04	1 day post-spray supertidal	**21**
8/29/04	4 day post-spray subtidal	< DL
9/5/04	subsurface ditch @ cages	< DL
9/5/04	subtidal intertidal	< DL
9/5/04	outer pond sed	**13**
9/5/04	intertidal inter mud	< DL
9/5/04	shore sed	< DL
Timber Point		
8/2/04	subtidal pre-spray	**20**
8/2/04	algal mat pre-spray	**40**
8/7/04	4 day post-spray supertidal	**39**
9/5/04	Panne scraping	**1200**
9/5/04	sulphur, high-marsh scraping	**58**
9/5/04	deposit pond	**64**
9/5/04	subsurface @ cages	**50**
Flax Pond		
8/2/04	supertidal pre-spray	< DL
8/2/04	subtidal pre-spray	< DL
Havens Point		
8/2/04	supertidal pre-spray	< DL
8/2/04	subtidal pre-spray	< DL
8/18/04	subtidal pre-spray	< DL
8/18/04	supertidal pre-spray	< DL

The question was asked why methoprene sinks. The "liquid" Altosid which is actually "micro-encapsulated" is composed of fine particles that are designed to dissolve over time and/or settle to the bottom of the water system. Although it is a propriety process, it appears that the coating process that creates the microencapsulated Altosid is intended to provide a distribution of coating thicknesses to allow for a steady release of the pesticide as the coatings dissolve. Altosid that dissolves into the water column tends not to remain long, as it is highly reactive with organic particles. Most organic detritus eventually sinks through the water column (if it is not consumed). The briquets are designed to sink.

Because methoprene is associated with organic debris, filter feeders and other detritivores on the sediment surface may consume methoprene with particulate matter. It was noted in comments that worms may thus consume the methoprene. The limited data from sediment sampling suggests that maximum methoprene concentrations will be in the tens of parts per billion in sediments. It is unclear if methoprene will be absorbed by the organisms when eaten, although the assumption is it will.

It was stated that because of the high K_{oc} of methoprene, it will adhere to plastics (as well as other organic matter. This is true, in a sense. Glass sampling containers and test jars would be preferred. In the Caged Fish experiment, however, because light-weight plastics are generally used in such experiments, the typical kind of set-up was used. Researchers believe that the combination of large water volumes compared to plastic surfaces and presence of a great deal of natural organic matter in the water column meant that the plastic vessels had little effects on the sampling results. Other researchers have also failed to recognize the potential for these problems. Although Dr. Horst made these comments regarding County experimental techniques, his papers (Horst and Walker, 1999; Walker et al., 2005a; Walker et al., 2005b) until very recently (Horst et al., submitted) all specified the use of plastic trays as experimental containers. The County notes that these containers would have a much higher exposed plastic surface area to water volume ratio than any devices used in the Caged Fish experiment. It may be that absorption and subsequent desorption of methoprene from the sampling containers affected the results reported in those papers.

It was noted that the claim that methoprene degrades quickly in the environment is misleading. Impacts may be detected, according to some research (see Horst et al., submitted), within the time period that the pesticide is degrading. Additionally because the pesticide may bioaccumulate, loss of it from the physical environment may not be as important. These are accurate statements, but do not erase the fact that methoprene has low aquatic persistence and a high degree of partitioning to sediment and suspended solids under natural conditions. In this vein, it was noted that the degradation of methoprene is not a good enough reason not to be concerned with its presence in the open estuary. That is fair enough; the reason not to be especially concerned about methoprene in estuaries is that its concentrations in salt marshes are very low, and dilution into the estuaries will decrease these concentrations even more. Very conservative modeling of potential methoprene concentrations in Long Island Sound resulted in a predicted concentration of 500 parts per quadrillion (ten thousand times smaller than 5 parts per billion) (Miller et al., 2005).

A comment was received that the persistence of methoprene in temporary ponds means that chronic impacts will be realized. The risk assessment tested this by using a steady-state 3.3 ppb value under chronic exposure conditions. Little to no potential for impact to organisms were detected (Hazard Indices for all scenarios were 0.1 or smaller). In addition, measurements of water column concentrations seem to indicate a rapid decay from initial values. Nevertheless, it is possible that methoprene reaching a small, shallow temporary pond on a marsh surface may indeed maintain concentrations that are great enough to have non-target impacts on the organisms in that pond. However, there is little information regarding the use of such habitats.

A comment was received that Tropical Storm Floyd washed methoprene briquets out into the estuary. As far as can be determined, this is a reasonable supposition for areas where direct runoff from the storm water system did reach the estuaries. However, there is no proof that the briquets were indeed washed out, and no measurements of any pesticide input or toxic effects from any instances of briquette washout. Using this as an example of other potential effects under the Long-Term Plan, various claims have been made regarding future washouts. For instance, one comment noted that there could be a massive impact if 100,000 catch basins had methoprene washed out into Long Island Sound. First of all, the County does not plan to put methoprene into all the catch basins in the County. Secondly, there is very little drainage from

Suffolk County into Long Island Sound. Much of the County does not have surface water run-off under any conditions into any estuary. Finally, it has not been shown that briquets do wash out of catch basins under heavy storm flow, although admittedly it is a reasonable assumption to make. Most storm water systems in the County drain into landlocked recharge basins, and so the fate of methoprene briquette washouts, if any occur, will mostly be to prevent mosquito breeding in overfull recharge basins. A query was made regarding placing briquets in a wire cage to prevent washouts. The County will, as it moves forward with its program under the Long-Term Plan, investigate alternatives to the use of loose briquets in storm water systems where a potential pathway does lead to natural surface waters.

Methoprenic acid has been identified as a breakdown product of methoprene, as noted in several comments. Very little information is available regarding this compound. As noted in one comment, there has been not testing for acute effects of methoprenic acid in arthropods. Methoprenic acid can be detected at concentrations greater than methoprene itself, but the analysis of samples in Washington State following methoprene applications did not find any concentrations greater than 1 ppb.

The question was asked why applicator exposures to methoprene were not tested. The study did not address applicator risks, as these are often very different exposures than received by residents.

A definition of the word "biomarker" was requested. As used in the Risk Assessment and DGIS, a biomarker is a compound that signals exposure to another chemical of interest. For instance, organisms, following exposure to contaminants, may express a chemical at a higher rate than otherwise.

A definition of the word "biorational" was requested. Biorational, as used in the Long-Term Plan and the DGEIS, is a modifier for pesticides used to signify that the compound has a restricted range of species or classes of organisms that it affects. Biorational pesticides such as Bti and methoprene are contrasted to broad spectrum pesticides such as DDT.

(3) Crustacean-specific comments (Q-55, S-69, S-74, S-75, X-15, X-19, Z-6, Z-14, Z-16, Z-19, Z-21, AA-8, AB-5, AB-6, AB-9, AB-10, AB-11, BI-21)

A comment identified the following as crustaceans for which methoprene is toxic:

- Grass shrimp
- Brine shrimp
- Daphnids
- Mysids
- Crabs
- Lobsters

The County notes that, perhaps more accurately, these are crustaceans for which toxicity values have been determined. From the County's perspective, use of methoprene in mosquito control is not toxic to these species, because the critical concentrations that would kill the organisms are not reached under label-compliant applications.

The Literature Search was criticized for excessively relying on Antunes-Kenyon and Kennedy (2001) regarding the potential for impact to crustaceans. The report, as far as the County has been able to determine, had a balanced and comprehensive review of methoprene impacts on crustaceans, as available in 2001. The earlier citations provided by the Peconic BayKeeper, for instance, did not result in higher toxicity values than those culled from Westchester County (2001) or Antunes-Kenyon and Kennedy (2001) (see the discussion in the DGEIS, pp. 993-1019). On those occasions where the paper drew conclusions regarding researcher findings, the statements seemed reasonable. For instance, the criticism of Horst and Walker (1999) for stating that 300 to 1,500 ppb constitutes "environmental" concentrations associated with methoprene applications for mosquito control seems very well grounded.

It was noted that USGS sampling found methoprene concentrations that exceed the threshold values found for toxicity to Stage II lobster larvae. It was also noted that the DGEIS did not account for impacts to larval crustaceans. Both comments have validity. Samples collected by USGS (reported in the DGEIS, pp. 765, Table 6-7) exceeded the 1 ppb value reported in Walker et al., 2005b. However, that concentration was found to be toxic to Stage II lobster larvae following 72 hours of exposure. The USGS data were from the first 30 minutes following application, and subsequent methoprene concentrations were at or below the levels where no effects to larvae were reported in Walker et al., 2005b (see Cashin Associates, 2005b). The LC_{50} for the Stage III lobsters was asserted to be 3 ppb. No experimental data for Stage III testing has ever been published which suggests that the comment was a typo, and Stage II larvae were meant – although the calculations and exact value for the LC_{50} datum are not presented in Walker et al., 2005a). Dr. Horst asserts that at least one of the 30 minute samples exceeded it, which is correct in terms of comparisons of 3 ppb to the Caged Fish data (one result was 3.3 ppb). The County notes that although the exposure of the larvae in the laboratory was for 72 hours to produce these results, the longer term methoprene concentrations in the marshes were in the low part per trillion range, where they were detectable (see the DGEIS, Table 6-7, p. 765, and Cashin Associates, 2004b).

It was noted that the quantitative risk assessment did not account for impacts to juvenile lobsters. This is true, as the information published by Walker et al. (2005a, 2005b) was formally available too late for incorporation into the study. However, the maximum concentration for methoprene calculated for use in the risk assessment (prior to any degradation or dispersion, or partitioning to sediment), which was based on aerial application of methoprene to salt marshes in the "Mastic-Shirley" risk assessment area, was 1.1 ppb. This is slightly more than the concentration at which 30 percent of the Stage II lobster larvae died with 72 hours of exposure; it should be noted that 14 percent of the control lobster larvae also died over that same time span. Therefore, since the 1.1 ppb instantaneous deposition concentration is not likely to be maintained, it is reasonable to state that if the risk assessment had formally used the 1 ppb concentration as a critical value, the Hazard Quotient would still be less than 1, indicating that an impact is not likely to occur. Merely accounting for partitioning to sediment, in the refined model following the USEPA RICE model, reduces the modeled concentration to 0.35 ppb. This is especially so for a risk assessment that uses LC_{50} values to determine impact, as was the case for this study. The LC_{50} concentration for Stage II lobsters, although not calculated by Walker et al. (2005b), would be between the 1 ppb value and 10 ppb value where 86 percent of the larvae had died, clearly above the maximum calculated methoprene concentration, ensuring that any Hazard Quotient calculation would be less than 1.

It was noted that the half-life of methoprene in sediments was long enough to cause effects in lobsters. Dr. Horst found that lobsters bioaccumulate methoprene after just four hours exposure to it in the water column. The research associated with Caged Fish found good evidence that methoprene had a half-life of much less than a week in sediments, as concentrations following repeated applications with one week intervals did not result in ever increasing concentrations in the sediment. On some occasions, methoprene was still detectable one week after an application, so it does not entirely degrade in a week. This implies the methoprene is in sediments for some measurable time period in discernable amounts, although most seems to dissipate within a week. Given an apparent rapid uptake by lobsters, this suggests that they will be exposed to higher concentrations long enough to uptake enough methoprene to potentially cause impacts. However, the mechanism by which the lobsters will take up methoprene in sediments is not clear. Dr. Horst discusses that the most significant pathway for lobster uptake of contaminants is through the digestive track, not exposure through the shell from ambient water column chemicals. Lobsters will take cover in sediments, but they do not consume sediments (intentionally). Dr. Horst has implied that worm consumption of sediment and detritus and then ingestion of the contaminated worm is a potential pathway for lobster exposure; but the kinetics of such a pathway should be discussed and shown to be viable given degradation of methoprene. The potential for worm depuration of any ingested methoprene is unknown. Therefore, although certain elements of the implication make some sort of prima facie sense, the statement does not test well when examined.

A claim was made that toxic effects with mud crabs, grass shrimp, and lobsters have been determined. This is true, but not accurate. The laboratory testing of these animals has determined that methoprene, at great enough concentrations, can have effects on various stages of these organisms, usually, for larvae. However, whether those concentrations occur when methoprene is applied is in dispute. Dr. Horst has been known to inflate the values associated with "environmental conditions," although he might suggest the County in turn underplays the value. The County believes that the weight of evidence, from field work and modeling, supports its estimates compared to unreferenced assertions by Dr. Horst. Thus, it is asserted that concentrations in the salt marsh will have significant effects on crab and shrimp. This seems unlikely, given measurements made in shallow, poorly flushed ditches in the salt marsh by the County as part of the Caged Fish experiment did not show sustained concentrations at the levels necessary to cause impacts.

It was stated that slow-release methoprene may cause 15 ppb concentrations on the salt marsh – although no justification for the statement is given. Such a concentration is said to cause significant mortality to non-target shrimp and lobsters. This is an intriguing notion, but has several important issues associated with it. One, in all of the literature reviewed for the DGEIS, received as comments on the DGEIS, and reviewed as part of the FGEIS, no adult impacts to crab or lobsters are identified at these concentrations. Some larval impacts are found. It should be noted that lobsters do not inhabit the salt marsh, and neither do crab larvae. Adult crabs do live on the marsh. Adverse impacts to mud crabs have been noted to occur at 100 ppb, if other stressors are involved (McKenney and Matthews, 1990, as reported in Horst and Walker, 1999). Since waters on the marsh may be shallower than those typically modeled to find higher methoprene concentrations than typically reported, does not stand for close scrutiny.

The endocrine impacts of methoprene are commented on quite often. Changes in gene expression, described in an unpublished paper (Horst et al., submitted), leading to changes in protein production which can cause a host of biochemical effects in an organism, are implied, but not yet proven to be the actual mode of action of methoprene in impacting lobsters. These effects are different from mode of action by which methoprene is said to prevent insects from developing. It should be noted that the work as presented does not actually trace the changes in protein production to changes in animal physiology. It is implied that the fact that changes occur at the cellular level will necessarily result in changes in the whole organism. However, that has generally not been the case. No reports that the County is aware of have determined a concentration for methoprene that is fatal to adult lobsters. So, that crabs and other crustacean are more exposed to methoprene in the summer when their growth and molting are occurring, appears to be an issue, because of the potential for impacts to proteins involved in molting; but no actual impacts have yet been described. It is true that molting increases stress on the organisms, and increased stressors (such as reduced salinity) have been shown to increase methoprene toxicity to crabs. However, the inference that molting in summer will lead to lower toxicities for crabs has not been shown to occur. Additionally, it has not been shown that the concentrations of methoprene that crabs are actually exposed to on a salt marsh represent concentrations of concern.

Dr. Horst states that because toxic effects on Stage III lobster larvae were found at 3ppb, then the effects would also be expressed in crabs and shrimp. For one, he evidently is referring to Stage II larvae, as that was the test animal most affected according to Walker et al. (2005a, 2005b). Secondly, the conclusion drawn is very misleading. Data compiled on methoprene show that, in fact, crabs and shrimp are often affected at very different concentrations, and at different concentrations than impacts were measured in lobsters. Risk assessments often take shortcuts, and assign one toxicological value to classes of organisms such as crustaceans. Using the species that is most susceptible to impact as a representative of an entire class of organisms is a highly conservative approach to a risk assessment. However, that should not be confused with actual impacts across the grouping. Some non-toxic effects were reported for shrimp at around 3 ppb, but the lowest LC_{50} (or greater) toxicity concentration for shrimp was reported to be 106 ppb, and lowest LC_{50} (actually, LC_{80}) for crabs was 500 ppb.

Dr. Horst states that methoprene bioaccumulates 250-fold in lobsters. This, again, is not exactly accurate. The data in Walker et al. (2005b) show that methoprene accumulates in various organs at concentrations ranging from 30 to 575 times the ambient concentration. Typically, bioaccumulation is usually determined in terms of lipids or whole body concentration, although sometimes, with large organisms, individual organ concentrations are determined (see testing conducted on various aqueous and terrestrial organisms at Brookhaven National Laboratory, Cashin Associates, 2004c). Therefore, the numbers reported here are not typical presentations. In addition, the depuration of methoprene from lobsters is not discussed. In fact, Dr. Horst asserts that methoprene may remain stable in lobsters for days, but the bioaccumulation studies he did with lobsters merely exposed them for four hours, and then they were sacrificed. No determination of the fate of methoprene in lobsters has been presented in the scientific press.

Dr. Horst reports changes in hepatopancreas functions within 24 hours of exposure to methoprene. He neglects to report in this comment that the concentration the animals were exposed to was 50 ppm (50,000 ppb). This is an extraordinarily high exposure, and therefore it is not surprising that impacts to the lobsters were realized at this concentration.

The following table may be of use when considering methoprene impact claims. This table shows the values used by the County in conducting the risk assessment, and shows other data that various sources have suggested the County should have used in its analysis. Sometimes these additional data are not as sensitive as those used by the County, but some are lower values. The issue that needs to be considered is whether or not they would change the calculations reached in the risk assessment. Presentation of "environmental concentrations" (in the right-hand columns) suggests that nearly all of the critical toxicity values for biota identified in the literature exceed those values estimated for or measured in the environment. The few that do not either are not toxic endpoints or, as for Stage 2 lobsters, may be somewhat disputed. Zulkowsky et al. (2005) did not find methoprene to be toxic to Stage 2 lobsters, and in fact noted the difficulty of testing larval lobsters, due to the tendency for the organisms to eat each other and so produce unfounded measurements of toxicity. The Walker papers do not mention this lobster predilection, and so the assertion by Zulkowsky may be incorrect. Nonetheless, the "fact" that lobster larvae are susceptible to very low methoprene concentrations is not scientific fact. And, many of the estimates of methoprene concentrations are much less than the concentrations needed to cause effects to all organisms, even mosquitoes, although methoprene has been shown to be very effective against mosquitoes.

Table 4-12. Critical Methoprene Concentrations
(plain text indicates data used in the Risk Assessment, **bold** with a reference superscript indicates data from other sources)

Organism	Effect	Concentration (ppb)	Exposure Duration	Environmental Concentration (ppb)	Time after Application
Beetles[24]	**Virgins laid eggs**	**0.02 ug/organism-0.5 ug/organism**			
Beetles[24]	**Pupae did not develop**	**0.02 ug/organism-0.5 ug/organism**			
Mummichog	LC50	125,000	96 hr		
Mummichog[20]	***LC50***	**125,000**	**96 hr**		
Catfish	LC50	>100,000	96 hr		
Rainbow trout	LC50	61,000	96 hr		
Mummichog[20]	**NOEC**	**25,000**	**96 hr**		
Fresh water snail	LC50	10,600	48 hr		
Fathead	LC50	>10,000	96 hr.		

Organism	Effect	Concentration (ppb)	Exposure Duration	Environmental Concentration (ppb)	Time after Application
minnow					
Leopard frog larvae	LC50	>10,000	NR		
Grass shrimp	LC50	10,000	96 hr		
Aquatic insects[22]	**Reduced emergence**	**10,000**	**30 min**		
Daphnia[23]	**LC100**	**10,000**	**24 hr**		
Copepod[1]	**LC50, early nauplii more sensitive**	**100-10,000**	**96 hr**		
Daphnia[23]	**LC100**	**5,000**	**24 hr**		
Copepod	LC50	4,500	48 hr		
Salt water amphipod	LC50	2,050	96 hr		
Blue claw crab tissue[2]	**Post-molt tissue alterations**	**1,500**	**4 h**		
Blue claw crabs[2]	**Reduction in hatching and lethargy in larvae**	**300-1,500**	**11 days**		
Mud crabs[3]	**Disorders in gametogenesis**	**1,300**	**NR**		
Fresh water amphipod	LC50	1,250	96 hr		
Leopard frog	LC50	>1,000	22 days		
Woodhouse toad	LC50	>1,000	Acute		
Woodhouse toad	LC50	>1,000	22 days		
Aquatic insects[22]	**Reduced emergence**	**1,000**	**30 min**		
Blue crab megaloplae[2]	**LC50**	**1,000**	**6 days**		
Grass shrimp[4]	**LC100**	**1,000**	**NR**		
Mud crab larvae[17]	**LC100**	**1,000**	**2 days**		
Daphnia[23]	**LC50**	**1,000**	**96 hr**		
Daphnia[23]	**LC100**	**1,000**	**8 days**		
Blue claw crab megalopae[2]	**LC80**	**500**	**10 days**		
Blue-green algae[19]	**N-fixation rates increased 9x**	**500**	**5 days**		
Daphnia[23]	**LC40**	**500**	**8 days**		
Daphnia[23]	**No embryos developing to late stage**	**500**	**8 days**		
Australian fresh water shrimp[25]	**LC50**	**500**	**24 hr**		
Grass shrimp	NOEC	387	Chronic		
Fresh water daphnia	LC50	340	48 hr		
Sowbug larvae	LC50	300	48 hr		
Daphnia[5]	**All male reproduction**	**300**	**72 hr**		
Brine shrimp[9]	**Molt related mortality**	**300**	**NR**		
Brine shrimp	**Molt related**	**300**	**Duration of 3rd**		

Organism	Effect	Concentration (ppb)	Exposure Duration	Environmental Concentration (ppb)	Time after Application
larvae[21]	**mortality in low salinity solutions**		**instar**		
Eastern oyster	EC50, immobility of larvae	247	48 hr		
Mysid shrimp[15]	**LC100**	**125**	**NR**		
Mysid shrimp	LC50	110	96 hr		
Opossum shrimp	LC50	106	96 hr		
Daphnia[6]	**All female reproduction**	**10-100**	**NR**		
Grass shrimp[4]	**Reduced metamorphosis success**	**100**	**NR**		
Mud crab[7]	**No effect**	**100**	**NR**		
Mud crab[8]	**Adverse effects (with suboptimal T and Sal)**	**100**	**NR**		
Mud crab larvae[18]	**LC25**	**100**	**First crab stage**		
Mud crab megalopae[18]	**No effect on survival**	**100**	**First crab stage**		
Daphnia[23]	**LC10**	**100**	**10 days**		
Daphnia[23]	**Reduced survival of juveniles**	**100**	**Day 6**		
Daphnia[23]	**Slowed development**	**100**	**13 days**		
Daphnia[23]	**Reduced population (60%)**	**100**	**14 days**		
Lobster[10]	**Bioaccumulation (30x-575x)**	**50**	**4 hr**		
Stage IV lobster larvae[13]	**LC11**	**50**	**72 hr**		
Stage IV lobster larvae[10]	**LC90**	**50**	**72 hr**		
Daphnia[23]	**No mortality**	**50**	**10 days**		
Fathead minnow	NOEC (growth)	48	37 days		
Brine shrimp larvae[21]	**Delayed ecdysis in low salinity solutions**	**30**	**Duration of 3rd instar**		
Daphnia	NOEC	27	42 days		
Stage IV lobster larvae[10]	**No mortality**	**25**	**72 hr**		
Mysid shrimp[10]	**No mortality**	**25**	**72 hr**		
Daphnia	LC50	20	72 hr		
Mysid shrimp	NOEC	14	28 days		
Copepod nauplia[16]	**Disrupted mate recognition**	**10**	**NR**	**10**	**"typical"[32]**
Mud crab larvae[18]	**LC9**	**10**	**First crab stage**		
Mud crab megalopae[18]	**No effect on survival**	**10**	**First crab stage**		
Daphnia[23]	**LC10**	**10**	**10 days**		
Stage 2 lobster larvae[13]	**LC86**	**10**	**72 hr**		
Stage 1 and	**No mortality**	**10**	**48 hr**		

Organism	Effect	Concentration (ppb)	Exposure Duration	Environmental Concentration (ppb)	Time after Application
Stage 2 lobster larvae[27]					
Mysid shrimp[15]	**Diminished size/fecundity**	**8**	**NR**		
				4.4-6.4	**Calculated[28]**
				6.0	**Maximum of 186 samples (1-35 days)[29]**
Stage 4 lobster larvae[11, 13]	**Increases in molt frequency**	**5**	**72 hr**		
Daphnia[23]	**No mortality**	**5**	**10 days**		
				4.0	**Maximum, 30 day briquet (Day 7)[29]**
				3.3	Chronic exposure concentration used by Integral Consulting in the risk assessment
				3.3	**Maximum, interface marsh sample, 30 min.[31]**
				2.2	**Maximum, liquid Altosid (Day 1)[29]**
Mysid shrimp[12]	**Reduced fecundity**	**2**	**NR**	**2.0**	**Maximum, 30-day pellets (Day 7)[29]**
Stage 2 lobster larvae[11]	**Increased mortality**	**2**	**72 hr**		
Emerging insects[26]	**No difference in the Shannon diversity index**	**1.6**	**3 applications, weekly intervals; measured 14 days later**	**1.6**	**Calculated from (26)**
				1.5	**Maximum, subsurface marsh sample, 30 min[31]**
				1.1	Maximum open water, aerial application Mastic-Shirley
Stage 2 lobster larvae[13]	**LC30**	**1**	**72 hr**		
Most resistant Australian mosquito[25]	**LC90**	**1**	**24 hr**		
				0.84	Maximum, open water, Manorville
				0.7	Maximum, hand application Mastic-Shirley and Dix Hills
				0.7	**Maximum, 150 day briquet (Day 3)[29]**
Stage 2 lobster larvae[13]	**No mortality**	**0.5**	**72 hr**		
				0.35	Maximum, refined estimate, aerial application Mastic

Organism	Effect	Concentration (ppb)	Exposure Duration	Environmental Concentration (ppb)	Time after Application
					Shirley
				0.28	Maximum, refined estimate, Manorville
				0.23	Maximum, refined estimate, hand application Mastic-Shirley and Dix Hills
				0.2	**Consistently, 150 day briquet[30]**
Typical Australian mosquito[25]	**LC90**	**0.17**	**24 hr**		
				0.024	**Maximum, subsurface marsh sample, 24 hr[31]**
				0.0005	**Maximum modeled methoprene concentration in western Long Island Sound embayments, 1999[33]**

LC: lethal concentration for the percent organisms that follows: LC50 = lethal concentration for 50 percent, LC25 = lethal concentration for 25 percent, etc.
NOEC: no observable effect concentration
NR: not reported

[1] Bircher and Ruber (1988)
[2] Horst and Walker (1999)
[3] Payen and Costlow (1977) (reported in Horst and Walker, 1999)
[4] McKinney and Matthews (1990) (reported in Horst and Walker, 1999)
[5] Olmstead and LeBlanc (2003)
[6] Peterson et al. (2001) (reported in Olmstead and LeBlanc, 2003)
[7] Christiansen et al (1977) (reported in Horst and Walker, 1999)
[8] McKenney and Matthews (1990) (reported in Horst and Walker, 1999)
[9] Ahl and Brown, 1990 (reported in Horst and Walker, 1999)
[10] Walker et al. (2005b)
[11] Walker et al. (2005a) (as reported in Walker et al., 2005b)
[12] McKenney and Celestial (1996) (as reported in Walker et al., 2005b)
[13] Walker et al., 2005a
[14] McKenney and Celestial (1993) (as reported in Walker et al. 2005a)
[15] McKenney and Celestial (1996) (as reported in Walker et al., 2005a)
[16] Ting et al. (2000) (as reported in Walker et al., 2005a)
[17] Costlow, 1977
[18] Christiansen et al 1977
[19] Wurtsbaugh and Apperson, 1978
[20] Lee and Scott, 1989
[21] Ahl and Brown, 1990
[22] Yasuno and Satake, 1990
[23] Laufer, 1982; Templeton and Laufer, 1983.
[24] Chellyan and Karnavar, 1989
[25] Brown et al., 2000
[26] Pinkney et al. 2000
[27] Zulkowsky et al., 2005
[28] LeClair et al., 1998 (as reported in Antunes-Kenyon and Kennedy, 2001)

[29] Ross et al., 1994b
[30] Ross et al., 1994b (as reported in Antunes-Kenyon and Kennedy, 2001)
[31] Cashin Associates, 2005b
[32] Degitz et al., 2001 (as reported in Antunes-Kenyon and Kennedy, 2001); Antunes-Kenyon and Kennedy (2001); Ross et al., 1994a (as reported in Antunes-Kenyon and Kennedy, 2001)
[33] Miller et al., 2005

(4) Bti-Bs concerns and other Minnesota studies comments (T-22, T-40, U-46, Y-12, AA-18, AG-55, AG-56, AG-57)

A study of the impact of larvicide use on freshwater wetlands was made in Minnesota. The study covered ten years (1989-1998). The work was conducted under the joint auspices of the Natural Resources Research Institute (University of Minnesota at Duluth) and the St. Paul Metropolitan Mosquito Control District. Wetlands were selected for study in Wright County, MN, an area that had not previously been treated for mosquitoes, but where burgeoning development made such treatments increasingly likely. The study was designed to look for direct non-target effects associated with methoprene or Bti use, and to determine any ecological effects propagated in the food chain. Therefore, aquatic insects were sampled from the marsh substrates. Zooplankton (typical aquatic insect prey) were also sampled, as were marsh breeding birds which are predators of the insects. Two years of pre-treatment sampling were made in 27 wetlands. The results of pretreatment sampling were used to identify treatment sites so that differences discovered in pretreatment sampling did not affect tests for treatment effects. Marshes were assigned to control, Bti treatment, or methoprene treatment groups. Pesticides were applied throughout the initiation of treatment (until 1998). After three years of sampling, reports were prepared for publication regarding changes in insect populations (Hershey et al., 1998) and ecological effects propagation (Niemi et al., 1999). In 1997, sampling was resumed at 25 of the 27 original wetlands, by the Metropolitan Mosquito Control District, and the sampling continued in 1998. A report was issued on its findings (Balcer et al., 1999).

Hershey et al. (1998) found significant differences in insect populations between treatment and control sites. Bti and methoprene treated sites, especially by 1993, showed reductions in insect diversity and a tendency to be dominated by relatively few genera compared to control sites. Diptera, the dominant insect present, was most strongly affected, especially the Nematocera (71 percent of all insects), and especially chironomids. The methoprene treated sites also had noticeable reductions in predatory insects in 1992. In 1989-1990, mollusks were the dominant non-invertebrates, but in control sites insects became the dominant invertebrates. Generally, invertebrate numbers increased across all sites from 1989, which was droughty. At treatment sites, invertebrate numbers did not increase as much as they did at the control sites, which therefore comprised the measured effect. There were no significant differences in non-insect numbers of diversity between control and treatment sites.

Niemi et al. (1999) reiterated the insect findings of Hershey et al. (1998). However, no effects on zooplankton between Bti or methoprene treatment sites and control sites were discernable. The same was true for breeding bird populations. Therefore, the study concluded that, despite significant differences in insect populations between treatment and control sites, there had been no propagation of effects either up or down the food chain. The apparent lag between initiation of treatment and determination of effects found in Hershey et al. (1998) was used by Niemi et al. (1999) to suggest that perhaps a similar lag might be associated with food chain effects, and so more sampling might be required. Scaling issues were also discussed: zooplankton populations are patchy, and so large variabilities in results might disguise apparent effects, as replication at sites was sacrificed to make the study broader across sites. The range of birds and the focus on bird breeding may also have hidden impacts. Because birds can access other wetlands to feed, effects at local sites may not impact the overall population (unless enough sites were impacted). The study focused on breeding, and because larvicides generally impact insects later in the summer when breeding has been completed, there could have been a disconnect in the timing of any effects.

Balcer et al. (1999) found very different results. For one, diversity and abundances were much greater at nearly all sites over the 1997-1998 time period as compared to the results found over the 1989-1993 time period. This was attributed to conducting the sampling during wetter than normal conditions, where most of the wetlands grew a vegetative mat not present in the earlier sampling. In fact, for some characteristics the treatment sites were more productive than the control sites (although not in a statistically significant way). None of the patterns detected by Hershey et al. (1998) were maintained into 1997 and 1998. No differences in zooplankton and birds were detected either. Balcer et al. tried to factor in presence/absence of the vegetative matting and fish. Fish, potential top predators in the systems that were unevenly distributed in the marshes, were noted in earlier sampling, but not accounted for. These additional factors did allow significant differences to be determined.

There have been few satisfactory explanations offered for these divergent results. It is clear weather is a major factor on insect populations. It has been said by some that perhaps larvicide applications were above recommended rates early in the study or that they were less effective due to the vegetative mats in 1998 (Balcer et al., 1999). It may be, as suggested by Dr. Horst, among others, that pesticides combined with other environmental stressors cause greater than anticipated effects. However, it is difficult to determine why that should cause notable effects with a lag from the time of peak stress. It does seem reasonable to assert that insect populations can recover quickly, especially under favorable conditions. This might explain why under "best possible" conditions few to no non-target effects were measured. The effectiveness of the larvicides against mosquitoes was not discussed in Balcer et al. (1999) although Niemi et al. (1999) reported methoprene inhibited nearly 90 percent of mosquito emergences and Bti treated sites, in annual reckonings, had 90 percent fewer mosquito larvae than control sites.

Because long-term data do not show impacts to non-target insects, it does not seem that the initial Hershey et al. (1998) and Niemi et al. (1999) conclusions that larvicides have serious long-term impacts on insects can be supported without qualifications. Instead, a key issue seems to be if environmental conditions that may stress non-target organisms need to be considered with larvicide applications. However, how to address the apparently causeless lag in effects would be a major complication. It also should be understood that the Hershey et al. findings apply equally to Bti and methoprene, and not just to methoprene, despite a tendency to apply these studies only to methoprene. Bti, because of its mode of action, could have impacts on chironomids, and the potential for methoprene to have impacts on other non-mosquito organisms has been reviewed extensively just above. The results finding impacts are credible. However, whether they can be replicated is an issue. Over the short-term, for instance, Pinkney et al. (2000) found no significant differences in overall diversity of emergent insects with methoprene treatments, and also did not find differences specifically for chironomids.

NYSDEC offered several comments regarding the Hershey et al. (1998) study. The County disagrees with the offered comments. For instance, it was stated that Hershey et al. found food chain impacts. That is not the case. In the discussion of results in that paper, it was noted that

> the failure of chironomids to develop in treated sites, relative to controls, might represent a substantial difference in the function, as well as the structure, of the insect community.

This is offered as (informed) speculation by Hershey et al., and Niemi et al. (1999), where the researchers from Hershey et al. examined the data for food chain impacts, explicitly denied that the data showed any such effects. Secondly, it was said that Hershey et al. found changed predator-prey relations. This is closer to what was reported. Hershey et al. found fewer predacious chironomids in methoprene treated sites in 1992 (compared to Bti and control sites) and noted an overall reduction in predatory insects at all treatment sites in 1993. Because Bti is not thought to have a direct effect on predatory insects, it was speculated that an indirect effect must have occurred. Several were offered, but no data to support any of these were available. Therefore, the study found changes in predator-prey numerical relationships, but certainly did not report on actual changes in population dynamics (based on observations, for instance).

The reports do support the comment made by Peer Reviewer #1 that Bti can have non-target impacts, and NYSDEC comments that Bti can affect non-target dipterans. This was also reported in the Literature Search (Book 7, CA-IC, 2004) and in the brief discussion of Bti toxicology in the DGEIS (p. 959). Bti is a selective insecticide, in that its toxins only affect a few kinds of insects, and they can only be activated under conditions that are specific to certain kinds of insects. Therefore, it is quite proper to denote this as a selective product.

A comment was made that Bti (and Bs) is not an "endotoxin." This is true, as the term endotoxin is reserved for toxins released from the cell walls of specific pathogenic gram-negative bacteria (not including these Bacillus) (Todar, 2002a). The better description would be an "exotoxin," and because the site of attack is the intestine, it is also properly connoted as an "enterotoxin" (Todar, 2002b).

4.8.2 Triggers for larvicide use (K-5, K-6, N-10, Q-9, AH-10)

When to use larvicides, and which ones to use, were commented on a number of times.

It was noted that the larvicide triggers in the Executive Summary of the DGEIS were too generic, and that the criteria for use should be clarified. The County believes that some of this concern arise not from the technical decisions on how and where to larvicide, but rather on determinations that a sufficient problem exists to justify the use of larvicides. This is a valid issue, as the determination of a "mosquito problem" is subjective, in many ways.

Mosquito problems can be identified quantitatively by means of trap data (above "background" conditions) or consistent identification of virus in a particular area. Mosquito problems are also identified by citizen complaints. Calls to SCVC result in inspectors being dispatched to investigate the setting, and if mosquito breeding is identified at the site, the problem is considered to be one of concern. Following these initial investigations, and identification of a site as a potential recurring mosquito breeding area, the site may be added to a routine surveillance route. There are several sites, as discussed in the Long-Term Plan that receive surveillance visits on varying schedules. Surveillance schedules are largely driven by weather and breeding initiation factors. For instance, because salt marshes breed on a regular schedule largely spawned by tides, they receive very regular surveillance. On the other hand, upland areas that host flood water mosquitoes do not need regular visits unless conditions for breeding have been met. At present, the County uses a presence-absence scale for determination of a larval problem. In salt marshes, the area that appears to be breeding is also considered at almost all sites. This is due to the patchy nature of mosquito breeding and the difficulties in accomplishing more statistical means of defining mosquito densities using dipping techniques. Once the presence of a potential problem has been determined, then more defined activities follow:

- the type of larvicide is determined based on the stages of the larvae that are present and the overall physical setting

- the amount to apply is determined based on label rates and the area being treated

- the timing of the application is based on whether appropriate equipment is at hand, noticing practices, the need to arrange for a helicopter, weather, etc.

The County believes that in some settings the measurement of larval mosquitoes can be made more quantitative, and that indices can be developed, on a site by site basis, to refine conditions required to initiate larval control. Section 4.1.5 discussed this issue briefly, but Section 4.4.2 discussed this in more detail. This work will not be simple to accomplish, but the availability of digitized records for recent sampling efforts may allow for data mining in support of selective index development. The need for robust past data sets and (in almost all instances) a number of sampling stations for an affected area will limit the applicability of indices to some extent.

NPS pointed out that, in general, criteria for pesticide use in FINS are most likely going to be different than they are in the rest of the County, due to the obligation under the organic act for FINS to preserve natural areas and because of NPS policies regarding the control of pests in its holdings.

It was stated that the larval control program has an emphasis on salt marsh mosquito control. That is true in certain aspects of the program, but not necessarily so in other ways of thinking about the program emphases. Nearly all aerial larviciding is in settings where several species of salt marsh mosquitoes breed, and most of the volume of larvicides is applied to salt marshes. However, as discussed in the DGEIS (p.36, Table 2-1), the majority of treatments are made in fresh water settings. Therefore, it might be argued that the County, in its more discretionary elements of the larval control effort, focuses its efforts on removing fresh water breeding opportunities. The County readily concedes that most product is delivered to salt marshes, however. That is the basis for the anticipated reduction in larvicide use that will occur with increased water management efforts across the aerially-larvicided marshes.

One comment called for a reliance on Bti, given its proven effectiveness and questions the use of methoprene due to its impacts. Related to that comment was one calling for the use of two or more larvicides at once to increase efficacy. The County notes that both methoprene and Bti are more effective against certain stages of mosquito larvae. Bti is very effective with younger stages, but not with older stages; similarly, because methoprene prevents development to adult mosquitoes, it is more effective against older mosquito larvae stages. Therefore, the Long-Term

Plan described how the County prefers to use Bti when it has been demonstrated to be more effective, and to use methoprene when it is more effective. To do otherwise would mean using pesticides inappropriately. At the peak of summer, when mosquitoes develop rapidly, and when a mix of stages is determined from surveillance, the County will use "duplex" formulations, which are a mix of methoprene and Bti, to control the mosquito problem.

4.8.3 Application impacts (AF-1, AG-108)

It was noted that low-flying helicopters may affect listed species, and that NYSDEC has information identifying exactly such occurrences. The County is aware of this potential. It coordinates its larval application efforts with piping plover protection efforts and other similar organized protected species monitors. This is possible for larval applications, generally, because the County applies larvicides aerially at the same sites from year to year. Larvicide application routes are generally no changed due to prevailing weather conditions. Therefore, each site where aerial applications occur can have general routing restrictions determined at any time in the season, and concerns regarding effects from flights can be and are addressed.

4.8.4 Neem as alternative (P-73, Y-1, Y-16, Z-4, Z-5, Z-23, AG-66)

Comments were received regarding the use of alternatives to methoprene. The County disagrees with the premise that methoprene is a chemical with significant non-target impacts. Nonetheless, if alternatives become available, the County will consider them. Under the conditions for further environmental review, the County will be required to conduct additional environmental reviews in order to substitute a new pesticide in the Long-Term Plan. If the initial environmental reviews show that such a pesticide has less of a potential for environmental impacts and is just as effective as other, approved pesticides, then a Supplemental Environmental Impact Statement is not specifically required (although the County may choose to generate such a review).

Dr. Horst strongly suggested that Neem be considered as an alternative to methoprene, and noted that it has been used for hundreds of years in Asia with no reported negative effects. Neem is derived from the Indian neem tree, and there are two insecticide forms. One is a cold-pressed oil, considered to be effective against soft-bodied insects, generally, by physically coating the organisms, but also potentially from toxic impacts of included disulfides. Extracts of neem have a more active chemical, azadirachtin (Isman, 2006). There are reportedly a dozen active forms of azadirachtin in neem extracts, and at least 35 biologically active elements (Isman, 2006; Mittal and Subbarao, 2003). Indigenous methods of applying neem were found to be effective at preventing emergence in field testing, and cake powders and were found to be very good in rice fields. It was noted that neem oil is "promising" as a mosquito repellent, although reported results were mixed, with some studies showing good efficacy and others not finding very good protection (Mittal and Subbarao, 2003). Isman (2006) found neem to have "fallen short of initial hype," as it is expensive and is said to be slow-acting on pest insects. Triterpene azadirachtin appears to be the most active element. In any case, this is the compound that is extracted by solvents from natural 0.2-0.6 percent by weight in seeds to 10 to 50 percent by weight for technical grade insecticides (Isman, 2006). Neem acts by blocking the synthesis and release of molting hormones (Isman, 2006; Mittal and Subbarao). It is also said to make female insects sterile through other hormonal effects on the prothoraic gland (Isman, 2006).

Isman (2006) reported results suggesting it is non-toxic to animals, fish, and pollinators. However, he also reported mixed results for impacts to beneficial insects. Other reported non-target effects associated with Neem include impacts to chironomids (Scott and Kaushik, 2000), chironomids, daphnia, and hyalella (Scott and Kaushik, 1998), crustaceans (Goktepe and Phlak, 2004), and frogs, Gambusia fish, copepods, and daphnia (el-Shazly and el-Sharnoubi, 2000). It is not clear whether these toxic effects to non-target organisms occur at application concentrations, although Scott and Kaushik (1998) and el-Shazly and el-Sharnoubi (2000) found that toxic levels for mosquito larvae were not always less than the non-target organism toxicities.

The County is baffled by Dr. Horst's enthusiasm for neem, given its hormonal activities and the large number of undetermined active ingredients that are associated with it. Dr. Horst is very concerned with hormonal effects associated with methoprene. Peer Reviewer #2 expressed great concern that people are enthusiastic about products where very little is known about their impacts, merely because they are not standard (and usually are not perceived of as synthetic). In a review of this issue, Coats (1994) points out that "the biological activity of a chemical is a function of its structure rather than its origin". He also thought highly of both methoprene and neem, remarking on methoprene's selectivity and quick degradation, and the reported effectiveness of neem. A bias towards untested natural chemicals over highly tested synthetic chemicals does not seem warranted.

This is why clove oil was not reviewed in depth by the program. Clove oil has received certain positive reviews from supporters, but has no demonstrated efficacy, and can be harmful to people because it is corrosive at high concentrations.

Monomolecular films were reviewed by the County. They are best applied in still open waters with no emergent vegetation, and where direct wind stress is low such as in swamps. The swamps where mosquito control is a priority for the County are red maple and Atlantic white cedar swamps. The County was concerned regarding non-target impacts in these environments with monomolecular films due to alteration of the surface film layer. Most other larviciding sites in the County are subjected to wind stress that would make the films much less effective.

4.8.5 Efficacy of larvicides (Z-24, Z-25)

The County has cited a paper by Campbell et al. (2005) regarding the efficacy of methoprene larvicides. This paper was presented as a poster at the 2004 American Mosquito Control Association meeting, as is indicated in each citation in the DGEIS. It has not been published separately, and did not undergo formal peer review.

4.9 Concerns Regarding Adult Controls

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with Adult Controls (Adulticide Use). Comments were divided into nine subcategories, ranging from questions regarding the general safety of pesticides, triggers for pesticide use, application issues, efficacy of applications, considerations regarding alternatives, and more technical questions associated with the risk assessment, non-target organism impacts, and recent reports concerning pyrethroids.

4.9.1 All pesticides harmful? (E-1, E-3, E-4, H-15, Q-14, R-20, U-19, U-20, U-43, U-44, AC-3, AC-27, AJ-14, AJ-15, AK-3, AK-5, AK-6)

The risk assessment conducted on adulticide use for the Long-Term Plan showed that there are minimal increased risks to people from the potential pesticide use outlined in the Long-Term Plan. At times, the Risk Assessment and DGEIS may have incorrectly termed these conditions as "no risks;" that is not an accurate characterization of the situation even when computed Hazard Indices are much less than one. A Hazard Index is the ratio of predicted exposure to the concentration where impacts may occur. Rather, the intent of the risk communication should have been to echo the findings of the New York State Department of Health in the 2001 West Nile Virus Response Plan:

> Pesticide exposure carries some inherent risk to people … [but]… if the pesticides are applied properly, it is expected that most people would not experience health symptoms.
>
> (NYSDOH, 2001b)

The County would also extend the interpretation to say that "people *should* not experience health symptoms," as near as can be determined, based on the available information regarding health impacts from these pesticides.

A total of 17 comments were received that were classified as being primarily related to the potentially harmful nature of pesticides.

It was stated that the use of pesticides has a negative impact on the health of people, including or especially for people in Suffolk County. The intent of pesticides regulations is to ensure that benefits received from pesticide use exceed potential harmful effects. It is difficult to be certain for all pesticides that the regulations have been successful in this intent. For instance, some of the exposure information related in Section 3 of the DGEIS (pp. 367-382) suggested that cumulative exposure to organophosphates through food sources and potentially because of pest strips could exceed levels established by USEPA to ensure little to no human health impacts. However, mosquito control pesticides risks, as related in this EIS (see the DGEIS, pp.1032-1074), for New York City NYCDOH, 2001), Westchester County (Westchester County, 2001), and in a generic risk assessment (Peterson et al., 2006), do not appear to rise to the level where negative impacts to health will be realized.

It is true that USEPA and NYSDOH do not describe pesticide use as "safe." There is some risk elevation associated with the use of pesticides. However, the procedures used in the Impact Assessment (Section 7) of the DGEIS are those that are used by USEPA itself to develop risk profiles of applying mosquito control pesticides. The findings made by Suffolk County in its assessment of health threats from adulticide use in the County are likely to thus be similar to the findings USEPA would make, had it done the same analysis. Therefore, the County believes that USEPA would similarly determine the health risk elevation associated with the proposed adulticide usage to be not significant. It is true that pesticide use should not be considered to be risk-free, as a commenter noted, and that pesticide use is not entirely safe; however, the risk assessment certainly did not identify a set of exposures and pathways that seemed to represent risks elevated much above conditions that would exist if the pesticides were not to be used. Very little that occurs in life is entirely risk free. For instance, use of garlic as a barrier treatment is not entirely risk free, according to one comment by Peer Reviewer #2, even given its "Generally Regarded as Safe" status by the Food and Drug Administration, as it has been shown that very high doses of garlic can cause human health effects. Peer Reviewer #2 also noted that garlic oil has had very little efficacy testing, as is often the case for non-standard control methods.

One comment favorably noted that the DGEIS should allay fears associated with pesticide control of mosquitoes; another suggested that the report downplays the risks associated with exposures to pesticides. In a sense, both are true. The risk assessment did not find significant elevations in human health risks with the proposed pesticide uses described in the Long-Term Plan. Rather, under all but one scenario, the risks associated with human exposures were nearly all much less than a Hazard Quotient of 1, indicating that the exposure to the pesticide was much less than the concentrations thought to be of concern. The one exception was with weekly applications over the course of a mosquito season, using hand applicators. Dispersion was less, and multiple applications meant there was continual exposure to the pesticides. Under these conditions, a "community gardener", or someone who tended a garden and used the garden as a source of produce so that he or she consumed 14 percent of all vegetables across all years of his or her life this way, could exceed a Hazard Quotient of 1, if the garden were at the very location where the modeled deposition concentration was greatest. The only place where weekly pesticide treatments are made is in certain communities on Fire Island, and the poor soils and harsh ocean-side conditions there would not allow for a substantial garden to be maintained.

Therefore, the maximum exposure was thought to be hypothetical and not actual, and served as notice that the low risk nature of the County's approach to adulticiding might not be sustained if applications were made on a regular basis, especially to those who grow (and eat) vegetables at home. The Long-Term Plan does not envision such application rates taking place in areas where gardens are found. Therefore, the results of the quantitative risk assessment should provide residents of the County confidence that mosquito control adulticide applications should not cause negative health impacts for them and their families.

It is not that these pesticides are risk-free at all concentrations. The DGEIS discusses potential health impacts associated with the selected adulticides at pp. 1041-1043 and pp. 1119-1131. However, as noted by Peer Reviewer #2, the low level of risks identified in the risk assessment is a function of the low level of exposure to these pesticides. Because they are applied at low concentrations and they disperse and degrade rapidly, people are not exposed to very high concentrations.

Dr. Pimentel, citing an unpublished paper of his own (Pimentel, accepted), stated that wide area applications can have serious impacts. The paper this comment was based on discussed the pros and cons of agricultural pesticide use. Agricultural pesticides are almost always applied at much higher rates than mosquito control pesticides are because the insects consuming plants tend to be larger and more robust than mosquitoes and are generally designed to leave residues following an application. The mosquito control pesticides identified by Suffolk County for use are not designed to leave residues since mosquito control pesticides intend to kill mosquitoes in the air, whereas most agricultural pesticides intend to kill insects landing on and trying to eat plants. Although aerial applications of mosquito control pesticides in Suffolk County cover relatively large areas, compared to the huge swaths of countries that are devoted to agriculture, the mosquito control areas considered by Suffolk County are tiny. Therefore, the County does not agree that the findings of this paper apply to its setting. The County agrees with Dr. Pimentel that agricultural pesticide use has caused and continues to have the potential to cause human health and ecological impacts. The County is less certain that the potential for impacts has been underestimated, especially by regulators such as USEPA, but notes there is room for reasoned disagreement on this issue. However, making findings regarding agricultural impacts does not mean the same conclusions hold for mosquito control pesticides.

Comments were received that "regret[ted]" the continued use of pesticides for mosquito control, and that noted minimizing pesticide use will provide benefits. The County would like to minimize its use of adulticides by maximizing the effectiveness of other elements of its mosquito control program. The analysis by the County suggests there are not likely to be measurable improvements in human health by doing so. However, it needs to be understood that risk assessment, as an analytical method, requires making many assumptions and simplifying many complex processes. Therefore, it can never be determined with true assurance that there is no risk from these kinds of pesticide usages.

4.9.2 Triggers for adulticide use

39 comments were classified as discussing triggers for adulticide use. They were apportioned into two broad categories: those that made comments about specific aspects of the proposed adulticide triggers, and those that were more general.

Comments received on application rates were helpful to the County in its refinement of the Long-Term Plan (Appendix 5). The County had been much more specific regarding parameters for adulticide use in the May 2006 version of the Long-Term Plan than it had been in earlier versions of the Long-term Plan. However, some ambiguities remained regarding specific triggers, which comments helped the County identify. Two very specific refinements are:

- It should be understood that the mosquito species to be counted towards the trigger values,25 mosquitoes in a New Jersey light trap, and 100 in a CDC trap, must all be human biting mosquitoes from species of concern (see the list in the DGEIS, Table 2-13, pg. 83).

- Landing rate triggers should be understood to be 1 mosquito per minute. All mosquitoes landing on a person are assumed to be human biters, and the rate determination is independent of the length of time the test is carried out. The time period is usually five minutes in length, as often it takes a minute or more for mosquitoes to find the test subject.

(1) General comments (H-6, H-7, N-11, P-4, P-45, S-16, AC-15, BA-4, BA-5, BA-9)

It was noted that adulticiding is the least preferable option, and that the CDC recommends that the focus should be on larval instead of adult control. The County agrees with both these comments, and has tried to emphasize that the Long-Term Plan is compliant with both of these overall goals.

It is also noted that the use of adulticides signals failure for other means of control. Again, the County has generally stated this in more than one document associated with this program (see the Long-Term Plan, and also the DGEIS, p. 206 and p. 219).

It is said that adult control has an emphasis on salt marsh mosquito control. There is a bias in the vector control adult applications towards areas afflicted by salt marsh mosquitoes. This is because broods of mosquitoes generated by salt marshes can be the largest mosquito problem in the County and because some salt marsh mosquito species are the most aggressive biting mosquitoes faced by County residents, have the greatest impact on the quality of life. Nonetheless, because these mosquito species have also been confirmed by various tests to be vectors of serious disease, control of them also has the effect of reducing overall disease risks. Therefore, although one aspect of such treatments is to alleviate threats to human welfare, these treatments also serve to reduce human disease risks. However, applications made under Health Emergency conditions tend not to be targeted against salt marsh mosquitoes or fresh water mosquitoes in particular. The risk evaluation under a Health Emergency focuses on evidence of disease transmission potentials, which means pathogens must be confirmed to be circulating, and appropriate vectors to deliver the pathogens must need control.

Two sets of comments were made. One was that a blurred distinction between nuisance and disease causes more adulticide applications to be needed, and also causes more adulticide applications to be made. Related to these linked comments were comments that suggested that viewing all mosquitoes as dangerous leads to more requests from the public for adulticide treatments. The County does not believe that it has “blurred” a distinction between nuisance and disease threats. Rather, the County has suggested that the presence of a widespread virus (widespread in both time and space) has changed the way that the County identifies mosquito problems. WNV is a different kind of mosquito problem than EEE is, and is different from the kind of mosquito problem presented by malaria. There are so many potential vectors for WNV, and, in most years since 1999, the evidence of pathogen is so omnipresent in the County, that it is no longer possible to discount disease risks from essentially any mosquito bite. For the pre-1999 but post-malaria era, when EEE was not circulating and amplifying in white cedar or red maple swamps, the risks of human disease from a "generic" mosquito bite were infinitesimal. When malaria was present in the County (in the 1920s and earlier), two species of *Anopheles* mosquitoes were responsible for human disease. Malaria tended to be patchy in geographic distribution, because of the necessity for human hosts, but control efforts to reduce disease risks could have been focused on the *Anopheles* mosquitoes; at this point salt marshes were not sites that caused disease. Now, although the chances of WNV being carried by any particular human biting mosquito are extremely small, there are measurable risks associated with bites from all species of human biting mosquitoes (except perhaps, with some unintended irony, for the *Anopheles* species). The County has reason to believe, based on its analysis of illness rates from other jurisdictions, that impacts from WNV would be much greater in the absence of a comprehensive mosquito control program(see the DGEIS, pp. 1223-1234, and Section 4.10, below). Therefore, although others may disagree regarding the scope of this threat to human health, it seems factual to state that all human biting mosquitoes do present some form of human health threat to the residents of Suffolk County.

However, that does not necessarily mean that the County will apply adulticides to address all indicators of human health threats. For one, this would require widespread applications of adulticides across much of the County in most years (see the maps of WNV detections in the DGEIS, pp. 1148-1152). The County not only reacts to the presence of pathogens as a signal of a health threat, but also uses surveillance data to determine if vectors are available and likely to propagate disease. In addition, factors such as specific weather forecasts are important – to ascertain whether the adulticide effort would be effective, and also to determine if natural controls will reduce threats in a timely manner. Complaints and calls from residents are important to decision-making processes in two ways. One, they help the County determine the scope of a mosquito infestation. Two, they sometimes assist the County in determining overall community tolerance for adulticide actions to control mosquitoes. However, public pressure to adulticide, as related by certain community comments received, are not effective at causing the County to adulticide.

It was also stated that it is not true that adulticides need to be used in residential communities. That is factually correct. Many jurisdictions use adulticides to try to treat mosquitoes as they move from breeding locations towards residential areas. Suffolk County generally lacks well-defined fringes between wetlands breeding locations and residential neighborhoods. Therefore, although technically the County could try to intercept mosquitoes as they moved towards residential neighborhoods, in actuality the combination of wetlands application buffers and paucity of undeveloped marsh fringes throughout the County means that all adulticide applications occur in or near residential neighborhoods. The County had intended this description of its need to treat in residential areas as another reason for the County to try and avoid using adulticides as a means of mosquito control.

(2) Specific comments (K-10, P-30, P-35, P-36, P-37, P-38, P-40, Q-2, Q-6, Q-7, Q-8, R-29, R-30, R-31, S-1, AC-16, AC-17, AG-48, AO-23, AS-3, AS-4, AS-5, BA-14, BA-20, BA-21, BD-5, BF-2, BG-4, BV-6)

The County was asked to clarify the personnel that conduct risk assessments for potential Health Emergency applications. Staff that have been involved in these determinations for the Department of Health Services have included the Director of the ABDL, Dr. Scott Campbell, the Public Health Division director, Dr. David Graham, and Dr. Patricia Dillon of the Public Health Division. Dominick Ninivaggi, Superintendent of Vector Control, serves as an advisor to these health professionals regarding mosquito control issues. The Commissioner of the Department of Health Services, Dr. Harper, has always had the final determination in assessing risks.

It was asked how “community preference” is determined. In most cases, community preference is not an issue of concern, because there is no information that would suggest the community has a preference. In other situations, community preference is forcefully expressed. For instance, several community organizations in the Mastic-Mastic Beach area have strongly expressed the desire to have an aggressive mosquito control program conducted in those neighborhoods. Fire Island Pines and Davis Park have also indicated that there is an overwhelming majority of residents who would like to see adulticides used to control large populations of mosquitoes. On the other hand, some communities have just as strongly expressed a strong desire not to have adulticides applied there, if possible. Cherry Grove and Ocean Beach are examples. When

Vector Control applications are being considered, such community preferences will play a role in whether a potential application might be cancelled. Strong community preferences for applications do not mean that the County relaxes its standards for considering applications. However, strong preferences against applications will mean that it is unlikely that vector control applications will be conducted in the community. When Health Emergency applications are being considered, community preferences do not matter.

It was suggested that the Long-Term Plan should use the New York State West Nile Virus Response Plan (NYSDOH, 2001b) language to describe its criteria for applications regarding distinctions between nuisance control and WNV control. However, as near as can be determined, the 2001 West Nile Virus Response Plan does not discuss nuisance control at all, but does have a section (Appendix C) where considerations regarding adult control for WNV are spelled out. The criteria listed there are very similar to those described in the Long-Term Plan for Public Health applications.

It was suggested that Suffolk County follow the Connecticut model for adulticide applications. There towns, cities, and villages sometimes have independent mosquito control programs, where adulticides are applied outside of the state system. In the state system, however, applications are not considered until multiple human cases have been found. According to several newspaper reports, this system was not necessarily well received in 2006, as the state did not consider applying pesticides until at least one death had occurred. The DGEIS discussed the policy of not applying adulticides until after illnesses had been diagnosed, as one of the Integrated Pest Management alternatives (Section 8, pp. 1189-1222).

Several comments were received regarding clarifications of triggers and criteria, and to better describe landing rates proposed under the Long-Term Plan. These comments were addressed immediately above.

It was stated that the criteria allowing for adulticiding is at almost any mosquito density. That is absolutely correct for Health Emergency applications, but it clearly not so for Vector Control treatments. It was noted that the vagueness associated with some of the criteria allow for management expertise to be employed, so that discretionary actions can be made with some flexibility. Much of that discretion has been removed. As specified in the four-step process (see the DGEIS, pp. 241-242), the criteria are primarily used to rule out the possibility of an application, even when mosquito numbers exceed threshold values.

It was noted that the criteria do not balance risks and benefits associated with disease. This view depends upon the assumption that the only sound purpose for adulticides is to limit risks associated with imminent risk of disease. The County does not agree. Section 4.10 will reiterate that risks associated with imminent risk of disease far exceed any calculated risks from pesticides. The County believes that the benefits associated with Vector Control applications, although more difficult to calculate, also outweigh risks associated with the application of pesticides. Opponents of pesticide use for mosquito control have not been able to provide any quantitative risk estimates describing how the County's risk calculations are incorrect. The closest to such a presentation is assertions by Dr. Pimentel that agricultural pesticide use over large areas has greater impacts to human health and the environment than is usually determined, although he does not specify those impacts (Pimentel, accepted).

Currently the County does not specifically trap ahead of adulticide applications. The Long-Term Plan specifies a change in that policy. Comments were received regarding the availability of pre- and post-application trap data. Mostly, the County has data sets that were collected as part of other surveillance activities that may apply to application events. The data sets are not organized so as to allow for easy comparison of pre- and post-application trapping, however, and the data were usually not collected in an optimal manner. This is why the local efficacy data presented in the DGEIS (pp.1136-1137) are relatively sparse.

A specific comment was made that traps should be set out five days ahead of any application. For the purposes of efficacy calculations, one day pre-application trapping is sufficient. To establish longer term mosquito population trends, a five day trapping event would provide richer data. The additional data are of little practical use.

It was also suggested that the County provide 72 hours notice before each application event. This is impractical, as determinations of the need for an application are often made less than 36 hours before an application. The County Charter specifies a 24 hour notice. A 72 hour notice might be too long a lead time, and result in residents losing track of when an application will occur.

Members of the Smith Point Property Association noted that there was sometimes a three week lag between complaints being made and treatments, and that responses to complaints had been poor at times. Vector Control treatments are not initiated by complaints, per se. The County may become aware of a mosquito problem by means of a volume of community complaints. However, the need for treatment is not determined on the basis of complaints, but on the assessment of surveillance data and other criteria. Under the Long-Term Plan, the imposition of more numeric criteria will make it more transparent that complaints do not drive treatment decisions.

4.9.3 Adulticiding only for health emergencies (E-6, P-24, P-25, P-39, P-47, R-25, R-32, AH-7, AK-8, AR-16, BD-3, BD-4, BJ-2, BJ-3)

A total of 14 comments were classified under this subtopic. A number of comments were received that stressed that the County should only use adulticides to prevent disease outbreaks. Variants included:

- Adulticide only when there is evidence of disease
- Adulticide only when disease is uncovered
- Adulticide only for disease control
- Adulticide only when the risk of disease is intolerably high
- Adulticide only when there is an imminent disease threat

Comments cited examples:

- Onondaga County only adulticides when mosquito pools are positive for EEE
- Fire Island only allows adulticides outside the community when there is a disease threat and only allows aerial adulticides when WNV is present, which is a situation that occurs too late in the year for actual applications to occur)

In short, the commenters felt that nuisance control is an inappropriate reason for adulticiding. The conditions identified above would meet control options identified by the County as Health Emergency treatments. However, the County also calls for potential adulticide use under what it describes as "Vector Control" conditions.

The County, however, does not believe that there is any "pure nuisance" situation in an age of WNV. As discussed above, any time human-biting adult mosquito populations are reduced in Suffolk County, some amount of risk for WNV transmission is necessarily reduced. In addition, the notion of "nuisance" in itself is short-hand for "public health nuisance," not for "irritating problem." Mosquitoes are classified as a public health nuisance because, prior to the occurrence of WNV, mosquitoes were recognized as having health impacts through allergic reactions and the transmission of minor parasites and pathogens. The kinds of cross-species transmission of pathogens that are associated with mosquito bites are not perceived as being of little note, in times when SARS and avian flu have caused global headlines and some degree of panic. Therefore, the County insists on having its due regarding the potential for health impacts under essentially all conditions where mosquitoes are identified as being major problems "merely" due to large biting populations.

4.9.4 Technical risk assessment issues (T-24, T-25, T-27, T-28, T-31, T-32, T-33, T-34, T-35, T-35, T-39, T-41, U-52, U-53, U-54, Y-6, Y-15, AA-2, AA-10, AA-13, AA-14, AA-17, AG-60)

These 23 comments were primarily generated by three commenters.

Peer Reviewer #1 raised the following technical issues:

- Identify the surrogate for salamanders, identified as key species for the analysis, because the eastern tiger salamander is a locally endangered species

  Permethrin, resmethrin, sumithrin: bull frog

  PBO: chorus frog

  Malathion: western chorus frog

Methoprene: Woodhouse's toad

Bti: mummichog

- Are turtles terrestrial or aquatic?

  Because the surrogate for reptiles was birds, turtles were treated as terrestrial species.

- An incomplete pathway was used, although the assessment protocol specified such would not be done.

  The incomplete pathways were used to ensure that the study areas completely generalized to the County as a whole. Because only four discrete areas of the County were studied, hypothetical pathways were included, such as vegetable gardening in Davis Park, that would allow for a more complete understanding of potential risks, despite the actual absence of the activity at the specific location.

- Why were fractional intakes used for Tier 1 (worst case) scenarios?

  Fractional intakes were only applied for ingestion of produce (by a community gardener) and for fish ingestion. It is reasonable to assume that not all vegetables and fish consumed across a year will be either from a home garden or from locally caught fish.

- Maximum point estimate used is too conservative

  The County agrees that the use of the maximum point estimate is a very conservative value for risk computation. The intent was to sieve the exposures that could not, under any circumstances, be considered to be a concern by identifying them through a very conservative first approach.

- LOAEL to NOAEL conversion (10x) not necessarily conservative enough

  This conversion was only used for malathion subchronic and chronic inhalation and resmethrin acute, chronic, and subchronic inhalation toxicity computations. USEPA used this safety factor, for instance in calculating a PBO MOE with LOAEL data (USEPA, 2006a).

- Adding pyrethroid and PBO risks may not necessarily be conservative, because they act synergistically.

  Normally, two products that act in entirely different ways, as PBO and pyrethroids do, are not considered to enhance each other's effects. Adding the impacts is conservative, because it emphasizes that they potentially act together in organisms other than target organisms. There are little to no data suggesting that another approach more accurately describes the conjunction of the two chemicals. The notion of maintaining conservative principles in the calculation comes from ignoring the two different modes of action, and considering them to enhance each other's effect.

- Other reasons than those stated in the risk assessment exist to assume the malathion results are conservative

  The risk assessment noted that the two order of magnitude difference in modeling deposition rates is sufficient to account for the fact that the Westchester County (2001) risk assessment found no predicted elevated risks for malathion use, whereas this assessment found some potential under certain scenarios. Other factors that may have affected the malathion calculations include using a maximum point estimate, and the number of applications considered for Davis Park and Mastic-Shirley (in both case, the risk assessment used the maximal number of application events over the 1999-2004 time frame).

- Pesticides may stack against buildings

  It is quite likely that many features in a real landscape either concentrate or disperse pesticide applications. The modeling scenario was complicated to begin with. Adding details such as trees or buildings could have been attempted, but the additional details would likely lead to too many unsupported assumptions that might drive the modeling output. Nonetheless, the point is well-taken, and it may be interesting to determine if serious anomalies in predicted concentrations can occur due to eddying and stacking associated with substantial structures.

- Update Table 4-3, using 2000 references for sumithrin and 2005 references for malathion, resmethrin, permethrin, and piperonyl butoxide

  The USEPA website was searched for a 2000 reference to sumithrin or d-phenothrin or phenothrin, but none was found. In addition, the changes to toxicity values used for malathion, permethrin, and resmethrin were all made after the completion of the risk assessment.

  However, the County notes that for malathion, USEPA adjusted the acute dietary toxicity value to 13.6 mg/kg/d, approximately 25 percent of the value of the toxicity value used in the quantitative risk assessment. The chronic value was increased to an RfD value of 0.07 mg/kg/day, approximately 350 percent of the value used in the risk assessment (USEPA, 2006b). Therefore, the revised values would increase acute risks but decrease chronic risks. The malathion acute risk computation did not include an ingestion pathway because of the differences in the fashion that USEPA defined the toxicities did not allow for aggregation. Therefore, the change in acute values would not have affected the assessment. Increasing the toxicity value for chronic exposure would have reduced the estimate of risk increase, especially in key exposures such as community gardeners, where risks potential for serious risk increases were identified.

  For resmethrin, the acute dietary toxicity value was eliminated. The chronic dietary endpoint was changed to 0.35 mg/kg/d, compared to the value used in the risk assessment of 0.03 mg/kg/d, making the risk assessment slightly more conservative. Dermal and inhalation exposures were changed to a MOE approach, but the values used to determine the endpoints were identical to those used in the risk assessment, with two exceptions. A single value was used for acute and chronic toxicities. For dermal exposures, the more conservative value was used, meaning the resmethrin acute risk assessment was not conservative enough regarding dermal exposure. For inhalation risks, USEPA adopted the more liberal acute value, meaning the risk assessment was much too conservative in assessing acute inhalation risks (USEPA, 2006c). These changes mean, since inhalation risks were much more important for acute risk derivation, that the risk assessment was more conservative than USEPA in assessing risks.

For permethrin, the acute dietary toxicity value was eliminated. The chronic dietary endpoint was changed to 0.25 mg/kg/d, which is 500 percent greater than the value used in the risk assessment. Dermal and inhalation exposures were changed to a MOE approach, but the values used to determine the endpoints were identical to those used in the risk assessment, with two exceptions. A single value was used for acute and chronic toxicities. For dermal exposures, the more conservative value was used, meaning that, as with resmethrin, the permethrin acute risk assessment was not conservative enough regarding dermal exposure. For inhalation risks, USEPA adopted the more liberal acute value, meaning the risk assessment was much too conservative in assessing acute inhalation risks (USEPA, 2006d). These changes mean, since inhalation risks were much more important for acute risk derivation, that the risk assessment was more conservative than USEPA in assessing risks.

No changes were made to the USEPA findings for ingestion and dermal exposures, although Reviewer #1 indicated changes had been made. Inhalation toxicity values were changed to 3.91 mg/kg/day, which is slightly less than the 4 mg/kg/day value used for the risk assessment (USEPA, 2006a). The risk assessment also identified the toxicity value as a NOAEL, but it apparently was actually a LOAEL, as the computed MOE for both Table 4-3 and USEPA (2006a) were given as 1000. The difference is too small to matter in the calculations.

The sum of the changes made in 2006 for these new re-registrations were inconsequential, in sum, except that the risk assessment might have determined impacts using the older values that would not have been determined with the newer data sets.

- It was said that the buffer area for the risk assessment was too large.

The buffer was not selected to meet USEPA or standard risk assessment concerns. Rather, the buffer was selected as a means of determining how drift might or might not be affecting surrounding areas, and also as a means of incorporating certain sensitive areas into the risk assessment indirectly. This proved to be sound when drift proved to be a major concern under standard aerial application means.

- The reviewer did not agree that the maximum one-hour exposure provided an estimate of worst-case conditions.

  Earlier, the reviewer had expressed dissatisfaction with an "overly" conservative approach in using these values; however, this comment was made in the context of 20 minute acute exposures. Using a one hour modeling approach can reduce the overall average concentration that exposures are based on. However, all of these estimates are necessarily approximations of real exposures. The helicopter applies a 300 foot swath. With a 5 mph wind, ignoring dispersive effects, the spray cloud should move past a stationary observer in about 40 seconds. Over the course of a time period, the observer would experience pesticide clouds from successive swaths, but all for the same limited time period if dispersion is ignored. Accounting for dispersion would increase the time of exposure, but as the duration of exposure increased, the concentration experienced would decrease. Helicopter applications typically occur over several hours, so that using a one hour exposure may actually result in a greater exposure to pesticides than a 20 minute calculation because of exposure to more swaths. In the "real world," where trees and houses impeded drift from a truck application, the shorter duration of exposure might have a much higher exposure concentration. However, with multiple exposures calculated at the maximum concentration site, it is likely that a one-hour value will be higher for the modeling run. This holds similarly for multiple swath exposures for hand-held applications for the longer modeling run. Deviation from real world conditions will tend to be conservative in these three instances, meaning that the modeling failures do not contribute to calculations of lower risks.

Peer Reviewer #2 raised the issue of pyrethroids and potential links to Parkinsons Disease. This issue had been discussed in the Literature Search (Book 6 Part 1, CA-SCDHS, 2005) in the context of Gulf War syndrome linkages. Because the weight of evidence appeared to be against pesticide involvement in the syndrome, and because the findings were not suitable for incorporation into the risk assessment, these reports were not included in the DGEIS. The County recognizes that significant work demonstrating that similar processes may occur with pyrethroid pesticide exposures and in Parkinsons Disease onset; however, it has not been shown that there is a relation between pesticide exposure and disease incidence.

Peer Reviewer #2 noted that a study of New York City asthma incidence found no connection between increases in pesticide applications in 1999 and hospitalizations or the asthma census at a South Bronx hospital. The DGEIS cited a similar study (p. 1075) by Karpati et al. (2004) that was conducted over more of the City than the reviewer's paper. There do not seem to be links between mosquito control pesticide applications and increased asthma cases.

Peer Reviewer #2 questioned the use of birds as a surrogate for reptiles. The link is distant. However, studies of pesticide impacts on reptiles are few, and certainly do not extend across the suite of pesticides evaluated for the Risk Assessment. Reptiles could have been lumped with amphibians, but amphibians were treated as predominantly aquatic life, based on the idea that larval amphibians are more vulnerable than are adults. This seemed to be the best choice. This comment also, indirectly, addresses the NYSDEC comment that accurately noted terrestrial amphibians were not separately assessed. Data for any amphibians were in short supply. It was thought that aquatic, larval amphibians would be more susceptible to pesticide impacts. Therefore, terrestrial amphibians were not traced in the risk assessment.

Dr. Horst had a series of comments:

- That impacts do not propagate up the food chain

  This statement is based on the ecological analysis of aquatic foodchain exposure propagation. Three mid- to upper foodchain consumers were modeled – the raccoon, the sandpiper, and the belted kingfisher. The calculations and modeling scenarios were presented in Appendix F to the Ecological Risk Assessment (Cashin Associates, 2005a). No impacts to these consumers were detected.

- Annelids and nematodes were not included in the risk assessment

  Resmethrin, permethrin, and Bti were expressly tested with polychaetes in the risk assessment evaluation, as data were available for them. Generally, annelids and nematodes were broadly treated in the "aquatic insect and larvae" classification. The ecosystem model (Aquatox) looked at fresh water systems, and, although benthic organisms were explicitly included in that effort, the representatives used were amphipods and chironomids.

- Toxicity of methoprene to bees was only mentioned but not further discussed

  Terrestrial life was not evaluated for methoprene due to a lack of completed pathways. This may have been an incorrect determination, as it is possible that terrestrial organisms could be exposed to methoprene by drinking from contaminated ponds. Although an analytical approach to these issues would be preferable, the County notes that methoprene quickly disappears from the interface layer (defined as the top one to two cm of the water column), which presumably is where bees and other insects would drink from, according to the Caged Fish Experiment (Cashin Associates, 2005b). Dr. Horst also is concerned that methoprene quickly partitions from the water column, which suggests that all parties might agree that this does not represent a significant exposure.

- Define hormesis

  In a list of changes that might be measured other than on an organism level in the Literature Search (Book 7, CA-IC, 2004), the word "hormesis" was used as an effect that might be measured. Hormesis generally is used to describe the induction of a positive effect by otherwise what is considered to be an agent that causes negative effects. For instance, small amounts of toxins are sometimes thought to induce good health through a hormetic effect. This is a controversial notion, and generally has not been shown to have scientific validity. It has been shown that some materials that at low concentrations or in small amounts are necessary for biological processes can have negative effects when received at higher concentrations or larger amounts (i.e., metals that serve as vitamins or trace nutrients). It is this latter sense that was intended in the Literature Search.

- For crustaceans, absorption of pesticides through the digestive tract is more important than uptake through the shell from ambient water

  The County appreciates the greater knowledge regarding crustaceans that Dr. Horst brings to the review process. However, for the purpose of conducting the risk assessment, the County believes that larger doses of pesticides, especially for acute effects, would be generated by having a crustacean absorb pesticides unimpeded through the shell from ambient waters than by modeling uptake through drinking or consumption of tainted organisms. Therefore, the approach adopted in the risk assessment is more conservative in determining exposure by the organism. In any case, effects reported for exposure were calculated in comparison to ambient water concentrations, and were independent of the means that the pesticide was taken up.

4.9.5 Non-target organisms assessment review

28 comments were received that were classified as predominantly relating to non-target impacts associated with adulticides. These comments were further classified as more generic and more specific comments.

(1) General comments (E-2, N-1, N-8, P-6, P-7, P-41, AC-6, AK-4, AM-2, BF-5)

Adulticides were said to cause negative impacts to Long Island's ecology, and to have a negative impact on wildlife. The County found some potential for non-target impacts from adulticide use. A presumption that adulticide use can cause impacts to flying insects can be supported in two ways. One is on the basis of the risk assessment modeling. The second is on the basis of some limited sampling of insects following applications.

As reported in the DGEIS (pp. 1087-1088), sampling in California and elsewhere tends to find that night-flying insects, and some times day fliers such as bees, can be reduced in number immediately following an application. This stands to reason, as pyrethroids and malathion are not extremely specific pesticides, and so are likely to have effects on insects other than mosquitoes. However, mosquitoes are extremely small and relatively fragile insects. It would not be surprising if dosages sufficient to kill mosquitoes did not affect larger flies or beetles. The limited testing shows there is a drop in general abundance following applications. However, recovery appears to be quick. The reason for the rapid recovery was not determined, but it is likely due to migration and not sudden reproduction. This means that if the County were to expand the area it generally applies pesticides over, the chance for a more significant impact might increase.

Pesticide testing often uses honey bees to determine impacts on insects. Honey bees are very important insects, and they are large, and relatively easy to work with. Testing is usually accomplished by fixing a patch containing pesticide directly to the bee. It thus receives a full dose of pesticide. It is not clear if bees are especially sensitive or not to pesticides. However, modeling associated with the risk assessment found that there was the potential for impact to bees from the application amounts used for all considered pesticides. A discussion of the potential for mitigation of this apparent impact was presented in the DGEIS (pp. 1084-1087). In addition, a more general discussion of insects and the chance for impacts was appended to that discussion (pp. 1087-1091). Generally, non-target impacts for mosquito control were described as being less than those associated with agricultural applications. Impacts to important emergences of insects can be mitigated by sharing information between natural resource agencies and SCVC, so that SCVC can make any applications in a more aware fashion.

A second area of potential impacts is to certain aquatic organisms with certain agents. Malathion was generally predicted to potentially increase the risk of effects on crustaceans and larval aquatic insects, while permethrin was found to have similar potential increased risks for impacts, but only under one particular set of circumstances. Resmethrin and sumithrin were not found to have any predicted increased risks of ecological impacts. The potential for these increased risks to actually lead to ecological impacts was tested using an USEPA model, Aquatox. Because it is more likely for the County to use pyrethroids in its control program, permethrin was tested. The pesticide was modeled as having short-term population effects on several kinds of aquatic invertebrates. However, populations quickly recovered with the cessation of applications, and the effects on the invertebrates did not propagate in the foodchain (see the DGEIS, pp. 1101-1109). These results suggest that pyrethroid use with resmethrin and sumithrin will not have increased risks for ecological effects, as well. Therefore, the County believes it is justified in stating that there are no significant elevated risks to the ecology, and generally for non-target organisms over the long-term (although some short term impacts are possible).

One of the comments related that there did not appear to be any impacts to fauna from past applications. This is an interesting observation. In many ways the County is supportive of this point of view. For instance, this is a general observation made by trained marsh ecologists working with marsh management programs. The County believes this is the case with regard to potential impacts to flying insects from its own adulticide program (see just below). However, in and of themselves, such observations are not persuasive as impacts may be subtle or otherwise generally undetectable to even very close observation.

Comments specified that the peer reviews disclosed adverse impacts not discussed by the County. Specifically, Dr. Pimentel and Peer Reviewer #2 were said to have found impacts that the County had not discussed. Dr. Pimentel did assert he thought there were ecological impacts where the DGEIS suggested none would occur, but provided no good basis for his assertion. His reference, to an unpublished paper of his own, discussed impacts from widespread use of pesticides to support agriculture. It did not discuss mosquito control pesticides at any time (Pimentel, accepted). Peer Reviewer #2:

- noted that endocrine disruption effects were not discussed in the risk assessment (and calls the identified impacts "debatable")
- stated that the pesticides are not "hazard-free" (in the context that the County identified risks to flying insects and non-target aquatic organisms)
- noted that permethrin has received a regulatory tightening of status to "restricted use" on crops due to its potential for impacts to aquatic organisms (the DGEIS did not report this, which is not relevant to mosquito control uses)
- discussed some very recent findings relating to pyrethroid use as household and agricultural pesticides.

Peer Reviewer #2 noted that the impact of these findings to Suffolk County depend on how sediment interactions affect pyrethroid concentrations. Peer Reviewer #2 stated that DeLorenzo et al. (2005) and Barnes et al. (2005) came to different conclusions on that matter. The County has interpreted DeLorenzo et al. (2005) as not reporting lower toxicity concentrations for pyrethroids than were found by Zulkowsky et al. (2005) or Cashin Associates (2005e), for instance. Barnes et al. (2005) (results reported in the DGEIS as Barnes [2005] and Cashin Associates, 2005e) and DeLorenzo both report that sediments appear to be a sink for pyrethroids, although different pesticides were tested in the two studies. USEPA, reported on by Peer Reviewer #2, also has noted that sediments are a sink for pyrethroids. This raises some concerns regarding bioavailability of material in sediments – a subject with notably little research findings but much speculation. The recent pyrethroid results and the DeLorenzo study were all reported on in the DGEIS, in any case (pp. 1115-1116, noting that the SETAC presentation DeLorenzo et al., 2005, was published as Key et al., 2005, and is so presented in the DGEIS). Most of the material presented by Peer Reviewer #2 on pyrethroids was not in the Risk Assessment (see Cashin Associates, 2005a) but was discussed, at least in passing, in the DGEIS. None of the material had any impact on the findings of the DGEIS. Therefore, the County does not believe that relevant adverse impacts were disclosed in these comments.

A comment was made that the ecological impacts were not well researched. This notion had been put forth by Dr. Horst, who thought that the Literature Search (Book 7, CA-IC, 2004) did not contain any citations past 2001. The citations for post-2001 were listed separately, because of organizational issues associated with the way this part of the project was managed. 91 specific post-New York City (NYSDOH, 2001) and Westchester County (2001) references were included.

Finally, a comment was received suggesting that the County's analysis ignored manufacturer warnings of toxicity. This is not the case. The underlying data used by the pesticide manufacturers to develop their labels (specifying risks to various biota) were used to develop the toxicity ranges used in the risk assessment. There remains considerable confusion between the identification that a pesticide can cause harm at certain concentrations, and whether or not the applications of the pesticide result in environmental concentrations at the critical levels. The discussion of methoprene toxicity (see 4.8.1, above) reviewed this issue in depth, using concrete examples.

(2) Specific comments (Q-49, Q-50, Q-51, T-38, U-42, U-55, U-56, AC-4, AC-5, AC-6, AC-7, AC-11, AQ-1, AQ-2, AQ-3, BB-15, CB-1, CB-2)

Many of the specific issues raised here had to do with bee and other flying insect impacts from adulticides. It was pointed out that many farmers now need to hire beekeepers, and the decline in natural bee populations relates to mite infestations. The County notes that beekeeping has a long and noble history, limited in many times by transportation problems. Modern times have alleviated those issues, and so beekeeping is available to all farmers as is needed. This may play a role in the increase in beekeeper use. Natural bee and other native pollinator populations are under pressure from many factors, including pesticide use, loss of habitat, and invasive competitors (see Biesmeijer et al., 2006).

Nonetheless, the County agrees that most insects are considered to be beneficial (that is, they provide positive ecosystem values and services). Unfortunately, it is impossible to eliminate all risks to flying insects when adulticides are used, as is noted. One comment noted in particular that honey bees might be impacted along the marsh edge; this is unlikely, as the County tends not to focus its adulticiding efforts along the marsh edge for a number of reasons, technical and regulatory. Bees would mostly be impacted in the neighborhoods where the pesticides were applied. However, because there are likely to be no effective residuals from mosquito control applications, the County does not believe bees are likely to be greatly impacted by its control program. Peer Reviewer #2 agreed, somewhat. It was noted that bees make a poor surrogate because apparently some pyrethroids (especially permethrin) act as repellents for bees. However, the testing of bees would not account for that effect in developing toxicity criteria. It also did not seem to be a factor in some of the studies reported on the DGEIS (p. 1088), where bee populations were either unaffected by adulticide use, or recovered very quickly.

A comment was received that stated the County understated the impact to flying insects. The County has tried to show why it believes there will be little impact to insect populations from the use of the mosquito control pesticides. This belief is founded on a small number of papers that support it, and observations made in conjunction with the long-standing County adulticide program. Indeed, that is often a complaint made about County use of adulticides, in that it appears that insects recover very quickly following an application.

It was suggested that the County rework the non-target insect discussion as presented in the Risk Assessment (CA-IC, 2004), and use qualitative information to help form more authoritative judgments. The County did revamp this section of the impact assessment extensively (see the DGEIS, pp. 1084-1091). Malathion still has more potential for increased risks of impacts than do the pyrethroids, as noted in a comment.

Comments were made that the impact assessment ignored their potential for toxicity to fish. This is not so. Toxic impacts to fish were tested for directly in the risk assessment (and in the Caged Fish Experiment, see Cashin Associates, 2005d), and indirectly through the Aquatox model. The concentrations modeled for pyrethroid applications did not reach concentrations that had been determined might lead to impacts to fish, so no increase in risk as determined. This was found for single applications, and repeated applications (impacts to fish were tested under the Davis Park scenario, which accounted for 14 weekly applications) (see the DGEIS, Table 7-29, p. 1098).

It was suggested that the DGEIS analysis does not address the potential for impacts to estuarine ecology. On the contrary, one of the more sophisticated ecological models, Aquatox, was run to determine impacts from permethrin on a shallow water body in the Mastic-Shirley area, such as a small wetland or salt marsh pool (see the DGEIS, pp. 1101-1109). The inclusion of Atlantic silversides, marine gastropods, and clams were intended to allow for the results to be transferable to more marine settings. It should be noted that the modeling effort did not allow for exchange of water out of the system, and so impacts for tidally-flushed systems would likely be less due to dilution effects. Furthermore, the individual toxicity assessments included evaluation of marine and estuarine species. The risk assessment did not include a specific marine organism to test if foodchain propagation occurred, but the results found for the other species tested (raccoon, sandpiper, and belted kingfisher) can be assumed to be applicable (it also might be argued that the sandpiper is an estuarine species, but at least some members of the family are terrestrial).

Comments were received that, although Scoping Comments had been received that specified high acute toxicities for pyrethroids, the DGEIS did not address the potential for impacts to organisms at these levels. This is not entirely accurate. The comment is accurate in that pp. 343-385 of the DGEIS did not address these issues. However, the ecological assessment of adulticide use, on pp. 1079-1118 (quantitative risk assessment) and on pp.1131-1134 (field work results) did discuss the potential for impact, using similar ecotoxicity values as discussed in the Scoping Comments (see the Literature search, Book 7, CA-IC, 2004). The potential for impacts to flying insects from all pyrethroids and to aquatic invertebrates from permethrin under specific conditions were discussed in detail.

4.9.6 *Pyrethroid issues (Q-45, Q-46, Q-47, U-14, U-15, U-48, U-49, U-50, U-51, U-57, U-58, U-59, U-60, U-62, U-63, U-64, U-65, U-66, U-67, U-68, U-69)*

21 comments were received regarding updated or additional information on pyrethroids, material that was not included in the DGEIS. Primarily these comments were received from Peer Reviewer #2, although several other comments were also received.

Comments were received regarding the carcinogenicity of permethrin and resmethrin. At the time the Risk Assessment was being finalized (approximately March through August, 2005), USEPA was working on its own evaluations of mosquito control pesticides (resmethrin, permethrin, malathion, and the pyrethroid synergist, PBO). The draft analysis for permethrin was released in September, and it changed the classification of permethrin to a potential carcinogen. Integral Consulting was able to conduct a relative analysis of permethrin in terms of mosquito control application rates modeled for Suffolk County and the types of applications reviewed by USEPA. Integral Consulting's analysis showed that exposures associated with mosquito control applications were orders of magnitude lower than anything considered by USEPA, and so any increase in cancer risks from mosquito control use in Suffolk County was infinitesimal. This information was presented in the DGEIS on pp. 1070-1073, and summarized in Table 7-21.

Following the release of the DGEIS, USEPA released a Reregistration Eligibility Document (RED) for resmethrin (USEPA, 2006c). In March 2005, USEPA had reclassified resmethrin as "Likely to be Carcinogenic to Humans" based on laboratory evidence of benign and malignant tumors in rats and mice exposed to resmethrin (Q^*_1 = 5.621 mg/kg/day, human equivalents). This document evaluated the cancer risks associated with all uses of resmethrin. It found some elevated risks for the general population (2.6×10^{-6}), but this level of elevated risks is deemed by USEPA to be below the level of concern. This means there is a risk of 2.6 additional cancers per million people in the US over the course of their lifetimes. This risk was not attributable to mosquito control uses, but to a combination of dietary exposure and use of resmethrin products within residential areas as indoor aerosol space sprays. USEPA attributed the dietary exposure to

> [t]he only food use for resmethrin is in food handling establishments such as food processing/handling plants, restaurants, commercial food item transportation, and food storage facilities. The Agency conducted a conservative cancer risk estimate assuming 10% of food handling establishments are treated with resmethrin. This is likely an overestimate of use based on use data reviewed by the agency.

Dietary exposure accounted for 1.6×10^{-6} additional risk, and residential exposure accounted for 1.0×10^{-6} of additional risk (modeled residential use of resmethrin also slightly exceeded non-cancer risks for exposed children, and has resulted in a label restriction for these kinds of uses). No endocrine disruption effects were described (USEPA, 2006c).

USEPA determined bystander cancer risks from mosquito control applications. USEPA assumed a 20 minute exposure over 70 years. The airborne concentration that the bystander was exposed to was 0.011 mg/m^3 for truck sprays and 0.0015 mg/m^3 for aerial applications. Given those assumptions, the bystander would need to be exposed to 125 truck sprays every year to exceed a lifetime cancer risk of 1.0×10^{-6}, and aerial sprays could never exceed that risk since more than 365 exposures would have to occur each year (USEPA, 2006c). The results for modeling of applications for the Risk Assessment showed a maximum air concentration under all scenarios for hand applications of 0.016 mg/m^3 (over one hour), a maximum of 0.015 mg/m^3 for truck applications, and a maximum of 0.013 mg/m^3 for aerial applications. Mean maximum concentrations ranged from 0.006 mg/m^3 for hand applications to 0.005 mg/m^3 for truck to 0.004 mg/m^3 for aerial applications (Cashin Associates, 2005a). This suggests that similar analyses conducted using Suffolk County modeling data would be on the same order of risk determination, and therefore not result in the identification of cancer risk increases of concern.

USEPA suggested there are risks for the kinds of ecological impacts to aquatic invertebrates from mosquito control uses, along with acute risks to non-target insects such as bees. Some risks were also found for birds. One analysis found exceedances of levels set for endangered species that feed in short grasses. Mitigation of impacts was made by ensuring the current maximum application rate of resmethrin was adhered to and limiting annual applications to 28 per year at the maximum label rate for each application, and by ensuring that resmethrin was not applied by air to close to the ground. Minimum flight heights of 75 feet for helicopters and 100 feet for planes were set. These changes do not affect any of the procedures outlined in the Long-Term

Plan. Warnings on the label regarding the potential for impact to aquatic invertebrates and honey bees visiting application areas are required (USEPA, 2006c).

It was noted that links between Parkinsons Disease and pyrethroids had been found, per Peer Reviewer #2. The comment by Peer Reviewer #2 was discussed above in Section 4.9.4. Essentially, similarities between brain tissue effects associated with pyrethroid exposure and early stages of Parkinsons Disease have been found. These tend to be for in vivo studies. They suggest there may be links between pyrethroid exposure and the initiation of Parkinsons Disease, but no information has been generated beyond these first tentative linkages.

Peer Reviewer #2 noted the following, which the County agrees are accurate statements regarding pyrethroids:

- The public is generally unaware that mosquito control uses are only a small percentage of pyrethroid usage

  Most pyrethroid use is for agricultural pest control, although institutional and at-home products are also common. Mosquito control is generally an insignificant source of pyrethroids to the environment.

- CDC has documented a lack of human uptake following exposure to pyrethroids used for mosquito control.

  CDC, as reported in the DGEIS (pp. 1076-1078), has made several biomonitoring efforts to determine if mosquito control pesticides are entering human bodies following applications. Urine sample analyses show no statistical increase in metabolic products compared to pre-treatment data.

- Considerable uncertainties exist regarding pyrethroid modes of action

  USEPA is supporting research on this topic, which will allow risk assessments to determine how and when various impacts from different products can be aggregated.

- Regulators have not yet established means of testing for pyrethroids at environmentally consequential concentrations

Suffolk County is in the forefront of developing assays for pyrethroid measurement. The Suffolk County Public and Environmental Health Laboratory, using standard methods, has been able to detect pyrethroids at environmentally meaningful levels, but has not been able to report the detections, due to method restrictions[1]. USGS and the Brownawell laboratory, located at Stony Brook University, have extended the detection levels of the pyrethroids considerably. USGS has a 5 ng/l (part per trillion) detection limit. The Brownawell laboratory can and has detected lower levels. It believes that it can claim detection limits at least as low as 500 pg/l (parts per quadrillion). The results of the proficiency tests across the laboratories (see the DGEIS, p. 769) provide support for the accuracy and reliability of the three laboratories' work.

- Low concentrations of pyrethroids may need more complex assessments than cause-and-effect

The County assumes this is a reference to the potential for estrogenic effects and other non-toxic kinds of impacts. As Dr. Horst pointed out (see 4.8.1), modes of action that are more complex than simple organism toxicity raise issues regarding how to evaluate the impacts of the non-fatal (or, at least, slow to occur) alternate impacts. This may prove to be an issue for pyrethroids, although such concerns are only suppositions at this time.

- Data suggest pyrethroids are more associated with sediments than the water column

This finding is supported by the results of the Caged Fish experiment (Cashin Associates, 2005b), although the County was unable to confirm any detections of resmethrin in sediments.

- High concentrations of pyrethroids have been measured in California stream sediments

- The higher concentrations measured in California (compared to other areas) may relate to dry weather irrigation run-off flows

[1] Use of standard methodologies, as promulgated by agencies such as USEPA and the New York State Department of Health, establishes limits for reporting results, based on equipment used in the analyses and other technical considerations. Careful and precise laboratory work can extend the equipment and methodological capabilities beyond those assumed to be possible under standard practices. Adherence to published restrictions means that able

High use rates of pyrethroids for agricultural and home landscaping and pest control reasons in California, coupled with irrigation when natural stream flows are low, provide large inputs of pyrethroids under conditions that promote deposition to sediments. The DGEIS discussed these issues (see pp. 1115-1116).

- DeLorenzo et al (2005) found that low concentrations of permethrin are toxic to larval grass shrimp

- Presence of sediments reduced the toxicity of permethrin

These two findings, albeit identified as Key et al., 2005, were discussed in the DGEIS (see p. 1115). They did not change any of the findings of the risk assessment.

- An unresolved issue is whether only dissolved pyrethroids are bioavailable

- USEPA has become concerned that sediment-bound pyrethroids may be bioavailable in some way

- Pyrethroid residues are widely found in California sediments

- It has been suggested that these residue concentrations are great enough to have organism impacts

- The pyrethroids at issue are not those used for mosquito control

These five comments form the crux of current challenges to pyrethroid use in California. It is clear that relatively high concentrations of pyrethroids are accumulating due to run-off and relatively slow degradation of the compounds in the sediments. The standard assumption has been that particle-bound pesticides, and contaminants in general, are not available to the foodchain, although it is clear that some organisms consume and process sediment. USEPA is trying to determine how to address the issue that such contaminants are not entirely unavailable to the foodchain. The relevance of the issue to the current

practitioners (such as the County Public and Environmental Health Laboratory) cannot report these better than standard results, if the laboratory is to remain method-compliant.

environmental review is small; none of the compounds at issue are used for mosquito control. Therefore, the findings of potential impacts are moot.

- Journal of Shellfish Research (Fall, 2005) discussed the potential for mosquito control pesticides to have contributed to the 1999 Long Island Sound lobster die-off

  The findings of the Long Island Sound Lobster Research Initiative, as presented in the Journal of Shellfish Research, were presented in the DGEIS (see pp. 409-411).

4.9.7 *Application issues (H-12, I-38, I-40, K-11, K-13, K-17, K-19, K-20, K-21, K-22, Y-2, AC-22, AC-25, AC-26, AG-49, AG-50, AG-118, AJ-16, AX-3, BJ-3)*

20 comments were received on a wide variety of application-oriented issues.

Buffer areas were discussed in several comments. The Town of Babylon urged the County to find a means of reducing current buffers. The buffers were negotiated with NYSDEC as a means of meeting regulatory setbacks established to protect wetlands. The County believes that better mosquito control could be achieved if pesticides could be applied closer to wetlands boundaries. The results from the air modeling could be interpreted as supporting reduced buffers. At the conclusion of the environmental review process, the County intends to discuss this issue with NYSDEC. NYSDEC notes that there is a 100 foot Adjacent Area that surrounds regulated wetlands that is subject to NYSDEC regulatory authority. Related to that is a comment that suggests applications enter surface waters. Labels for the various pesticides tend to not allow direct deposition of adulticides into open waters because of the potential for impacts to aquatic invertebrates. Pesticides do drift. One of the reasons the County has purchased the Adapco targeting system is to allow it to better apply pesticides to reduce unintentional depositions.

The Adapco system is a coupled air dispersion model and aircraft guidance system. The model is driven by real-time weather data collected by a connected kitoon system. A kitoon is, essentially, a tethered weather balloon. The model, which has a proprietary component aligned with an AgDisp element, uses the actual weather data to predict dispersion from the aircraft, using flight characteristics of the aircraft entered into the model. The model is designed to optimize delivery of pesticide over the selected target zone. Best flight routes to achieve the optimal delivery are projected onto a screen to provide pilot guidance. The system also provides output suitable for submission to regulators at the completion of the flight. The theory and development of the Adapco system are discussed in more detail in the Literature Search (Book 5 Part 3, CA-CE, 2005b). The County intends to refine its applications further as it receives more information from local environmental experts regarding sensitive areas, as was suggested in one comment; these could be programmed into the Adapco system.

The County uses the maximum label amount when it applies pesticides. This is done for two reasons. One is that the potential for generating resistant organisms is somewhat reduced by using larger concentrations. Secondly, greater effectiveness is realized by using higher concentrations.

Agricultural use of pesticides is very different from mosquito control uses. The County believes that the reporting requirements for pesticide uses and storage it is subject to are more onerous than those imposed on farmers; however, because of the different regulatory requirements, it is possible to assert, as the Southold Town trustees did, that the County is not being made subject to IPM demands as are farmers. The County has clearly defined its mosquito control plan in terms of IPM, and thinks this is a sound approach to address this.

It was asked if the preferences of one community can affect another's risks. In a sense, yes, because mosquitoes are mobile organisms. Therefore, if one community expresses a strong preference to avoid the use of adulticides when discretionary applications are considered, the County believes that this may slightly increase risks for those surrounding that area. The Health Commissioner is not obliged to consider any such preferences under a Health Emergency, and also has the ability to waive requests from those on the Do Not Spray registry.

An inquiry was made regarding the potential role for the QA/QC team members in adulticide application decision-making. The information generated by this group's work will be interpreted by senior members of SCVC. However, the members of the QA/QC team do not play an active role in determining whether applications will be made or not (see the discussion of specific SCVC roles, DGEIS pp. 245-248, and the Long-Term Plan, Section 8).

Decisions to treat the canopy or to use pre-dawn treatments would be made by different senior personnel, depending on the conditions of the treatment. For Vector Control treatments, the Superintendent of SCVC, or the deputy division leader, would be responsible for the decision. Under a Health Emergency, the Commissioner of SCDHS would be responsible for this decision. Most Health Emergency determinations are made cooperatively among senior Department of Health Services personnel and the Superintendent of SCVC. However, under Health Emergency conditions, SCVC is subject to the authority of the Health Commissioner.

Under a Health Emergency, Suffolk County and NYSDEC have established procedures to allow the County to receive an expedited permit, called an Emergency Authorization, when NYSDEC concurs an emergency exists, per the Uniform Procedures Regulations. Generally, a declaration by the State Health Commissioner of emergency conditions with a particular problem identified by the County Commissioner of Health Services is sufficient for NYSDEC to issue such a permit.

Applicator judgment plays a role in making adulticide applications. For one, the applicator must implement routing as determined by supervisors in SCVC or SCDHS. Secondly, applicators must determine if conditions exist (such as resident exposures) that require cessation of the application (for hand-held and truck applications only). For this reason, it is important to recognize the continuing education requirements for professional applicator certification (as noted by NYSDEC). Many of the County's applicators are certified both as Public Health Pest Control applicators (Category 8 of the NYSDEC strata) and Aquatic Insect and Miscellaneous Aquatic Organism Control applicators (Category 5B). Certification requirements for both include obtaining 18 credits of continuing education over a six year period, and those with dual certification must obtain credits in both areas. The NYSDEC website (http://www.dec.state.ny.us/website/dshm/pesticid/appman.htm#certification) contains a great deal more information regarding certification and recertification requirements.

Malathion will be used under three conditions, as envisioned at this time. One is if resistance is a great concern and an alternative to pyrethroids is needed. Secondly, malathion may be used if it is determined that a daytime application is the optimal means of achieving mosquito control. Malathion would also be used when active penetration of structures is required to achieve mosquito control. Thermal fogging, which is more active than the drift techniques used for ULV treatments, forces the pesticide to go in certain directions. A classic use of thermal fogging would be to treat a tire pile. Malathion is the only one of the County's adult agents that is allowed to be used in thermal fogging.

The County notes that Fire Island applications are indeed made with hand-held, cart-drawn equipment. Dr. Pimentel made some broad statements regarding aerial applications that the County generally agrees with. Aerial applications do tend to cover more ground, and also are a little more expensive than truck applications. It is not clear that aerial applications are, necessarily, "better." If conditions are good, efficacy for truck applications can equal or exceed aerial applications. Sometimes truck applications can be "better" in that they can be more tightly focused. Also, if canopy mosquitoes are the primary target, then spraying up from below may be more effective than trying to reach mosquitoes from above. Generally, where a canopy exists, it is better to use a truck application rather than an aerial application. These issues are discussed in the DGEIS (pp. 228-235) and in the Long-Term Plan, Section 7.

Truck applications can be ineffective under several conditions. One is where there are many no-spray areas. This may occur because of membership on the No-Spray registry. Applications cease 150 feet from the property line and resume 150 feet away from the property line of the included residence. Secondly, buffers and wetlands themselves may also require cessation of applications along a particular road. Interruptions to the applications make them less effective. Determinations as to the benefit-cost of truck application to a particular area are made by senior personnel.

4.9.8 Efficacy discussion

The effectiveness of adulticide applications was the subject of 16 comments. Some of these comments were very technical and specific, while others were more general in nature.

(1) General comments (I-37, P-46, Q-53, AC-12, AC-13, AT-10, BH-3, BH-4, BH-5)

Under the Long-Term Plan, the County intends to set out traps before and immediately after applications. The pre-application trapping is intended to ensure that conditions meet thresholds established to determine the need for the application. However, when coupled with trapping data from the same site the night following the application, these data can be used to determine the effectiveness of the treatment. Optimally, the County will also set out a control pair of traps. That ensures that if a brood emerges immediately following the treatment or other factors influence the numbers of mosquitoes, it is accounted for in the assessment of the treatment. Data relating treatment effectiveness will be an important element in communicating to the public about the mosquito control program.

This was requested in several comments, and noted to be a sound element of the Long-Term Plan by Dr. Pimentel.

There were some general disagreements regarding the effectiveness of adulticiding on mosquitoes. One comment noted adulticiding seemed to make problems worse, and another said that pesticides cannot keep mosquitoes from biting. Opposed to this point of view was a longer term report from Fire Island. Conditions were said to be intolerable with no adulticiding, and not much better when applications were made once a month. Once a week adulticiding seemed to make conditions tolerable.

(2) Specific comments (N-7, Q-54, AC-19, AC-20, AC-21, AC-23, AC-24)

Dr. Pimentel offered several specific comments regarding adulticide efficacy. His comments, as was noted by several other comments, disagreed with the County's position.

The County presented information regarding adult mosquito control efficacy in the DGEIS (pp. 1134-1137). As noted by Dr. Pimentel, there are not many studies regarding efficacy, and there may be fewer "reliable" studies. Many studies, as discussed in the DGEIS, are conducted by manufacturers under specialized conditions to meet regulatory requirements. Quite a few of the studies that are published show poor or less than satisfactory results. This is because most applications meet targets for control at, typically, around 90 percent for mosquito reductions. Those that do not are often used as examples in the professional mosquito control press to enlighten operators, and try to ensure that the conditions and parameters that led to poor results are not repeated.

Mount authored two comprehensive reviews, one for truck applications (Mount, 1998) and one for aerial applications (Mount, 1996). He concluded that if conditions were appropriate, good control could be consistently achieved. Dr. Pimentel drew on the Mount documentation, but a little more selectively than Mount did. He decided that results tend to be poor, and provided some theoretical justifications for his view. Some seem to be not well thought out. For instance, Dr. Pimentel describes truck applications as always having an efficacy of less than 50 percent. This is because the insecticide will be carried downwind away from the truck. Dr. Pimentel does not recognize that truck applicators apply the pesticide up and out on both sides of the truck, and if wind conditions are mild enough, dispersion of the pesticide will occur some distance upwind. Suffolk County will not apply adulticides when wind speeds exceed 10 mph. However, the basic tenet is true enough, in that the pesticide will tend to drift downwind. The point loses its purpose when the notion of swaths is introduced. There always will be an ultimate upwind leg for an application pattern. However, the pesticides are not laid out in Suffolk County in a linear fashion, but rather over a grid, following the streets. This, according to the modeling (which did not account for barriers such as trees and houses) will result in quite a lot of overlap in a downwind direction. The small size of ULV droplets essentially means they are exempt from gravity. Therefore, complexities of air circulation caused by buildings and trees will mean that the pesticides will infiltrate behind houses and throughout the intended application zone. Therefore, it is not accurate to divide the supposed effectiveness of the application in half or to assert that areas behind buildings and other barriers will receive no treatment, as Dr. Pimentel suggests. The effectiveness of these applications was determined by comparison of pre-treatment mosquito counts to post-treatment mosquito counts, sometimes accounting for control site variations. Thus, the measure of the effectiveness is a true measure. It is true that stands of trees and other factors can reduce application effectiveness. That is the purpose of publicizing those conditions, so that operators can calibrate their efforts to maximize effectiveness. Dr. Pimentel cites some earlier work he had conducted to suggest that most adulticide drifts away from the zone where it was intended for. USEPA disagrees, claiming that mosquito control applications are generally 75 percent "effective," (see USEPA, 2006c, for instance). Nonetheless, Suffolk County recognizes that there may be some validity to Dr. Pimentel's concerns. This is why the County has adopted the Adapco system. It is designed to put all of the adulticide within the area intended for mosquito control. There will be some associated drift as the pesticide moves away from the zone. It is not intended to result in 100 percent deposition within the zone. The County had also looked at modeling approaches that might result in nearly all of the pesticide being deposited within the target area, but to do so would have required the helicopter to adopt slower, and, in the professional opinion of the pilot, unsafe speeds.

4.9.9 Alternatives (C-4, AX-2, BE-9, BE-10, BE-11, BF-1, BJ-11, BJ-12)

8 comments were received regarding a number of alternatives to Suffolk County's intent to use adulticide applications for adult mosquito control.

One was to use a white dinner plate containing Lemon Joy as a mosquito attractant. This idea has been offered as an effective means of mosquito control. It has not shown itself to be so under any independent testing, however.

Davis Park reported that it will subsidize the purchase of Mosquito Magnets to increase coverage in the community. The comment added that the machines are mosquito specific. Unfortunately, they are not, and they will catch a certain number of non-target insects. The DGEIS (pp. 837-849) also discussed experiments conducted regarding the effectiveness of Mosquito Magnets and similar devices and materials. They have been reported, in some tests, to work well. The county's results were not good. The County can not recommend their use as a generally effective mosquito control tool, but notes that in particular settings they do seem to be effective. Exactly what constitutes a setting where they will work has not yet been determined, however.

A number of comments suggested that alternatives to the County program might cause greater impacts than the use of adulticides by the County. These included:

- Repellents have greater impacts than adulticides

  The County does not believe there are unacceptable health risks associated with either repellent use (including DEET formulations) or adulticides, so long as label instructions are followed.

- Individuals can buy pesticides easily at establishments such as Home Depot, and use them in an unregulated way

  The County acknowledges that home owner pesticide use is relatively unregulated, but assumes that its citizens will not over apply or incorrectly apply any pesticide.

- Homeowner storage of older, now banned pesticides could lead to impermissible use of these pesticides

  The County would like to see all such pesticides disposed properly through local STOP programs.

4.10 Concerns Regarding Human Health Impacts from Mosquito-borne Disease

The comments on the DGEIS were predominantly classified in terms of the overall structure of the Long-Term Plan and its impact assessment – public education and outreach, surveillance, source reduction (with water management discussed separately), biocontrols, larval control, and adult control. Potential public health impacts associated with mosquitoes was also separated as an overall topic.

This section addresses comments classified as being concerned with public health issues. This section is concerned primarily with points raised regarding the County's explanation of the need to protect the public health by controlling mosquitoes.

4.10.1 Reevaluate WNV risk determination (I-27, Q-43, Y-4, U-6, U-16, U-26, U-30, U-31, U-32, U-33, U-34, U-35, U-36, U-37, U-38, U-39, U-40, AJ-3, AJ-4, AO-19, BB-9, BB-10, BB-11, CB-4, CB-5, CB-6, CB-7, CB-8)

Two comments sets generated most of the comments associated with the County determination of WNV risks, Peer Reviewer #2, and Bob McAlevy. Peer Reviewer #2 thought the entire mosquito-borne disease section of the Task 8 report contained errors, but that they were "correctable." Peer Reviewer #2 focused comments on the model developed by the County to determine the impact of WNV in the absence of mosquito control, especially in light of a paper by Busch et al. (2006). Mr. McAlevy discussed his view of the County's interpretation of bird data and the potential to identify WNV impacts from the data. In all, 28 comments were classified under this category.

It was said that WNV incidence is decreasing. Nationwide, that is somewhat true (see Table 4-7), but it is clear that infection rates are higher as of 2005 than before 2002. For instance, for Suffolk County, which has had low and variable rates of infection since 1999, it is hard to determine an overall trend (Table 4-14). Therefore, it is not exactly accurate to say that WNV rates have declined, which could be interpreted as the incidence of illness is much less than it used to be. In light of that, the diagnosis and definition of WNV-related illnesses have changed. In the first few years (for 1999-2002), records of WNV illness reported only deaths and cases that required hospitalizations. At this time, diagnosed cases are also accounted for (although not in the representation of national disease incidence shown in Table 4-13). At the same time, reports are also surfacing that non-meningitis, non-encephalitis cases of WNV can be more serious than first apprehended (see, for instance, Patnaik et al., 2006) and that recovery from more serious cases also is less certain than originally thought (Sejvar et al., 2006). Therefore, although it is true that influenza is a much more serious human illness (see Taubenberger and Morens, 2006), with many more fatalities and cases each year than WNV, WNV is not a trivial matter. In addition, while control efforts for influenza are ineffective at stopping outbreaks each year, Suffolk County appears to have information that its control program is very effective at reducing risks associated with WNV – which was also reported in comments.

Table 4-13. Serious WNV Human Cases and Deaths, US, 1999-2005

Year	Meningitis-Encephalitis Cases	Deaths
1999	59	7
2000	19	2
2001	64	9
2002	2,946	284
2003	2,860	264
2004	1,142	100
2005	1,294	119

(collected from http://www.cdc.gov/NCIDOD/DVBID/WESTNILE)

Table 4-14. WNV Cases and Deaths, Suffolk County, 1999-2005

Year	Cases	Deaths
1999	0	0
2000	0	0
2001	1	0
2002	8	2
2003	9	2
2004	0	0
2005	7	0

A comment also asked if models of WNV transmission had been considered. Most models were not considered because the scale they used was not appropriate. For instance, an early model suggested that infection rates were a function of temperature and rainfall. Since the County as a whole has essentially the same weather, using these kinds of models would not help the County understand or predict within-County infection incidences. A more sophisticated model, based on a malaria transmission base model, looked at the dynamics between *Culex spp*. mosquitoes and crows to predict disease incidence. It worked well on a New York State scale, but had not been tested on smaller areas (Wonham et al., 2003). The Wonham et al. model also suggested that reducing mosquito populations would reduce disease risk, but that reducing bird populations would not (it should, in fact, increase disease transmission rates).

Peer Reviewer #2 thought that the modeling approach used by the County (see the DGEIS, pp. 1223-1234) was "useful." Some particular comments were made regarding the model:

- Was the exposed population the sum of the population in the highlighted zip codes?

  That was a correct assumption.

- It is not accurate to assume exposure occurs only at residences

  It is true that infection can occur as a result of work or leisure-related activities, and these activities can clearly occur at locations far from home. However, because of limitations in data collection techniques (it is difficult for people to determine where they had been bitten by mosquitoes, sometimes, and if they are traveling, it is impossible to determine which mosquito bite resulted in the infection), assignment of other infection locations is not a straight-forward matter. It has long been a contention of SCVC and ABDL personnel that probably many New York City WNV cases were actually the result of Long island or other resort area infections. Secondly, a major assumption of many WNV researchers is that *Culex spp*., especially *Cx. pipiens* (in the northeast US), are the primary transmitters of WNV to people. *Cx. pipiens* is a relatively stationary mosquito (flight ranges often expressed in terms of hundreds of feet), and tends to bite people late at night, often within houses (A. Spielman, Harvard School of Public Health, personal communications, 2004). Therefore, if the assumption is true, it makes the most sense to assign the location of infection at the primary residence. Third, all other investigations of infection rates have assumed that the residence is the place where the infection occurred.

- The first years results shows a 1.5 percent infection rate, although an assumption was that there was a 2 percent infection rate

  The infection rate for the County is a function of the exposed, naïve population times the infection rate. Because approximately three-fourths of the population of the County was identified as being exposed to WNV in 2000, and it was assumed that none had been previously infected, a 2 percent infection rate for the exposed population resulted in a County-wide 1.5 percent infection rate.

Peer Reviewer #2 thought that use of the results of Busch et al. (2006) might lead to some different conclusions regarding the impact of WNV. This was based on the following exegesis and interpretation of Busch et al:

- The data presented show WNV penetrates the population quicker than estimates based solely on diagnosed neuron-invasive disease cases

- The infection rate must be higher than 2 percent, unless there are misdiagnosed neuron-invasive cases that should have been attributed to WNV

- If WNV penetrates the population more quickly than was assumed, the immunity rate of the population should also increase more rapidly, and so predicted disease incidence will fall over time

This resulted in another comment interpreting Peer Reviewer #2's analysis as suggesting the DGEIS exaggerated the risks of WNV in the absence of mosquito control.

However, the key element of the County's model is the rate of neuro-invasive disease (called "hospitalizations" in the model). The blood bank data suggests that there are more WNV infections than were determined by serosurveys. Therefore, for the baseline data sets used by the County, the infection rates should be increased, and the ratio of infections to serious illnesses also increased. This means that for the baseline year, the same number of serious illnesses will result at each of the sampled sites (as the number of hospitalizations in Douglaston in 1999, Staten Island in 2000, and Ohio and Ontario in 2002 were constants).

Busch et al. reported a calculated undiagnosed infection rate per case of 256. The infection rates reported on a state-by-state level had four instances where infection rates appeared to meet or exceed 4 percent (Colorado, Nebraska, and South and North Dakota), and one (Wyoming) where the rate was 3.5 percent. Table 4-15 presents the reported and “recalculated” infection rates for the four serosurvey locations. The state-by-state data and the serosurvey information suggest that a maximum rate of 5 percent may be a reasonable estimate of infections for populations exposed to mosquitoes carrying the virus, but that consideration of other rates as low as 3 percent would not be unreasonable.

Table 4-15. Reported Serosurvey Infection Rates, Recalculated per Busch et al. (2006)

Year	Location	Reported Infection Rate (percent)	Reported Undiagnosed Infections per Case	Calculated Infection Rate Based on an Undiagnosed Infection Rate per Case of 256
1999	Douglaston	2.6	140	4.8
2000	Staten Island	0.5	160	0.8
2002	Cuyahoga County	1.9	170	2.9
2002	Ontario	3.1	160	5.0

Therefore, the County modeled the different scenarios, and compared them to the actual incidence of disease in the County for 2000-2004 (an analysis of exposure of the County to WNV for 2005 has not yet been made). Table 4-16 presents the scenarios, with Model A representing a 2 percent infection rate and 150 serious illnesses per case, Model B representing a 3 percent infection rate and 260 cases per serious illness, Model C representing a 4 percent infection rate and 260 cases per illness, and Model D representing a 5 percent infection rate and 260 cases per illness.

Table 4-16. Modeled and Actual WNV Cases, Suffolk County

	2000	2001	2002	2003	2004	Totals
Actual Cases	0	1	8	9	0	18
Actual Deaths	0	0	2	2	0	4
Model A Cases	152	157	151	156	24	640
Model A Deaths	15	16	15	16	2	64
Model B Cases	131	135	128	132	20	546
Model B Deaths	13	13	13	13	2	54
Model C Cases	175	178	169	172	26	720
Model C Deaths	17	18	17	17	3	72
Model D Cases	218	221	207	209	31	886
Model D Deaths	22	22	21	21	3	89

The three percent incidence rate slightly reduces the numbers of predicted illnesses and death compared to the original model, but not by very much. The models were then run out through 2025. It was expected that increasing immunity rates might reduce the impact of the modeled disease incidence, and, to some degree that did occur. However, the magnitude of predicted illness is still well above current levels. This is also the case when populations are not allowed to continue to grow, but are capped (in line with predictions that the County will be "built out" in 2010).

Table 4-17. Model Scenarios, 2005-2025

Model	2005-2025 serious illnesses	2005-2025 deaths	2025 immunity percentage	2025 serious illnesses	2025 deaths
A	3,619	360	31.7	162	16
A with capped population	3,420	341	35.3	138	14
B	2,802	280	44.2	117	12
B with capped population	2,635	263	47.9	95	9
C	3,355	336	53.7	131	13
C with capped population	3,144	316	57.9	106	11
D	3,775	377	61.3	138	14
D with capped population	3,525	353	65.9	105	11

Some of the scenarios do result in eventual decreases in illnesses and mortalities from the original model. Model B with a capped population shows nearly a 50 percent smaller impact to public health compared to the original model. Nonetheless, even with very high immunity rates, the infections that result from exposure of the population to WNV result in predictions of substantial impacts to the health of people in the County (remembering that the serious illness classification means an often lengthy hospitalization, and that often these patients do not experience full recovery, even after several years [Sejvar et al., 2006]). This does not make it seem that the County exaggerated potential impacts from WNV in the DGEIS to any degree, even if the Busch et al. infection information is more accurate than those used in the original model. Note that the ever-increasing immunity percentages suggest that at some time the impacts may be relatively minor. For scenario D with a capped population, because of the population dynamics of some residents dying and others being born, the immune population plateaus at approximately 86.5 percent (even in 2100), and the impact predictions are 40 serious illnesses and 4 deaths each year.

Comments were received regarding the section on impacts to birds from WNV. Mr. McAlevy correctly noted that the fluctuations described for bird populations (drawn from the Christmas bird counts) were very large. These prevented a standard statistical analysis of the data sets. Instead, the County compared six year trends before and after the onset of WNV to determine if species commonly noted as being infected with WNV were being impacted by the disease. The overall conclusion from the analysis was that there appeared to be a weak effect on crows, but that the crow populations might be recovering from an initial impact. The comments noted that analysis of dead birds sent to Albany showed pesticide residues; Cashin Associates does not have such records, but does not doubt this is possible, as careful analyses of most organisms can find some pesticide residues in them – mostly longer-lived compounds that are no longer commonly used for pest control. This is said to justify a diagnosis that pesticides, not WNV, caused the bird mortalities. However, the New York State Department of Health protocols for testing dead birds requires a wildlife pathology determination, along with testing for virus presence (NYSDOH, 2001b). It is the professional wildlife pathologists' reports that have led to diagnoses of the dead birds as having been felled by WNV, and not by pesticide poisoning. That is the source for claims that large numbers of birds are being killed by WNV.

4.10.2 Vector status of local mosquitoes (fresh and salt sources of WNV) (F-2, F-4, F-5, F-10, G-1, I-25, I-26, N-13, N-15, N-16, P-14, P-15, P-16, Q-48, R-35, S-15, S-19, S-20, S-21, U-29, U-72, AM-9, AM-10, AR-15, AS-15, BA-14, BA-15, BA-16)

A total of 28 comments were classified as addressing the issue of whether or not certain types of local mosquitoes are vectors for WNV. Most of the comments focused on "salt marsh mosquitoes." Colloquially, "salt marsh mosquitoes" means mosquitoes of the species, *Ochlerotatus sollicitans*. The DGEIS and other program documents have sometimes relaxed and used this kind of language, as well. However, technically, "salt marsh mosquitoes" is a classification of species that breed on the salt marsh. A substantial number of mosquitoes in the County breed in salt water environments. Table 2-13 of the DGEIS (p. 83) lists 15 species of greatest concern for mosquito managers in the County. Of those 15 species, three were identified as major salt water species:

- *Ochlerotatus sollicitans*
- *Ochlerotatus cantator*
- *Ochlerotatus taeniorhynchus*

Aedes vexans is also known to breed in brackish waters, although it is primarily a fresh water mosquito, and will not be treated as a salt marsh mosquito in the discussions below. The DGEIS did not give enough notice to *Culex salinarius*. The *Culex spp*. of mosquitoes are difficult to separate. Most species identifications in the County lump *Cx. pipiens*, *Cx. restuans*, and *Cx. salinarius* as *Culex spp*. Prior to the appearance of WNV, the distinction was not important to make. After the appearance of WNV, it became more and more important to distinguish among these species. This is because *Cx. pipiens* was identified, early on, as a probable amplification vector of WNV. So was *Cx. restuans*. Early on (circa 2001), a standard theory was developed identifying *Cx. pipiens* as a central vector for the disease cycle, because it was known that *Cx. pipiens* bit people from time to time (whereas *Cx. restuans* did not). *Cx. pipiens* was detected with the virus, it appeared to be participating in the amplification cycle, and there were circumstances where *Cx. pipiens* bit people, and testing showed that when it bit people it passed sufficient amounts of virus to cause illness, thus meeting all criteria for being a competent vector (see Apperson et al., 2002). In fact, some researchers have said that physiological changes in the mosquitoes leads to feeding habit changes late in the season, causing the timing of human infections (Spielman, 2001), although this is not standard theory. *Cx pipiens* takes a portion of its meals from people, and that is sufficient to account for infections (higher infection rates in birds later in the season leads to higher infection rates in mosquitoes leading to a greater chance of human infection). It has been proposed that *Cx. pipiens* primarily feeds on robins, and that the late summer-early fall migration of robins causes *Cx. pipiens* to seek a replacement meal source – and it more often chooses people then (Kilpatrick et al., 2006). The sampling did show a meal preference for robins; the remainder of the notion is speculation. Nonetheless, standard conceptualizations of WNV propagation in the northeast US use *Cx. pipiens* as the primary vector for the disease (Anderson et al., 2004).

More sophisticated modeling of risk factors associated with disease transmission has changed the way WNV transmission is considered. For instance, a model was developed by the New York State Department of Health to identify risk factors for species of mosquitoes. The model factored in infection rates for different species of mosquitoes, their relative abundances in New York State, their feeding preferences for mammals (as a surrogate for biting people), and their determined competence as a WNV vector. The modeling found that *Cx. pipiens* is the greatest risk for disease transmission in New York State as a whole (Kilpatrick et al., 2005). The DGEIS used this model for mosquito distributions in Suffolk County, and it also returned *Cx. pipiens* as the most significant risk, even if pre-methoprene use mosquito distributions are considered (see pp. 1143-1144). In Connecticut, researchers there looked at mosquito distributions, and determined that *Cx. salinarius* was the species that carried the greatest risk (Andreadis et al., 2004). This mosquito is very good at transmitting WNV, and surveillance in Connecticut has long sought to distinguish the *Culex* species from each other. In Connecticut, *Cx. salinarius* was identified as a relatively plentiful mosquito. An analysis of Connecticut mosquito distributions, using the New York State Department of Health model, did find that *Cx. salinarius* was the greatest risk in Connecticut for WNV transmission (see the DGEIS, p. 1143).

Concurrently, the ABDL had obtained a grant that allowed it to hire another mosquito speciation researcher. The ABDL began looking closer at the "*Culex spp*." pools described for Suffolk

County. Surprisingly high percentages of these mosquitoes were identifiable as *Cx. salinarius* when close examinations were possible (S. Campbell, ABDL, personal communications, 2005, 2006). Therefore, the initial identification of *Cx. salinarius* as a mosquito that is not often found in Suffolk County appears to be in error.

In Connecticut, *Cx. salinarius* is most often associated with fresh water flooding areas at the upper fringes of salt marshes (P. Capotosto, CDEP, personal communication, 2005; W. Crans, Rutgers University, personal communication, 2005). Because soils in Connecticut tend to not to drain as well as the sandier sediments of Suffolk County, it was thought that the relatively low abundance of *Cx. salinarius* in Suffolk County as compared to Connecticut was due to a lack of suitable habitat in the County. However, surveys through the summer of 2006 have shown that *Cx. salinarius* is a relatively common mosquito in high marshes in Suffolk County, although it tends to occupy slightly higher ground that only floods on higher high tides, compared to *Oc. sollicitans* and *Oc. taeniorhynchus*. The County has known that mosquito breeding occurred in these habitats, but assumed that it was primarily the two *Ochlerotatus* species (larval surveillance in salt marshes has not always paid close attention to speciation). The *Cx. salinarius* areas were treated to prevent adult emergence, if treatments were prescribed for the marsh. Therefore, it seems that the low abundance for *Cx. salinarius* in the County is a combination of not speciating the *Culex* samples, and also larval control of "salt marsh mosquitoes" being effective at preventing adult emergence.

The three "traditional" salt marsh mosquito species (*Oc. cantator, Oc. sollicitans*, and *Oc. taeniorynchus*) have all been identified as potential vectors for WNV (Turrell et al., 2005). The County is now appreciating that salt marsh mosquito control may not only directly reduce disease transmission by two of these species, *Oc. sollicitans* and *Oc. taeniorynchus* (the third traditional salt marsh mosquito of concern, *Oc. cantator*, tends to emerge too early in the year to be a risk for WNV transmission), but also may have reduced disease risks by controlling a more serious disease threat (at least as it was identified in Connecticut), *Cx. salinarius*. The full extent of *Cx. salinarius* breeding (and breeding opportunities) across the County have not been determined at this time. However, it appears to have a significant vector potential.

The County has long made the case that *Oc. sollicitans*, which is the most commonly trapped mosquito in the County (see the DGEIS, pp. 77-79), constitutes a palpable threat of WNV transmission. It has been described through laboratory testing as a competent vector, albeit one that does not have the greatest potential to transmit the disease. It is an indiscriminant feeder, so that there are no theoretical reasons why *Oc. sollictans* will not feed on birds and then on people (in fact, this is how it transmits EEE to people, see the DGEIS, pp. 328-332). *Oc. sollicitans* pools have tested positive for WNV in other jurisdictions, in testing prior to 2005. And, in 2005, an *Oc. sollictans* pool was found to be positive in Suffolk County. Virus testing is biased, as the County and New York State Department of Health both wish to try to detect pathogens if they are present. Therefore, the County preferentially sends mosquito pools for analysis from species that have tended to test positive in earlier samples, as sample analysis resources are limited. *Oc. sollicitans* pools will receive more emphasis in viral testing now that it has been confirmed that they will be positive from time to time. Because so many people are bitten by these very aggressive mosquitoes, if even a small percentage of the mosquitoes carry virus, they can become a significant risk to residents in the County (the relative risk appears to be a third of that associated with *Cx. pipiens*, see the DGEIS, Table 7-36, p. 1134).

The County therefore believes that scientific evidence allows it to say that all of the human biting mosquitoes in the County have been identified as potential WNV vectors. In terms of distributions and vector competency, it seems that *Cx. pipiens* represents the greatest risk for disease transmission. However, *Cx. salinarius* needs to be considered much more carefully than it has been, and *Oc. sollicitans* also poses a considerable risk. Where they are present, the treehole mosquito *Oc. japonicus* also may be a very serious risk for WNV transmission. The County believes that this analysis provides more justification for its efforts to reduce salt marsh mosquito breeding. These efforts can be advanced through water management and larval control efforts. The two primary fresh water mosquito vectors, *Cx. pipiens* and *Oc. japonicus*, are difficult to control through large-scale control efforts. Their preferred habitats need to be addressed through public education and site specific actions. However, other plentiful fresh water mosquitoes such as *Ae. vexans* and *Cq. perturbans* can also spread WNV, so that efforts to reduce their numbers will also reduce overall risks for residents of the County.

Comments received included:

- The DGEIS implies all mosquitoes carry WNV or EEE, which is not true

  The County agrees with the sense of the comment. Not all mosquitoes carry disease. Only a small percentage of mosquitoes are infected at any one time. However, because so many people are bitten by mosquitoes, and the mosquitoes that bite people may be carrying pathogens, there is risk associated with nearly every mosquito bite

- The lack of distinction between health risk treatments and nuisance control leads the public to view all mosquitoes as harmful/deadly

  The County's response is similar: it is true that most mosquitoes do not carry pathogens. However, because all human-biting mosquitoes may carry pathogens, they all do represent some degree of health risk

- Fresh water mosquitoes are WNV vectors/WNV is a fresh water disease

  As discussed at the beginning of this section, not only are fresh water mosquitoes vectors, but salt water mosquitoes are vectors, too.

- Fresh water mosquitoes are more potent vectors

  As the County currently understands its mosquito ecology and vector potentials, it does appear that *Cx. pipiens* is the greatest risk to people from WNV transmission. However, the perception of the situation is changing, and it is certainly clear that very recent work has added to the County appreciation of the WNV risks posed by its salt marsh mosquitoes.

- Container breeding mosquitoes (*Cx. pipiens*) are the primary amplification vector

  The current, widely accepted theory is that *Cx. pipiens* and *Cx. restuans* are the primary amplification vectors for WNV. These mosquitoes will breed in containers, among other habitats. Storm water structures are also favored habitats, for instance. They require fluctuating levels of water for their eggs to begin to develop, and prefer high organic content in the water, and need a lack of predators. This means that backyard containers, especially those that have other things floating in them, are good breeding locations.

- Container breeding mosquitoes (*Cx. pipiens*) are the primary transmission vector

As discussed above, this appears to be the case; however, some of the cases of WNV diagnosed in the County appear to have been transmitted by other species of mosquitoes. Proving disease transmission is a very difficult task, especially when there are more than one species that could have been responsible.

- Salt marsh mosquitoes are not WNV vectors/not good WNV vectors

As discussed above, the mosquitoes that breed in salt marshes include at least four species that are known to be vectors of WNV, including one identified as perhaps the most competent vector. It is true that *Oc. sollicitans* is not acknowledged as the most efficient vector of WNV, which is fortunate for the County's residents. However, unfortunately, it is capable of transmitting WNV to people.

- There is no to little evidence that salt marsh mosquitoes spread WNV

This is accurate. With mosquito-borne diseases, when more than one species in an area can be vectors of the disease, it is very difficult to "prove" which mosquitoes are responsible for disease incidence. This difficult feat was managed by Crans (1977) with *Oc. sollicitans* and EEE transmission to people in New Jersey; malaria vectors are generally identifiable because generally only one or two species carry the pathogen. For WNV, no one species has been proven to transmit the disease to people, although several species have been implicated. It is true that most mosquito scientists suspect *Cx. pipiens* as the primary human vector. More studies are finding evidence for other species, too (see above).

- Salt marsh mosquitoes are not carriers of WNV in Suffolk County/there have been no cases of WNV in salt marsh mosquitoes

Until 2005, none of the species of mosquitoes that breed in salt marshes had tested positive for WNV in Suffolk County. In August, a pool of *Oc. sollicitans* mosquitoes from a trap in Greenlawn was found by the New York State Department of Health to be positive for WNV. To date, no other pool of *Oc. sollicitans* or *Oc. taeniorhynchus* has tested positive. The County has not sent any pools of identified *Cx. salinarius* for testing. Pools of "*Culex spp.*," which may have contained *Cx. salinarius*, have tested positive on numerous occasions.

- Science has not said that salt marsh mosquitoes are competent/good vectors of WNV

Turell et al. (2005), using a scale of 0-4, with four being the better vector, found *Cx. salinarius* to be a "4," and *Oc. sollicitans* and *Oc. taeniorhynchus* to rate as "1." This could easily be interpreted as finding *Cx. salinarius* to be a good vector, and *Oc.sollicitans* and *Oc. taeniorhynchus* to be competent (which means "capable," in terms of disease transmission).

- Salt marsh mosquitoes represent a small disease risk

Cx. salinarius may represent a greater disease risk than hitherto appreciated, but, generally, mosquitoes breeding in salt marshes appear to carry less risk of WNV transmission than other species such as *Cx. pipiens* do. Each individual mosquito carries a very, very small risk of disease transmission. The large numbers of mosquitoes in the County, and the large numbers of people bitten by mosquitoes, increase risks.

- Reducing salt marsh mosquito numbers will not decrease risks

All assessments of WNV risk for Suffolk County indicate that salt marsh mosquito species carry an appreciable amount of risk for the transmission of WNV. It can be argued that this risk is small compared to the risks associated with other mosquitoes, but there is a measurable risk. This justifies the statements in the Long-Term Plan that reducing salt marsh mosquito numbers will reduce risks for disease to the residents of the County.

- The Long-Term Plan links WNV with water management/water management is not justified only for nuisance mosquito control

Because water management is an effective means of controlling mosquitoes that breed in the salt marsh, and reducing their numbers will reduce disease risks, therefore implementation of water management should result in reductions of disease risks for residents of the County.

- Distinguish between nuisance mosquitoes and those that cause disease

The DGEIS (pp. 83-95) shows that all of the human biting mosquitoes in the County are capable of transmitting disease. It is true that spring-breeding mosquitoes are unlikely to be risks for disease transmission. Those mosquitoes are *Oc. cantator* and *Oc. canadensis*, primarily. However, *Oc. canadensis* is a very long-lived mosquito and can remain late enough in the season to present a substantive disease risk. *Oc. cantator* has been identified as a potential amplification vector. *Anopheles spp*. do not transmit WNV, but are the vectors for malaria, should any be present in the County.

- Expand the discussion of local vector mosquitoes

The December draft of the DGEIS was amended to include more information, as noted just above (see the DGEIS, pp. 83-95).

4.10.3 EEE a LI problem? (P-17, P-18, P-19, P-20, P-21, P-22, P-23, S-22, S-23, S-24, AO-16, AO-17)

12 comments were received regarding EEE and the mosquito control program.

Several comments noted that prevention and control of EEE is a major function of the program, and that it is highlighted in the report. In fact, prior to 1999, EEE was the most serious health threat from mosquitoes in Suffolk County. SCDHS regards EEE as a serious health threat. Estimates of the fatality rate to be expected from the disease range from one in three to 75 percent. Many of those who fall ill are children, and they often suffer long-term mental disablement from the disease, and require long-term care. This means those that survive often have very large medical expenses for the remainder of their lives.

Several comments correctly noted that the only human cases of EEE in New York State have been in Onondaga County, and there has never been a human case in Suffolk County. There have been human cases with some regularity in New Jersey. Massachusetts has had sporadic outbreaks of human cases of EEE. New Hampshire, in 2005, had its first human cases ever. However, EEE in Nassau and Suffolk Counties has been restricted to equine cases.

Wayne Crans, Rutgers University, has carefully studied EEE in New Jersey. He has written several papers on the subject, and made a presentation to the Long-Term Plan Technical Advisory Committee in 2005. He is of the opinion that all human cases of EEE in New Jersey have been transmitted by *Oc. sollicitans*. There are two environments where EEE is amplified by *Culiseta melanura* in birds. One is Atlantic white cedar swamps. These tend to be coastal swamps. The other is red maple swamps. These tend to be inland swamps. Dr. Crans believes that *Oc. sollicitans*, which have been shown in laboratories to be the most efficient vector of EEE, pass through Atlantic white cedar swamps, become infected by feeding on an infected bird, and are able to transmit the virus to people in sufficient amounts so as to cause the encephalitis. He believes that fresh water mosquitoes (primarily *Aedes vexans*) do not transmit enough virus to people to cause illness, but do transmit enough to horses to cause infections in them. Thus, he finds a relation between Atlantic white cedar swamps and human cases, and red maple swamps and horse infections. Andrew Spielman, Harvard School of Public Health, believes that recovery of red maple swamps and Atlantic white cedar swamps from logging (and, in New England, from the 1938 hurricane) explains increasing rates of EEE in New England. Older forests harbor more *Cs. melanura* mosquitoes, which need large trees to create below water "crypts" for the mosquitoes to overwinter in. Dr. Spielman believes more cases of EEE will occur as the forests mature.

Comments were received that stated it was false that EEE is carried by salt water or fresh water mosquitoes. Sampling in Suffolk County has not found EEE in bridge vectors (mosquitoes other than *Cs. melanura*, which only bites birds) since the mid-1990s. However, the statements are not correct. In 2005, mosquitoes transmitted EEE to a horse in Nassau County.

Comments were also received that EEE is not an acute threat or a serious threat. The County believes that its control program is one of the reasons that EEE has not been a problem in the County for over 10 years. Occasionally, EEE has been detected in *Cs. melanura*. However, these times of increased risk have not led to human or horse cases for some time. Because of the dire health impacts for anyone who becomes ill from EEE, the County is very concerned about the disease. A history of a lack of human cases is meaningless, as was shown in New Hampshire in 2005, when despite no cases of EEE ever having occurred before, four people became ill. The County does not have extensive Atlantic salt cedar swamps as New Jersey does. However, there are some of these swamps that are in proximity to salt marshes where *Oc. sollicitans* breeds. The swamps in the County have been under stringent environmental protections under the Saltwater and Freshwater Wetlands Land Use regulations since the 1970s. Therefore, conditions identified by both Dr. Crans and Dr. Spielman as potentially allowing EEE to be transmitted to people do exist in the County. This makes EEE a very real threat to human health in Suffolk County.

4.10.4 Context of human health impacts

Mosquito borne diseases (in particular, WNV) has caused 4 deaths in Suffolk County since 1999. The model of WNV without mosquito control suggested that perhaps 16 people might die from WNV if there were no mosquito control in Suffolk County (and disease transmission were other wise similar to that in Queens, Cleveland, and Ontario. This computes to a death rate of approximately 1 per 100,000 per year.

For perspective, the homicide rate for Suffolk County was 1.5 to 2.5 per 100,000 for 2000 to 2002 (NYSDOH, 2004). However, as WNV infections occur across a three month period of the year, during those months it appears that WNV will continue to be a greater mortality threat than homicide for residents of Suffolk County. On the other hand, traffic fatalities for 2001 (183) and 2002 (169) (USDOT, undated) were approximately an order of magnitude higher than the projected WNV deaths; even factoring in the seasonal restrictions on WNV impacts, car accidents are clearly a greater risk to local residents. Nonetheless, by most measures, homicides and car accidents represent serious sources of risk for many people. Although it is possible to significantly reduce risks of mosquito-borne disease through personal protection actions such as wearing long sleeves and pants, applying repellents, and avoiding outside activities at peak mosquito activity times (Loeb et al., 2005), many people may view becoming ill from WNV as something over which they had little control – which is similar, in many ways, to how many people perceive murders and car accidents in suburbia.

In the context of 12,000 annual deaths County-wide (on the order of 750 to 800 per 100,000 per year), none of these death rates are not exceptionally large. However, these deaths are all unexpected, and, in many people's perspectives, they are all preventable. If the County could prevent homicides or drunk-driving deaths from occurring, it would. The County believes it has the capability to stop nearly all impacts from mosquito-borne diseases. This is why the County conducts mosquito control.

4.10.5 Impacts other than disease (PP-48, U-27, AG-132, AT-1, AT-2, AT-3, AT-4, AT-5, AT-6, AX-1, AX-4, AY-1, AZ-2, BE-7, BE-8, BF-1, BF-3, BG-1, BG-2, BG-3, BJ-8)

22 comments were received.

Mosquito bites were called itchy annoyances by one commenter. However, others noted that mosquitoes can:

- cause people to suffer when they are "out of control"
- challenge the quality of life for visitors to Smith Point (some tourists ask for refunds)
- cause a problem for a community billed as a gateway to a national park
- be a public safety issue because of the risk of disease transmission
- create a liability issue, potentially, if control measures are not undertaken and someone becomes ill

- effect tourism. Tourism was identified as an important element of the Suffolk County economy, with Atlantic beaches alone said to generate $173.4 million in tourist revenues (2003 dollars) (Suffolk County Legislature Budget Review Office, 2003).

- impact children especially, and limit their outdoor activities

Peer Reviewer #2 noted that the DGEIS did not mention ancillary impacts to health, such as losing the ability to exercise outdoors. The County notes that generally, as was related in the DGEIS (pp.336-338), there are other impacts to human health, other than disease, that extend beyond itching.

NYSDEC asked for sources of the idea that mosquitoes, especially *Oc. sollicitans*, have affected development. Richards (1938, p.86) noted that the first ditches in salt marshes on Long Island (Lloyds Neck) were motivated

> partly by a desire for more comfortable and more healthful living conditions, and partly by a desire to enhance real estate values and at attract new residents.

Spielman and D'Antonio (2001, pp. 117-118), describing the success Smith had in controlling pest mosquitoes, especially the "New Jersey" salt marsh mosquito, in New Jersey, said

> Suddenly people began to be able to enjoy the out-of-doors, especially the state's beaches. Cities such as Newark and Elizabeth saw development accelerate, and new neighborhoods built in low-lying areas…. Smith described a landowner who paid $50 to have a breeding area drained and then claimed his acreage had increased in value by $10,000.

They quoted Smith directly:

> Take the mosquito out of Barnegat Bay and consider the resulting increase of visitors to that paradise for fisherman. The increase in value in that territory alone would pay for all the work that would have to be done along the shore.

Harwood and James (1979, pp. 169) are somewhat more circumspect:

> Vast areas of the seacoast are at times made unbearable by salt marsh mosquitoes, and agriculture and real estate development may be affected.

The claim was generally the result of extended conversations with mosquito control professionals, who do not believe the impact of unfettered mosquitoes is properly appreciated. Without mosquito control, screens, and air conditioning as adjuncts to mosquito control, it is commonly asserted that much of Long Island, New Jersey, and coastal Florida would not be as developed as they are today. Such claims are not verifiable to any great extent.

4.10.6 Diseases other than WNV and EEE (N-17, T-11, T-12, U-25, U-28, AJ-5, AO-18, BE-6)

Several (8) comments were received regarding this sub-topic. Many pointed out that risks from other diseases are minimal, or of little concern, or should not be speculated about. On the other hand, the County believes that it is likely that some novel mosquito-borne disease will be introduced into the country, because of the extent of modern travel for people and transportation for goods. There are a number of known mosquito-borne diseases that have a potential fit with North American mosquito ecologies. As another comment cited from the DGEIS, having a mosquito control program in place makes it more likely that impacts from any introduced disease will be less than they might otherwise be.

A comment was made suggesting that immigrants increase the risks from malaria. Malaria requires a human reservoir for the disease to be transmitted to mosquitoes and then again back to people. Malaria is no longer indigenous to the US. However, it is common in some other countries. Someone infected by malaria overseas and then coming to the US could be bitten by mosquitoes capable of transmitting malaria to other people, and so cause malaria cases here. This is a low probability event. However, this is likely to be the mechanism that caused the malaria cases in Suffolk County in 1999, although the cause of those two cases was never determined.

The two peer reviewers made a number of comments on the discussion of mosquito-borne diseases, as presented in the risk assessment. Most of those comments were addressed in the DGEIS presentation (see pp. 295-343). The following comments were not addressed:

Peer Reviewer #1 pointed out that the discussion of yellow fever did not include the existence of an effective vaccine. Travelers to areas where yellow fever may occur usually are required to be vaccinated to obtain a visa to minimize risks of infection. Because there are still animal reservoirs of the disease, and vaccination rates are not complete in these areas, cases of yellow fever still occur. However, epidemics no longer occur because use of the vaccine can forestall wide infection rates.

Peer Reviewer #2 thought the phrasing of the section heading for common worldwide mosquito-borne disease to be inappropriate. It was changed to the following:

> Certain mosquito-borne diseases are important in a historical context, or because they pose a potential ongoing health threat. The most important and common of these diseases will be briefly discussed.
>
> (DGEIS, p. 295)

Peer Reviewer #2 also made a number of corrections and suggestions for changes to the discussion of mosquito-borne diseases as presented in the risk assessment:

- "encephalitis" was identified as a virus, whereas it is an inflammation of the brain caused by bacterial or viral infections
- "WNV" was identified as an inflammation of the brain, whereas it is in fact a virus that causes illness, a symptom of which can be brain inflammations
- "Risk of contracting WNV is low" was noted to be better expressed as the risk of exhibiting symptoms from WNV is low.

The County notes that all of these comments are accurate. However, the County also noted that the risk of contracting WNV in an area where it is circulating is 2 to 5 percent (depending on the source of information used). Risks from other mosquito-borne disease can be much greater – malaria risks are near 100 percent by the end of early childhood in certain areas of Africa (see Spielman and D'Antonio, 2001). Other infectious human diseases (colds, the flu, bubonic plague, etc.) have much higher transmission rates. Nonetheless, Peer Reviewer #2's point is relevant.

The material as presented in the DGEIS was reviewed more closely and contained fewer errors.

5 Environmental Issues for which Further Environmental Reviews are Required

According to SEQRA §617.10(d):

> When a final GEIS has been filed under this part:
>
> (1) No further SEQRA compliance is required if a subsequent proposed action will be carried out in conformance with the conditions and thresholds established for such actions in the GEIS or its findings statement;
>
> (2) An amended findings statement must be prepared if the subsequent proposed action was adequately addressed in the GEIS, but was not addressed or was not adequately addressed in the findings statement for the GEIS;
>
> (3) A negative declaration must be prepared if subsequent proposed action was not addressed or was not adequately addressed in the GEIS and the subsequent action will not result in any significant environmental impacts;
>
> (4) A supplement to the final GEIS must be prepared if the subsequent proposed action was not addressed or was not adequately addressed in the GEIS and the subsequent action may have one or more significant adverse environmental impacts.

The above excerpt from the SEQRA statute should serve to guide future decision making in terms of the necessity for future environmental investigations relating to the Long-Term Plan. If modifications are proposed to the Long-Term Plan, or if actions are to be taken that exceed certain thresholds (discussed immediately below), consideration should be given to whether the changes or actions exceeding the thresholds are consistent with the Long-Term Plan, as reviewed in the GEIS. If not, or if these future modifications or actions exceeding the thresholds are clearly inconsistent or not adequately addressed in the GEIS, an EAF should be prepared to evaluate the potential environmental impacts of the modifications or actions. If through the EAF process, it is determined that an environmental impact is not anticipated, the modifications can be adopted or the work could proceed without further SEQR review. If, however, it is determined that there may be one or more significant environmental impacts associated with the modifications to the Long-Term Plan or the actions that exceed the designated thresholds, a supplemental EIS is required.

Suffolk County is expected to adopt findings on an environmental review of its Long-Term Plan for Vector Control and Wetlands Management. The environmental review took the form of a

GEIS. According to SEQRA, a GEIS is appropriate for "an entire program or plan having wide application or restricting the range of future alternative policies or projects …" (6 NYCRR §617.10(a)(4)). SEQRA points out that GEISs should "set forth specific conditions or criteria under which future actions will be undertaken or approved, including requirements for subsequent SEQR compliance" (6 NYCRR §617.10(c)). This may include "thresholds and criteria for supplemental EISs to reflect significant impacts … not adequately addressed or analyzed in the generic EIS."

5.1 Issues for which Supplemental Determinations of Significance are Required

Potential further environmental reviews for actions taken under the Long-Term Plan relate to two types of actions:

- adoption of the Annual Plan of Work by the County Legislature
- reviews of water management projects (actions taken by the NYSDEC and other local governments or agencies, including the Wetlands Stewardship Committee)

Upon adoption of Findings, the Legislature (as Lead Agency) will have satisfied itself that the potential impacts of the Long-Term Plan have been adequately reviewed. From this perspective, if an Annual Plan of Work complies substantively with the Long-Term Plan, then potential impacts of that annual plan will have been adequately considered, as well.

The primary criterion for determining if an Annual Plan of Work is not substantively in accord with the Long-Term Plan should be the annual plan's compliance with the overall approach of the Long-Term Plan, and, where specified, a failure to use particular actions, or a major deviation from an important specific set of actions. In general, annual plans need to focus on the use of surveillance to determine where mosquito problems exist, and to primarily employ source reduction tools to reduce the impact of mosquitoes on people. An important source reduction tool must be implementation (over time) of the techniques for water management developed in the Best Management Practices manual, as outlined in the Wetlands Management Plan. Any plan that proposes to manage mosquitoes without surveillance or to not use water management as a means of obtaining long-term control of mosquito problems will require additional environmental review.

Other criteria that would lead to additional environmental review of an annual plan would be:

- failure to include public education and outreach steps to educate residents and visitors on the means that are available to avoid mosquito bites and diseases associated with mosquitoes

- reductions in staffing levels as allocated in the Long-Term Plan to population or disease surveillance

- failure to commit to respond to all mosquito complaints using personnel appropriately trained to identify and mitigate sources of mosquito problems

- failure to use the review processes outlined in the Wetlands Management Plan for water management projects

- proposed use of a non-native biocontrol organism not already resident in Suffolk County natural environments

- proposed use of a larvicide other than *Bacillus thuringenesis var israelensis* (Bti), *Bacillus sphaericus*, or methoprene

- proposed use of an adulticide other than resmethrin, sumithrin, permethrin, natural pyrethrins, or malathion

- identification of a preferred adulticide agent other than resmethrin or sumithrin

- administrative changes that resulted in daily operational authority no longer residing with the Superintendent of the Division of Vector Control of the Suffolk County Department of Public Works (SCVC), or in operational authority under a declared health emergency no longer residing with the Commissioner of the Suffolk County Department of Health Services (SCDHS)

Environmental reviews may consist of a negative declaration if no significant environmental impacts will result (6 NYCRR §617.10(d)(3)) or a supplemental environmental impact statement if one or more significant adverse impacts may result (6 NYCRR §617.10(d)(4)). Use of an expanded EAF may be appropriate when a negative declaration is proposed.

Upon adoption of Findings, the Legislature (as Lead Agency) will have satisfied itself that the potential impacts of the Long-Term Plan have been adequately reviewed. From this perspective, the classification of allowable water management actions (as described in the Best Management Practices manual) as "no to little" potential impacts, "minor" potential impacts, "potentially significant" potential impacts, and "major" potential impacts will have been accepted, and the descriptions of the potential for impacts (and the mitigation steps to avoid impacts) will have been deemed to be adequate.

Nonetheless, on a project by project basis, the following criteria need to be considered to determine if additional environmental reviews are warranted:

- the techniques to be employed have been classified as having the potential for potentially significant or major environmental impacts (BMPs 5-15)
- consultation with local authorities or review by the Wetlands Stewardship Committee finds there is a potential for environmental impacts under the proposed course of action
- review by the CEQ finds there is a potential for environmental impacts under the proposed course of action

Environmental reviews may consist of a negative declaration if no significant environmental impacts will result (6 NYCRR §617.10(d) (3)) or a supplemental environmental impact statement if one or more significant adverse impacts may result (6 NYCRR §617.10(d)(4)). In light of the extensive reviews of the techniques to be employed for water management in the GEIS and associated documents, use of an expanded EAF to cite relevant sections of the GEIS or to report on local data collection efforts that justify the project may be appropriate if a negative declaration is proposed.

5.2 Issues for which Supplemental EISs will be Required

In any of the reviews described above, should the potential for impacts be determined, and the DGEIS for this the Long-Term Plan had not adequately discussed the potential and described appropriate mitigation, as determined by the Legislature (under the advisement of CEQ or other competent authorities), then a Supplemental EIS will need to be prepared, in accord with SEQRA.

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References

Abbene, IJ, SC Fisher, and SA Terracciano. 2005. *Concentrations of Insecticides in Selected Surface Water Bodies in Suffolk County, New York, Before and After Mosquito Spraying*. USGS Open-File Report 2005-1384. US Geological Survey, Denver, CO. 14 pp.

Able, KW, DM Nemerson, and TM Gothues. 2004. Evaluating salt marsh restoration in Delaware Bay: analysis of fish response at former salt hay farms. *Estuaries* 27(1):58-69.

Adamowicz, SC, and CT Roman. 2005. New England salt marsh pools: a quantitative analysis of geomorphic and geographic features. *Wetlands* 25(2):279-288.

Adamowicz, SC, and CT Roman. 2002. *Initial Ecosystem Response of Salt Marshes to Ditch Plugging and Pool Creation: Experiments at Rachel Carson National Wildlife Refuge (Maine)*. US Geological Survey, Narragansett, RI. 102 pp.

Ahl, JSB, and JS Brown. 1990. Salt-dependent effects of juvenile hormone and related compounds in larvae of the brine shrimp, Artemia. *Comparative Biochemistry and Physiology, A* 95A(4):491-496.

Anderson, JF, TG Andreadis, AJ Main, and DL Kline. 2004. Prevalence of West Nile virus in tree canopy-inhabiting *Culex pipiens* and associated mosquitoes. *American Journal of Tropical Medicine and Hygiene* 71(1):112-119.

Andreadis, TG, JF Anderson, CR Vossbrinck, and AJ Main. 2004. Epidemiology of West Nile virus in Connecticut: a five-year analysis of mosquito data 1999-2003. *Vector-borne and Zoonotic Diseases* 4(4):360-378.

Ankley, GT, JE Tietge, DL DeFoe, KM Hjensen, GW Holcombe, EJ Durhan, and A> Diamond. 1998. Effects of ultraviolet light and methoprene on survival and development of *Rana pipiens*. *Environmental Toxicology and Chemistry* 17:2530-2542.

Antunes-Kenyon, D., and G. Kennedy. 2001. *Methoprene: A Review of the Impacts of the Insect Growth Regulator Methoprene on Non-target organisms in Fish Bearing Waters*. Massachusetts Pesticide Board Subcommittee, Massachusetts Department of Food and Agriculture, Boston, MA. 40 pp.

Apperson, CS, BA Harrison, TR Unnasch, HK Hassan, WS Irby, HM Savage, SE Aspen, DW Watson, LM Rueda, BER Engber, and RM Nasci. 2002. Host-feeding habits of *Culex* and other mosquitoes (Diptera:Culicidae) in the Borough of Queens in New York City, with characters and techniques for identification of *Culex* mosquitoes. *Journal of Medical Entomology* 39(5):777-785.

Armitage, PD, PS Cranston PS, and LCV Pinder. 1995. *The Chironomidae: the Biology and Ecology of Nonbiting Midges*. Chapman and Hall, London. 572 pp.

Atlantic States Marine Fisheries Commission. 2004. Fish habitat in urban environments: NY-NJ Harbor. *Habitat Hotline* 11(1):1-5.

Averett, E., JS Neuberger, G. Hansen, and MH Fox. 2005. Evaluation of West Nile virus education campaign. *Emerging Infectious Diseases* 11(11):1751-1753.

Balcer, MD, KL Schmude, J. Snitgen, and AR Lima. 1999. *Long-term Effects of the Mosquito Control Agents Bti (Bacillus thuringiensis israelensis) and Methoprene on Non-target Macroinvertebrates in Wetlands in Wright County, Minnesota (1997-1998).* Metropolitan Mosquito Control District, Minneapolis, MN. 53 pp. + figures.

Balcom, N., and P. Howell. 2006. *Responding to a Resource Disaster: American Lobsters in Long Island Sound, 1999-2004*. CTSG-06-2. Connecticut Sea Grant, University of Connecticut. 22 pp.

Barnes, RK. 2005. *Pesticides Used to Control West Nile Virus: Toxicity to the Estuarine Grass Shrimp, Palaemonetes pugio.* Masters Thesis. Stony Brook University.

Barnes, RK, AER McElroy, BJ Brownawell, JP Ruggieri, R. Cerrato, and SA Terraciano. 2005. A field and laboratory assessment of lethal and non-lethal effects of pesticides used in mosquito control in Suffolk County on estuarine shrimp. Abstract. www.vims.edy/bem2005/docs/Abstracts-3-17-05.pdf

Biesmeijer, JC, SPM Roberts, M. Reemer, R. Ohlemüller, M. Edwards, T. Peeters, AP Schaffers, SG Potts, R. Kleukers, CD Thomas, J. Settele, and WE Kunin. 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. *Science* 313:351-354.

Bircher, L., and E. Ruber. 1988. Toxicity of methoprene to all stages of the salt marsh copepod, *Apocyclops spartinus* (Cyclopoida). *Journal of the American Mosquito Control Association* 4(4):520-523.

Brown, MD, TW Watson, S. Green, JG Greenwood, D. Purdie, and BH Kay. 2000. Toxicity of insecticides for control of freshwater *Culex annulirostris* (Diptera: Culcidae) to the nontarget shrimp, *Caradina indistincta* (Decapoda: Atyidae). *Journal of Economic Entomology* 93(3):667-672.

Busch, MP, DJ Wright, B. Custer, LH Tobler, SL Stramer, SH Kleinman, HE Prince, C. Bianco, G. Foster, LR Petersen, G. Nemo, and SA Glynn. 2006. West Nile virus infections projected from blood donor screening data, United States, 2003. *Emerging Infectious Diseases* 12(3):395-402.

CA-CE. 2005a. *Primary Study Area Report*. Task 7, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. Paged in sections.

CA-CE. 2005b. *Atmospheric Dispersion and Deposition Modeling*. Task 3, Literature Review, Book 5 Part 3, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 36 pp.

CA-CE. 2004. *Mosquito Control Pesticides and Lobster Mortality*. Task 3, Literature Review, Book 8 Part 2, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 33 pp. + appendices.

CA-CE. 2002. *Draft Task 1 Report*. Task 1, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Riverhead, NY. Paged in sections.

CA-IC. 2004. *Ecotoxicity Review of Primary List Mosquito Control Agents*. Task 3, Literature Review, Book 7, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. Paged in sections.

CA-SCDHS. 2005. *Human Health and Domestic Animal Toxicity*. Task 3, Literature Review, Book 6 Part 1, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. Paged in sections.

CA-SCDHS. 2004. *Suffolk County Reports of Ecological Impacts from Larviciding and Adulticiding*. Task 3, Literature Review, Book 6 Part 3, Suffolk County Vector Control and Wetlands Management Long-Term Plan and Generic Environmental Impact Statement. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 13 pp.

CDC. 2003e. *Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control*. 3rd Revision. Centers for Disease Control and Prevention, Fort Collins, CO. 75 pp.

Campbell, SR, D. Ninivaggi, and JF Sanzone. 2005. The effectiveness of methoprene for the treatment of salt marsh mosquitoes in Suffolk County, New York. Poster No. 162. *71st Annual Meeting, The American Mosquito Control Association*. Vancouver, BC. April 3-7.

Cashin Associates. 2006a. *Salt Marsh Losses*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 3 (Literature Search), Book 9, Part 4. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 78 pp.

Cashin Associates. 2006b. *A Retrospective Study of Salt Marsh Response to Historical Anthropologic Modifications at Seatuck and Wertheim National Wildlife Refuges*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 12 (Early Action Projects). www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 44 pp. + appendix.

Cashin Associates. 2005a. *Task Report: Part I: Summary*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 8 (Impact Assessment). www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 31 pp.

Cashin Associates. 2005b. *Water and Sediment Measurements*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 12 (Early Action Projects), Caged Fish Experiment. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 56 pp.

Cashin Associates. 2005c. *Regulatory History*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 12 (Early Action Projects Caged Fish Experiment). www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 7 pp.

Cashin Associates. 2005c. *Site Selection*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 12 (Early Action Projects Caged Fish Experiment). www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 8 pp.

Cashin Associates. 2005e. *Effects on Organisms*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 12 (Early Action Projects Caged Fish Experiment). www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 17 pp. + appendix.

Cashin Associates. 2005f. *Legal Issues Relating to Suffolk County Mosquito Control*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 2 (Law and Management Programs), Part 1. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 53 pp.

Cashin Associates. 2005g. *Salt Marsh Function and Value*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 3 (Literature Search), Book 9, Part 2. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 41 pp.

Cashin Associates. 2005h. *Salt Marsh Function and Value*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 3 (Literature Search), Book 9, Part 2. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 41 pp.

Cashin Associates. 2004a. *Stormwater Control and Mosquitoes*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 3 (Literature Search), Book 10, Part 2. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 18 pp.

Cashin Associates. 2004b. *Natural and Managed Salt Marshes*. Suffolk County Vector Control and Wetlands Management Long-Term Plan and Environmental Impact Statement, Task 3 (Literature Search), Book 9, Part 3. www.suffolkmosquitocontrolplan.org. Suffolk County Department of Health Services, Yaphank, NY. 165 pp.

Cashin Associates. 2004c. *Health and Environmental Assessment for the Peconic River*. Suffolk County Department of Health Services, Hauppauge, NY. 3 vols.

Chapman, VJ. 1974 *Salt Marshes and Salt Deserts of the World*. 2nd Ed. Strauss & Cramer GMBH, Leutershausen, Germany. 392 pp. + 101 pp. added for 2nd Ed.

Chellayan, S., and GK Karnavar. 1989. Juvenile hormone induced oviposition in virgin *Trogoderma granarium* (Dermestidae: Coleoptera). *Entomon* 14(3/4):187-190.

Childers, DL, JW Day, Jr., and HN McKellar, Jr. 2000. Twenty more years of marsh and estuarine flux studies: revisiting Nixon (1980). pp. 391-423. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

Chu, KH, CK Wong, and KC Chiu. 1997. Effects of the insect growth regulator (s)-methoprene on survival and reproduction of the freshwater cladoceran (*Moina macrocop*). *Environmental Pollution* 96(2):173-178.

Christiansen, ME, JD Costlow, Jr., and RS Monroe. 1977. Effects of the juvenile hormone mimic ZR-515 (Altosid) on larval development of the mud crab, *Rhithropanopeus harrisii* in various salinities and cyclic temperatures. *Marine Biology* 39(3):269-279.

Coats, JR. 1996. Risks from natural versus synthetic insecticides. *Annual Reviews of Entomology* 39:489-515.

Costlow, JD, Jr. 1977. The effects of juvenile hormone mimics on development of the mud crab, *Rhithropanopeus harrisii* (Gould). pp. 439-457. In: Vernberg, FJ, A. Calabrese, FP Thurberg, and WB Vernberg (eds.). *Physiological Responses of Marine Biota to Pollutants*. Academic Press, New York, NY. 462 pp.

Craig, JK, and LB Crowder. 2000. Factors influencing habitat selection in fishes with a review of marsh ecosystems. pp. 241- 266. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

Crans, WJ. 1977. The status of *Aedes sollicitans* as an epidemic vector of eastern equine encephalitis in New Jersey. *Mosquito News* 37:85-89.

Crooks, S., and RK Turner. 1999. Integrated coastal management: sustaining estuarine natural resources. *Advances in Ecological Research* 29:241-289.

Currin, CA, SC Wainwright, KW Able, MP Weinstein, and CM Fuller. 2003. Determination of food web support and trophic position of the mummichog, *Fundulus heteroclitus*, in New Jersey smooth cordgrass (*Spartina alterniflora*), common reed (*Phragmites australis*) and restored salt marshes. *Estuaries* 26(2B):495-510.

Dale, PER, and K. Hulsman. 1990. Critical review of salt marsh management methods for mosquito control. *Reviews in Aquatic Science* 3(2,3):281-311.

Deegan, LA, JE Hughes, and RA Rountree. 2000. Salt marsh ecosystem support of marine transient species. pp. 333-365. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

Degitz, SJ, GW Holcombe, PA Kosian, JA Tietge, EJ Durhan, and GT Ankley. 2003. Comparing the effects of stage and duration of retionoic acid exposure on amphibian limb development: chronic exposure results in mortality not limb deformity. *Toxicological Sciences* 74:139-146.

DeLorenzo, M., L. Serrano, J. Hoguet, K. Chung, and P. Key. 2005. Toxicity of the pyrethroid insecticide permethrin to adult and larval grass shrimp (*Palaemonetes pugio*). Presentation, *26th Annual Meeting of the Society of Environmental Toxicology and Contamination*, Baltimore MD. November 13-17.

El-Shazly, MM, and ED el-Sharnoubi. 2000. Toxicity of a neem (*Azadirachta indica*) insecticide to certain aquatic organisms. *Journal of the Egyptian Society of Parasitology* 30(1):221-231.

Ferrigno, F., and DM Jobbins. 1968. Open Marsh Water Management. *Proceedings of the New Jersey Mosquito Extermination Association* 55:104-115.

Ferrigno, F., P. Slavin, and DM Jobbins. 1975. Open marsh water management. *Proceedings of the New Jersey Mosquito Extermination Association* 62:30-38.

Fradin, MS and JF Day. 2002. Comparative efficacy of insect repellants against mosquito bites. *New England Journal of Medicine* 347(1):13-18

Glasgow, RD. 1938. Mosquitoes and wild life as interrelated problems in human ecology. *New York State Museum Bulletin* 316:7-20.

Goktepe, I., and LC Phlak. 2004. Acute toxic effects of neem-based insecticides on crustaceans. *Bulletin of Environmental Contamination and Toxicology* 72(6):1278-1284.

Guirgis, S. Undated. *The Possible Effect of Open Marsh Water Management on the Mosquito Population of Seatuck National Wildlife Refuge, Islip, Suffolk County, New York.* Seatuck Foundation, Islip, New York. 3 pp. + tables and figures.

Harrington, RW, and ES Harrington. 1961. Food selection among fishes invading a high subtropical salt marsh: from onset of flooding through the progress of a mosquito brood. *Ecology* 42(4):646-666.

Hartig, EK, V. Gornitz, A. Kolker, F. Muschacke. and D. Fallon. 2002. Anthropogenic and climate-change impacts on salt marshes of Jamaica Bay, New York City. *Wetlands* 22(1):71-89.

Hartig, EK, A. Kolker, and V. Gornitz. undated. Investigations into recent salt marsh losses in Jamaica Bay, New York. pp. 21-40. In: *Integrated Reconnaissance of the Physical and Biogeochemical Characteristics of Jamaica Bay*. Lamont-Doherty Earth Observatory, Columbia University. 121 pp.

Hayes, TB, P. Case, S. Chui, D. Chung, C. Haefele, K. Haston, M. Lee, VP Mai, Y. Marjuoa, J. Parker, and M. Tsui. 2006. Pesticides mixtures, endocrine disruption, and amphibian declines: are we underestimating the impact? *Environmental Health Perspectives* 114 Suppl 1:40-50.

Health Canada. 2004. *Proposed Phaseout of Citronella-Based Personal Insect Repellents.* Pest Management Regulatory Agency Information Note, 17 September.

Henry, R. 2006. Dying salt marshes puzzle scientists. *Associated Press*. August 22 (downloaded from abcnews.go.com/Technology/wirestory?id=2340902)

Hershey, AE, AR Lima, GJ Niemi, and RR Regal. 1998. Effects of *Bacillus thuringiensis israelensis* (Bti) and methoprene on nontarget macroinvertebrates in Minnesota wetlands. *Ecological Applications* 8(1):41-60.

Horst, MN, AN Walker, P. Bush, T. Wilson, ES Chang, T. Miller, and P. Larkin. Submitted. Pesticides induced alterations in gene expression in the lobster, *Homarus americanus*.

Horst, MN, and AN Walker. 1999. Effects of the pesticide methoprene on morphogenesis and shell formation in the blue crab, *Callinectes sapidus*. *Journal of Crustacean Biology* 19(4):699-707.

Howes, BL, and DD Goehringer. 1994. Porewater drainage and dissolved organic carbon and nutrient losses through the intertidal creekbanks of a New England salt marsh. *Marine Ecology Progress Series* 114:289-301.

Hruby, T., and WG Montgomery. 1985. *Open Marsh Water Management for Open Tidal Marshes in the Northeast: A Manual of Methods*. Massachusetts Audubon Society, Lincoln, MA. Paged in sections.

Isman, MB. 2006. Botanical insecticides, deterrents, and repellents in modern agriculture and an increasingly regulated world. *Annual Reviews of Entomology* 51:45-66.

James-Pirri, M-J, RM Erwin, and DJ Prosser. 2004. *US Fish and Wildlife Service (Region 5) Salt Marsh Study Year 3 Study Report*. US Geological Survey, Narragansett, RI. 277 pp.

James-Pirri, M-J, RM Erwin, and DJ Prosser. 2003. *Data Report for 2001 and 2002 US Fish and Wildlife Service (Region 5) Salt Marsh Study*. US Geological Survey, Narragansett, RI. 150 pp.

James-Pirri, M-J, CT Roman, and RM Erwin. 2002. *Data Report for the Year 1 (2001) US Fish and Wildlife Service (Region 5) Salt Marsh Study*. US Geological Survey, Narragansett, RI. 62 pp.

James-Pirri, M-J, CT Roman, and RM Erwin. 2001. *Field Methods Manual: US Fish and Wildlife Service (Region 5) Salt Marsh Study*. USGS , Narragansett, RI. 62 pp.

Johnson, PTJ, and JM Chase. 2004. Parasites in the food web: linking amphibian malformations and aquatic eutrophication. *Ecology Letters* 7:521-526.

Johnson, A., and K. Kinney. 2006. *Methoprene Concentrations in Surface Water Samples from Grant County Mosquito Control District No. 1*. Publication 06-03-001. Washington State Department of Ecology. 19 pp.

Johnson, PTJ, KB Lunde, DA Zelmer, and JK Werner. 2003. Limb deformities as an emerging parasitic disease in amphibians: evidence from museum specimens and resurvey data. *Conservation Biology* 17:1724-1737.

Karpati, AM, MC Perrin, T. Matte, J. Leighton, J. Schwartz, and RG Barr. 2004. Pesticide spraying for West Nile virus control and emergency department asthma visits in New York City, 2000. *Environmental Health Perspectives* 112(11):1183-1187.

Kearney, M., W. Lawrence, and J. Townshend (principal investigators). 1999. *Coastal Marsh Project*. Mission to Planet Earth at NASA and University of Maryland, sponsors. www.geog.umd.edu/wetlands/

Key, P., M. DeLorenzo, K. Gross, K. Chung, and A. Clum. 2005. Toxicity of the mosquito control pesticide Scourge to adult and larval grass shrimp (*Paleomonetes pugio). Journal of Environmental Science and Health, Part B* 40:585-594.

Kilpatrick, AM, LD Kramer, MJ Jones, PP Marra, and P. Daszak. 2006. West Nile virus epidemics in North America are driven by shifts in mosquito feeding behavior. *PLOS Biology* 4(4):606-610.

Knieb, RT. 1984. Patterns in the utilization of the intertidal salt marsh by larvae and juveniles of *Fundulus heteroclitus* (Linnaeus) and *Fundulus luciae* (Baird). *Journal of Experimental Marine Biology and Ecology* 83:41-51.

Kreeger, DA, and RIE Newell. 2000. Trophic complexity between producers and invertebrate consumers in salt marshes. pp. 187-220. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

LISS. Undated. *Long Island Sound Tidal Wetland Loss Workshop, June 24 & 25, 2003, Stony Brook, NY.* www.longislandsoundstudy.net/habitat/habitat_rest_wkshp_rpt03.pdf. 15 pp.

LaClair, JL, J. Bantle, and J. Dumont. 1998. Photoproducts and metabolites of a common insect growth regulator produce developmental deformities in *Xenopus*. *Environmental Science and Technology* 32(10):1453-1461.

Lathrop, RG, MP Cole, and RD Showalter. 2000. Quantifying the habitat structure and spatial pattern of New Jersey (U.S.A.) salt marshes under different habitat regimes. *Wetlands Ecology and Management* 8:163-172.

Laufer, H. 1982. *The Effect of Hormonal Pollutants on Aquatic Crustacea and the Surrounding Environment*. Institute of Water Resources, The University of Connecticut, Storrs, CT. 38 pp.

Lee, BM, and GI Scott. 1989. Acute toxicity of temephos, fenoxycarb, diflubenzuson, and methoprene and *Bacillus thuringiensis* var. *israelensis* to the mummichog (*Fundulus heteroclitos*). *Bulletin of Environmental Contamination and Toxicology* 43(6):827-832.

Lent, RA, T. Hruby, DP Cowan, and TS Litwin. 1990. *Open Marsh Water Management on Great South Bay, Islip, New York*. Seatuck Foundation, Islip, NY. 102 pp.

Loeb, M., SJ Elliott, B. Gibson, M. Fearon, R. Nosal, M. Drebot, C. D'Cuhna, D. Harrington, S. Smith, P. George, and J. Eyles. 2005. Protective behavior and West Nile virus risk. *Emerging Infectious Diseases* 11(9):1433-1436.

MacDonald, D., and G. Edinger. 2000. *Identification of Reference Wetlands on Long Island, New York*. New York Natural Heritage Program, Latham, NY. 106 pp. + appendices

Maryland Department of Agriculture. Undated. *Mosquito Control Program Description*. Maryland Department of Agriculture, Annapolis, MD. www.mda.md.us/plants-pests/mosquito_control/mosquito_control_program_description.htm

Merriam, TL. 1983. Food habits of nestling seaside sparrows in unaltered and ditched salt marshes on Long Island, New York. pp. 115-122. In: Quay, TL, JB Funderburg, Jr., DS Lee, EF Potter, and CS Robbins (eds.). *The Seaside Sparrow: Its Biology and Management*. Occasional Papers of the North Carolina Biological Survey, 1983-5. 174 pp.

McMahon, KW, BJ Johnson, and WG Ambrose, Jr. 2005. Diet and movement of the killifish, *Fundulus heteroclitus*, in a Maine salt marsh assessed using gut contents and stable isotope analyses. *Estuaries* 28(6):966-973.

Miller, REL, JR Wands, KN Chytalo, and RA D'Amico. 2005. Application of water quality modeling technology to investigate the mortality of lobsters (*Homarus americanus*) in western Long Island Sound during the summer of 1999. *Journal of Shellfish Research* 24(1):859-864

Mitsch, WJ, and JG Gosselink. 2000. *Wetlands*. 3rd Ed. John Wiley and Sons, New York, NY. 920 pp.

Mittal, PK, and SK Subbarao. Prospects of using herbal products in the control of mosquito vectors. *ICMR Bulletin* 33(1):1-10.

Mount, GA. 1998. A critical review of ultra-low volume aerosols of insecticide applied with vehicle-mounted generators for adult mosquito control. *Journal of the American Mosquito Control Association* 14(3):305-334.

Mount, GA. 1996. A review of ultra-low volume aerial sprays of insecticide for mosquito control. *Journal of the American Mosquito Control Association* 12(4):601-618

Mostashari, F., I Poshni, EM Layton, D. Graham, C. Bradley, M. Kacacia, S. Wong, C. Franchell, D. Morse, B. Wallace, P. Smith, E. Bresnitz, C. Baisley, A. Iton, G. Archambault, D. Mayo, J. Hadler, and EIS officers, CDC. 2001b. Serosurveys for West Nile infection – New York and Connecticut counties, 2000. *Morbidity and Mortality Weekly* 50(3):37-39.

NYCDOH. 2001. *Adult Mosquito Control Programs Draft Environmental Impact Statement (DEIS)*. New York City Department of Health, New York, NY. Paged in sections.

NYSDOH. 2004. *Homicide Death Rate per 100,000, 2000-2002: Info for Researchers, Suffolk County*. New York State Department of Health. Last updated, July 2004: available at: http://www.nyhealth.gov/nysdoh/chac/cha/plots/violence/homici47.htm

NYSDOH. 2001a. *Health Advisory: Tick and Insect Repellents.* New York State Department of Health.

NYSDOH. 2001b. *New York State West Nile Virus Response Plan – Guidance Document*. New York State Department of Health, Albany, NY. 66 pp. + appendices.

National Research Council. 1992. *Restoration of Aquatic Ecosystems*. National Academy Press, Washington, DC. 552 pp.

Niedowski, N. 2000. *New York State Salt Marsh Restoration and Monitoring Guidelines*. NYS Department of State, Albany, NY, and NYS Department of Environmental Conservation, East Setauket, NY. 135 pp.

Nixon, SW. 1982. *The Ecology of New England High Salt Marshes: A Community Profile*. FWS/OBS-81/55, US Fish and Wildlife Service, Washington, DC. 70 pp.

Nixon, SW. 1980. Between coastal marshes and coastal waters – a review of twenty years of speculation and research on the role of salt marshes in estuarine productivity and water chemistry. pp. 437-525. In: Hamilton, P. and KB McDonald (eds.). *Estuarine and Wetland Processes with an Emphasis on Modeling*. Plenum Press, New York, NY. 653 pp.

Odum, EP. 2000. Tidal marshes as outwelling/pulsing systems. pp. 3-7. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

Odum, EP. 1979. The status of three ecosystem-level hypothesis regarding salt marsh estuaries: tidal subsidy, outwelling and detritus-based food chains. *The Fifth Biennial International Estuarine Research Conference Abstracts, Jekyll Island, GA*. Oct. 7-12.

Ostfield, RS, CD Canham, K. Oggenfuss, RJ Winchcombe, and F. Keesing. 2006. Climate, deer, rodents, and acorns as determinants of variation in Lyme-Disease risk. *PLoS Biology* 4(6):1058-1068.

Patelli, R. 2003. *Tracing the Movement of Water Throughout the Grid Ditched salt Marsh*. Southampton College Estuarine Research Program. 31 pp. + appendix.

Patnaik, JL, H. Harmon, and RL Vogt. 2006. Follow-up of 2003 West Nile virus infections, Denver, Colorado. *Emerging Infectious Diseases* 12(7):1129-1131.

Peterson, RKD, PA Macedo, and RS Davis. 2006. A human health risk assessment for West Nile virus and insecticides used in mosquito management. *Environmental Health Perspectives* 114(3):366-372

Pimentel, D. Accepted. Area-wide pest management: environmental, economic and food issues. *FAO/IAEA*.

Pinkney, AE, PC McGowan, DR Murphy, TP Lowe, DW Sparling, and LC Ferrington. 2000. Effects of the mosquito larvicides temephos and methoprene on insect populations in experimental ponds. *Environmental Toxicology and Chemistry* 19(3):678-684.

Post, W., and JS Greenlaw. 1975. Seaside sparrow displays: their function in social organization and habitat. *The Auk* 92:461-492.

Redfield, AC. 1972. Development of a New England salt marsh. *Ecological Monographs* 42(2):1-23.

Reisenauer, T. 2006. *Effects of Tidal Discharge from Salt Marsh Ditches on Estuarine Ecosystems*. SCERP, Southampton College. 23 pp.

Relyea, RA, and N. Mills. 2001. Predator-induced stress makes the pesticide carbaryl more deadly to gray tree frog tadpoles (*Hyla versicolor*). *Proceedings of the National Academy of Sciences* 98:2491-2496.

Relyea, R. 2005. The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. *Ecological Applications* 15(2):618-627.

Roman, CT, WA Niering, and RS Warren. 1984. Salt marsh vegetation changes in response to tidal restrictions. *Environmental Management* 8:141-150.

Roman, CT, KB Raposa, SC Adamowicz, MJ James-Pirri, and JG Catena. 2002. Quantifying vegetation and nekton response to tidal restoration in a New England marsh. *Restoration Ecology* 10(3):450-460.

Ross, DH. P. Cohle, PR Blase, JB Bussard, and K. Neufeld. 1994a. Effects of the insect growth regulator (s)-methoprene on the early life stages of the fathead minnow *Pimephales promales* in a flow-through laboratory system. *Journal of the American Mosquito Control Association* 10(2):211-221.

Ross, DH, D. Judy, B. Jacobsen, and R. Howell. 1994b. Methoprene concentrations measured in freshwater mesocosms treated with sustained release Altosid formulations. *Journal of the American Mosquito Control Association* 10(2):202-210

SCDHS. 2002. *Peconic Estuary Program: Comprehensive Conservation and Management Plan*. Suffolk County Department of Health Services, Riverhead, NY.

SCERP. 2004. *The Effects of Pesticide Application on Cyprinodon Variegatus (Sheepshead Minnows) in Salt Marsh Ecosystems on Long Island*. Technical Report 05-04, Southampton College Estuary Research Program, Southampton, NY. Unpaged.

SCVC. 2001. *Annual Plan of Work for 2002*. Suffolk County Department of Public Works, Division of Vector Control, Yaphank, NY.

Salzman, A. 2006. Something is killing the marsh grass but no one is sure what it is. *New York Times*, Regional Section. July 2. p. 6.

Schofield, S., M. Tepper, J. Lalonde. 2006. Comparing risk of West Nile virus against risk of adulticiding (letter to the editor). *Environmental Health Perspectives* 114(9):A519.

Scott, GI, MH Fulton, DW Moore, EF Sirth, GH Chandler, PB Key, JW Daugomah, ED Strozier, JR Clark, MA Lewis, DB Finley, W. Ellenberg, and K J Karnaky, Jr. 1999. Assessment of risk reduction strategies for the management of agriculture nonpoint sources pesticide runoff in estuarine ecosystems. *Toxicology and Industrial Health* 15:200-213.

Scott, IM, and NK Kaushik. 2000. The toxicity of a neem insecticide to populations of culcidae and other aquatic invertebrates as assessed in situ microcosms. *Archives of Environmental Contamination and Toxicology* 39(3):329-336.

Scott, IM, and NK Kaushik. 1998. The toxicity of margosan-O, a product of neem seeds, to selected target and non-target aquatic invertebrates. *Archives of Environmental Contamination and Toxicology* 35(3):426-431.

Sejvar, JJ, AV Bode, AA Marfin, GL Campbell, J. Pape, BJ Biggerstaff, and LR Petersen. 2006. West Nile virus-associated flaccid paralysis outcome. *Emerging Infectious Diseases* 12(3):514-516.

Shisler, JK. 1978. Water management methods being utilized in coastal marshes to control mosquito populations. *Proceedings of the New Jersey Mosquito Control Association* 65:59-66.

Sjogren, RD, and MM Genereux. 1987. *Mosquito Control to Fit Your Town*. Zoecon Industries. Cited in Christie, GD. 1990. *Manual of Methods for Open Marsh Water Management in Rhode Island*. Rhode Island Pesticide Relief Advisory Board, North Kingstown, RI. 24 pp. + appendices.

Smith, JB. 1904. *Report of the NJ State Agricultural Experiment Station upon the Mosquitoes Occuring within the State, Their Habits, Life History, etc*. MacCrellish & Quigley, Trenton, NJ. 482 pp.

Spielman, A. 2001. Structure and seasonality of neararctic *Culex pipiens* populations. pp. 220-234. In: White, DJ, and DL Morse (eds.). *West Nile Virus: Detection, Surveillance, and Control*. Annals of the New York Academy of Science, V. 951. New York, NY. 374 pp.

Society for Restoration Ecology International Science and Policy Working Group. 2004. *The SER International Primer on Ecological Restoration*. Society for Ecological Restoration International, Tucson, AZ. 14 pp.

Steever, EZ, RS Warren, and WA Niering. 1976. Tidal energy subsidy and standing crop production of *Spartina alterniflora*. *Estuarine, Coastal and Shelf Science* 4:473-478.

Suffolk County Legislature Budget Review Office. 2003. *Impact of the Atlantic Ocean beaches to the Suffolk County Economy*. Suffolk County Legislature, Hauppauge, NY.

Taubenberger, JK, and DM Morens. 2006. 1918 influenza: the mother of all pandemics. *Emerging Infectious Diseases* 12(1):15-22.

Taylor, N. 1938. A preliminary report on the salt marsh vegetation of Long Island, New York. . *New York State Museum Bulletin* 316:21-84.

Teal, JM. 1986. *The Ecology of Regularly Flooded Salt Marshes of New England: A Community Profile*. Biological Report 85(7.4), US Fish and Wildlife Service, Washington, DC. 61 pp.

Teal, J. and BL Howes. 2000. Salt marsh values: retrospection from the end of the century. pp. 9-19. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Academic Publishers, Boston, MA. 875 pp.

Teal, J., and M. Teal. 1969**.** *Life and Death of the Salt Marsh.* Little, Brown, Boston, MA. 278 pp.

Templeton, NS, and H. Laufer. 1983. The effects of a juvenile hormone analog (Altosid ZR-515) on the reproduction and development of *Daphnia Magna* (Crustacea: Cladocera). *International Journal of Invertebrate Reproduction* 6(2):99-110.

Todar, K. 2002a. Mechanisms of bacterial pathogenicity: endotoxins. *Todar's Online Textbook of Bacteriology*, University of Wisconsin-Madison. http://textbookofbacteriology.net/endotoxin.html

Todar, K. 2002b. Mechanisms of bacterial pathogenicity: protein toxins. *Todar's Online Textbook of Bacteriology*, University of Wisconsin-Madison. http://textbookofbacteriology.net/proteintoxins.html

Town of East Hampton. 2002. *Joint Application for Permit, Accabonac OMWM*. Submitted to NYSDEC Region 1, December 4.

Town of East Hampton. 2001. *Open Marsh Water Management, Town of East Hampton*. Town of East Hampton Natural resources and Environmental Protection Department. 7 pp. + tables and figures.

Trocki, CL, and PWC Paton. 2006. Assessing habitat selection by foraging egrets in salt marshes at multiple spatial scales. *Wetlands* 26(2):307-312.

Turrell, MJ, DJ Dohm, MR Sardelis, ML O'Guinn, TG Andreadis, and JA Blow. 2005. An update on the potential of North American mosquitoes (Diptera:Culicidae) to transmit West Nile virus. *Journal of Medical Entomology* 42(1):57-62.

USDOT. Undated. *County by County Compilation of Traffic Fatalities for New York, 2001 and 2002*. US Department of Transportation. Available at: www-nrd.nhsta.dot.gov/pdf/nrd-30/NCSA/AlcRpt/2002/New%20York.pdf

USEPA. 2006a. *Reregistration Elegibility Decision for Piperonyl Butoxide (PBO)*. EPA 738-R06-005. US Environmental Protection Agency, Washington, DC. 111 pp.

USEPA. 2006b. *Reregistration Elegibility Decision (RED) for Malathion*. EPA 738-R06-030. US Environmental Protection Agency, Washington, DC. 111 pp.

USEPA. 2006c. *Reregistration Elegibility Decision for Resmethrin*. EPA 738-R06-003. US Environmental Protection Agency, Washington, DC. 102 pp.

USEPA. 2006d. *Reregistration Elegibility Decision (RED) for Permethrin*. EPA 738-R06-017. US Environmental Protection Agency, Washington, DC. 195 pp.

USEPA. 2005. *Permethrin: Updated Revised Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision Document*. US Environmental Protection Agency. June 29.

USEPA. 2003. *Guidance on Selecting the Appropriate Age Groups for Assessing Childhood Exposure to Environmental Contaminants*. EPA/630/P-03/003A. US Environmental Protection Agency, Risk Assessment Forum, Washington, DC.

USEPA. 2001. *June 2001 Update of the March 1991 Methoprene R.E.D. Factsheet*. Pesticide Factsheet. US Environmental Protection Agency. 9 pp.

USEPA. 2000. *Ambient Aquatic Life Criteria for Dissolved Oxygen(Saltwater): Cape Cod to Cape Hatteras*. EPA-822-R-00-012. US Environmental Protection Agency, Washington, DC.

USEPA. 1997. *Exposure Factors Handbook. Volume 1: General Factors*. EPA/600/P-95/002Fa. US Environmental Protection Agency, Washington, DC.

USGS. 2001. *Malformed Frogs in Minnesota: An Update*. US Geological Survey Fact Sheet 043-01. Mounds View, MN. 4 pp.

Valente, RM, and C. Cuomo. 2005. Did multiple sediment-associated stressors contribute to the 1999 mass mortality event in western Long Island Sound? *Estuaries* 28(4):529-540.

Valiela, I., ML Cole, J. McClelland, J. Hauxwell, J. Celebrian, and SB Joye. 2000. Role of salt marshes as part of coastal landscapes. pp. 23-38. In: Weinstein, MP, and DA Kreeger (eds.). *Concepts and Controversies in Tidal Marsh Ecology*. Kluwer Acadmic Publishers, Boston, MA. 875 pp.

Valiela, I., D. Rutecki, and S. Fox. 2004. Salt marshes: biological controls of food webs in a diminishing environment. *Journal of Experimental and Marine Biology* 300:131-159.

Valiela, I., and JM Teal. The nitrogen budget of a salt marsh ecosystem. *Nature* 280:652-656.

Vilbas, M. 2003. *Degradation of a Salt Marsh by Mosquito Ditches*. Southampton College Estuarine Research Program. Unpaged.

Virginia Sea Grant Program and Virginia Institute of Marine Science. About *Callinectes sapidus*, the blue crab. *Virginia Marine Resource Bulletin* 25(1-2):10-22.

Walker, AN, P. Bush, J. Puritz, T. Wilson, ES Chang, T. Miller, K. Holloway, and MN Horst. 2004a. Bioaccumulation and metabolic effects of the endocrine disruptor methoprene in the lobster, *Homarus americanus*. *Journal of Integrative and Comparative Biology* 45(1):118-126.

Walker, AN, P. Bush, T. Wilson, E. Chang, T. Miller, and MN Horst. 2005b. Metabolic effects of acute exposure to methoprene in the lobster, *Homarus americanus. Journal of Shellfish Research* 24(3):787-794.

Wellmark International. 2003. *Material Safety Data Sheet – Zoecon Altosid Briquets*. Wellmark International, Shaumberg, IL. 4 pp.

Wellmark International. 1997. *Material Safety Data Sheet – Zoecon Altosid Liquid Larvicide Concentrate*. Wellmark International, Shaumberg, IL. 4 pp.

Westchester County. 2001. *Comprehensive Mosquito-borne Disease Surveillance and Control Plan*. Draft Generic Environmental Impact Statement. Westchester County Board of Health, White Plains, NY. Available at:

http://www.westchestergov.com/planning/environmental/stingEIS/STING_DGEIS.htm#FGEIS. Paged in sections.

Wolfe, RJ. 1996. Effects of Open Marsh Water Management on selected tidal marsh resources: a review. *Journal of the American Mosquito Control Association* 12(4):701-712.

Wonham, MJ, T. de-Camino-Beck, and MA Lewis. 2004. An epidemiological model of West Nile virus: invasion analysis and control applications. *Proceedings of the Royal Society of London B* 271:501-507.

Wurtsbaugh, WA, and CS Apperson. 1978. Effects of mosquito control insecticides on nitrogen fixation and growth of blue-green algae in natural plankton associations. *Bulletin of Environmental Contamination and Toxicology* 19:641-647.

Yasuno, M. and K. Satake. 1990. The effects of diflubenzuron and methoprene on the emergence of insects and their density in an outdoor experimental stream. *Chemosphere* 21(10-11):1321-1335.

Zulkowsky, AM, JP Ruggieri, SA Terracciano, BJ Brownawell, and AE McElroy. 2005. Acute toxicity of resmethrin, malathion and methoprene to larval and juvenile American lobsters (*Homarus americanus*) after Scourge™, Anvil™ and Altosid™ application. *Journal of Shellfish Research* 24(3):795-804.