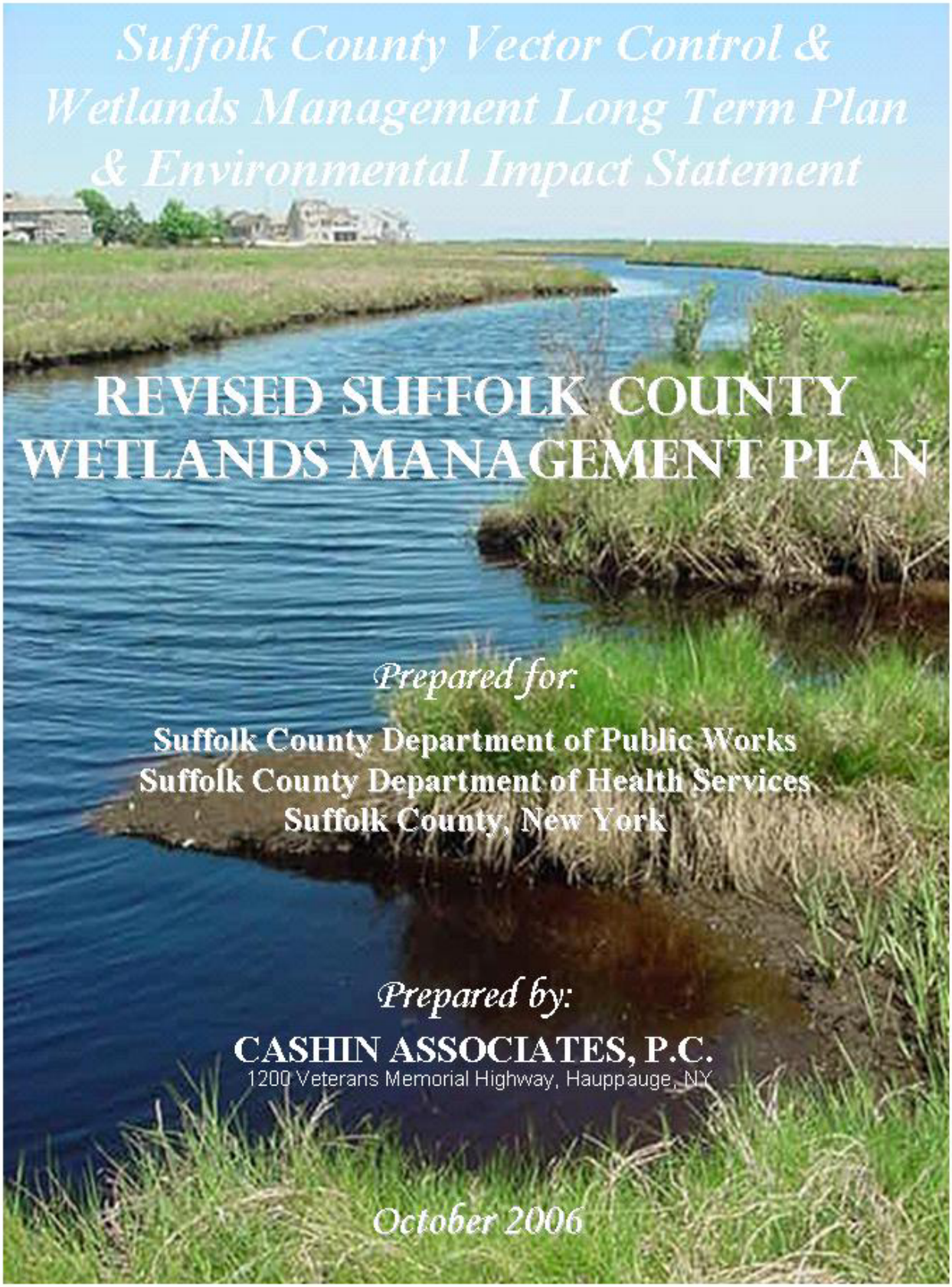
Suffolk County Vector Control &
Wetlands Management Long Term Plan
& Environmental Impact Statement
REVISED SUFFOLK COUNTY
WETLANDS MANAGEMENT PLAN
Prepared for:
Suffolk County Department of Public Works
Suffolk County Department of Health Services
Suffolk County, New York
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October 2006

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

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Table of Contents

Tables

Figures

Map

Appendix

List of Acronyms and Abbreviations

BMP	Best Management Practice
CEQ	Suffolk County Council on Environmental Quality
DGEIS	Draft Generic Environmental Impact Statement (dated May 3, 2006) for the Suffolk County Vector Control and Wetlands Management Long-Term Plan
EEE	Eastern equine encephalitis
FGEIS	Final Generic Environmental Impact Statement (dated October 2006) for the Suffolk County Vector Control and Wetlands Management Long-Term Plan
IPM	Integrated Pest Management
LISS	Long Island Sound Study
MOU	Memorandum of Understanding
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
OMWM	Open Marsh Water Management
PEP	Peconic Estuary Program
SCDE	Suffolk County Department of the Environment and Energy
SCDHS	Suffolk County Department of Health Services
SCDP	Suffolk County Department of Planning
SCDPSC	Suffolk County Dredge Project Screening Committee
SCVC	Suffolk County Vector Control
SEQRA	State Environmental Quality Review Act
SSER	South Shore Estuary Reserve
USACOE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
WNV	West Nile virus

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EXECUTIVE SUMMARY

Abstract

Through this Wetlands Management Plan, Suffolk County plans to address the vector control and ancillary wetland management needs for all 17,000 acres of tidal wetlands in Suffolk County. Consideration of major marsh restoration, natural reversion, and other best management practices will be a radical departure from the current program of maintenance of the legacy grid ditch water management system.

Progressive water management will be considered for implementation in over 4,000 acres of tidal wetlands that have been identified as mosquito breeding problem areas. Within these 4,000 acres, 46 separate locations are sites that currently receive aerial larvicide treatments. The goals of this initiative are to reduce the amounts of larvicide applied in these marshes, and, according to the development of cooperative management plans for the affected wetlands, achieve some degree of habitat enhancement and marsh restoration, including maintaining or increasing biodiversity and *Phragmites* control. It is estimated that approximately 4,000 acres of tidal wetlands will be left alone to undergo reversion, because of low mosquito breeding potential and/or distance from points of dense populations of people, unless the creation of a comprehensive County-wide marsh management plan, creating an Integrated Marsh Management program, determines there are non-mosquito control reasons to manage these sites more actively. In those areas, natural processes will gradually undo the construction of ditches across the marshes. In the long run, reversion is not necessarily ecologically optimal; thus, other restoration options may need to be considered for purposes other than vector control.

The remaining 9,000 acres of tidal wetlands in Suffolk County will undergo assessment by the County in cooperation with local government, regulators, and other interested parties over the coming decade, with some being actively restored, and others subjected to reversion processes. The policy in these areas will be one of presumptive interim reversion (i.e., no ditch maintenance unless deemed necessary for ecological or mosquito control purposes). It is expected that less than four percent of the County's tidal wetlands (less than 600 acres) will be subject to ditch maintenance over the next decade.

Ditch Maintenance Policy

Suffolk County has inherited a legacy of approximately 17,000 acres of tidal wetlands, wetlands which have been fundamentally altered from their natural state. In the 1920s and 1930s, these tidal wetlands were substantially grid ditched, in an effort to remove stagnant water and mosquito-breeding habitat. Natural features, such as ponds and pannes, were affected in many settings, and biological communities in the wetlands were altered.

The Wetlands Management Plan represents a significant departure from seven decades of grid ditch maintenance policy. Instead of committing to maintain the grid ditch network as a means of controlling mosquitoes, Suffolk County will instead apply more nuanced criteria to determine the best means of managing its salt marsh resources. For now, plans include a presumptive policy of reversion, where wetlands that pose no mosquito problems will remain untouched while long-term plans for restoration are developed and implemented. Existing water management systems (ditches, culverts, and other structures) will normally be either left alone, if not needed for mosquito control, or upgraded to Best Management Practices (BMPs) as outlined in this Wetlands Management Plan. In some cases, implementation of BMPs is not immediately feasible due to lack of pre-project information or institutional factors such as land manager policies. Implementation of BMPs may also not be immediately feasible due to lack of resources. For instance, if major tidal flow restoration is desirable but is currently too expensive because it involves major road work, interim measures should be taken while these resources are sought if the alternative is a loss of habitat and/or an increased reliance on pesticides. In addition, extensive project reviews may determine that the implementation of BMPs is not warranted due to environmental considerations.

Assuming Long-Term Plan water management policies are implemented, the general presumption will be against maintenance of ditch systems. However, in limited circumstances, existing structures may be maintained on an interim basis, when the following conditions are met:

- Deterioration of or damage to structures is resulting in a significant mosquito problem, as evidenced by larval and/or adult surveillance, serious enough to require control. An

example would be a collapsed pipe that restricts tidal flow and results in a need to larvicide an area. Or:

- Failure to maintain the structures would result in the loss of resource values, such as fish passage or tidal flow, or loss of vegetation due to fresh water impoundment. Or:

- Failure to maintain the structures would result in a hazard or loss of property as a result of flooding.

Benefits to be expected from the work include:

- Maintaining or reconstructing the existing structures will improve water circulation or provide fish habitat sufficient to reduce the need for pesticide application.

- Maintaining the structures is compatible with habitat values that existed prior to the failure or deterioration of the structures.

- Maintaining the structure will prevent flooding or other hazards.

Constraints on any maintenance of a pre-existing ditch system include:

- The structures will be maintained essentially in-place and in-kind.

- Disruption of wildlife habitat due to construction will be minimized by limiting work areas and/or by using seasonal constraints.

- Listed species will not be adversely impacted.

- Interim maintenance will not lead to excessive drainage that would result in a loss of wetlands values.

- The action will not lead to increased or more direct conveyance of inputs from storm drains or other structures.

- The action will not preclude the implementation of BMPs when resources and/or institutional considerations allow.

Given the above, it is expected that less than 50 acres of tidal wetlands per year will be subject to ditch network maintenance. All maintenance will be summarized annually, and will be conducted in accordance with a Memorandum of Understanding (MOU) with the Suffolk County Department of Health Services Office of Ecology and the Suffolk County Department of Environment and Energy.

Progressive Water Management

In Suffolk County, nearly all tidal wetlands were grid ditched in the 1930s for mosquito control. In addition, wetlands have been altered or manipulated in a variety of ways by other interests. Wetlands have been completely or partially filled, and waterways have been altered by dredging. A particularly important problem is the restriction of tidal flow to many wetlands as a result of road and other construction projects, so that in many cases ditches and culverts provide the little remaining tidal flow that reaches these degraded wetlands. SCVC has the responsibility for maintaining these structures. The legacy of these hydrological alterations is that many wetlands will degrade further without continuing maintenance or management of these water control structures. A major part of the overall water management strategy is to determine the best means to address past practices in ways that will maintain or even enhance these altered systems.

The proposed policy change is predicated on the ability to conduct a broad variety of best management practices and, specifically, to implement the kinds of progressive water management (practices that are sometimes labeled as Open Marsh Water Management, or OMWM). All mosquitoes spend larval stages as aquatic organisms, and source reduction is an essential component of mosquito control as practiced through Integrated Pest Management. Source reduction efforts through progressive water management can lead to impressive reductions in successful mosquito breeding, and so lead to major reductions in the number of applications and overall usage of pesticides. In addition, this kind of water management has the potential to increase overall marsh habitat diversity and wildlife values.

The Wetlands Management Plan, as presented here, has as its assumption that all projects involve some form of mosquito management. However, the project scope and final design of all projects will be developed cooperatively by the County in conjunction with local governments, regulators, and other interested parties. Because of keen interest and many comments received

on the original proposed means of evaluating projects, the County has expanded the review process. All proposed projects will require SCVC to consult with local natural resource managers, and to receive regulatory approvals from the New York State Department of Environmental Conservation (NYSDEC). A Wetlands Stewardship Committee has been established with a diverse membership that includes all groups of marsh management stakeholders. The Wetlands Stewardship Committee will be notified of all but the projects of no to little potential impact. It will review all projects with the potential for major impacts, and any other project that a portion of its membership deems to need such attention. Suffolk County will not be able to participate in projects that do not receive Wetlands Stewardship Committee approvals, and this Committee will make recommendations to the Council on Environmental Quality regarding the need for further environmental reviews. All projects requiring the use of management activities in BMP classes 5 to 15 will necessarily undergo some form of further environmental reviews. In addition, the Wetlands Stewardship Committee has a priority to create a definition of marsh health, and to use that definition to create a comprehensive marsh management plan for the County, one that will be the basis of an Integrated Marsh Management program.

The holistic approach to the design and evaluation of potential mosquito control and ecological enhancement projects has successfully been demonstrated for the first time on Long Island, as part of the Long-Term Plan development process, at the Wertheim National Wildlife Refuge. There, the land manager (the US Fish and Wildlife Service [USFWS]) and the primary regulator (NYSDEC) worked together with the County and its consultants to ensure that natural resource manager concerns and vector control goals were all addressed. This project was also important as the State issued a permit to the County contingent on a new County commitment to conduct monitoring and provide documentation of the effects of the project, which generally had not been attained by earlier marsh management demonstration projects. Continued cooperation between federal, state, and local agencies will be critical to ensure that other progressive water management projects will be implemented throughout Suffolk County.

For the first three years of the Long-Term Plan, the County will evaluate the possibility of achieving larvicide use reduction through low-impact BMPs at high priority mosquito management sites. It is likely that the County will limit its implementation of water management

over the next several years to a restricted geographical area and strategic partners. The initial restrictions ensure that the County can conduct early projects with partners who are willing and able to assist the County with project development, management, and monitoring. USFWS (which has already partnered with the County at Wertheim National Wildlife Refuge) and the County itself (through its parks holdings) are the most probable cooperating agencies for the 2007 to 2009 timeframe. It is quite probable that no major projects will be undertaken until the first Triennial Long-Term Plan Report has been completed, as this is anticipated to contain the fruits of the Wetlands Stewardship Committee's undertakings.

Wetlands Management Plan Approach

The Wetlands Management Plan consists of seven sections, the first of which addresses goals and numerous objectives. In the second section, a framework for selecting, designing, evaluating, and assessing projects is discussed. Key features include the creation of the Stewardship Committee to review and approve the major projects, and identification of the task to develop a marsh health definition, and use of that concept to create a comprehensive Integrated Marsh Management program that extends beyond mosquito control concerns.

In section three, the 15 Best Management Practices and four Interim Management Actions are discussed. The actions are aimed at reducing mosquito populations utilizing methods that either minimize potential environmental change, or maximize the enhancement of particular natural resource values.

Section 4 and Section 5 of the Wetlands Management Plan address plan implementation and resource needs of SCVC to undertake this Wetlands Management Plan, respectively. The need for streamlined and dedicated State processes is highlighted. Vector control program needs may be eligible for restoration grant opportunities, as well as the Suffolk County Water Quality Protection and Restoration Program (the Quarter Percent Sales Tax). Section 6 establishes a timeline for implementing the Wetlands Management Plan, and in Section 7 the County's salt marshes are prioritized in terms of those marshes where mosquito control needs are greatest, sites that appear to be best suited for reversion, and those areas requiring closer study before determining overall management needs.

Fresh Water Wetlands

In New York State, fresh water regulations do not allow for much manipulation of the existing hydrology of the marshes. This means that there are very few options in terms of mosquito-related water management and restoration. Source reduction (an emphasis on reduction of mosquito breeding opportunities, particularly manmade sources) and larval control are the main means of addressing mosquito problems associated with fresh water wetlands.

Underlying Data and Interagency Approach

This plan is based on tremendous amount of collaboration among agencies within the Wetlands Subcommittee of the Project Technical Advisory Committee. It is also the result of an exhaustive literature review and comprehensive field work, which is reflected in Task 3 (Literature Review) and Task 7 (21 representative wetland areas, totaling over 2,000 acres, have been evaluated in detail). The first digital tidal wetlands map, for all County wetlands, has been produced, and the Remote Sensing project is expected to provide a continuing and cost-effective means to implement the long-term program.

This Revised Wetlands Management Plan (October 2006) contains some important changes from the May 3, 2006 Draft Wetlands Management Plan. Minor edits were made throughout. Major changes in content, scope, or tone were made in the following sections of this report:

- Section 1 Goals and Objectives

  1.1 Introduction

  pp. 13-14: potential project identification and review

  1.2 Principles

  p. 17: establishment of a comprehensive Integrated Marsh Management program

- Section 2 Operational Structure

  pp. 23-44 This entire section has been extensively revised

- Section 3 Action Hierarchy

  pp. 46-53: The discussion of the BMP Manual has been revised (including revisions to/creation of Tables 1-5).

- Section 4 Implementation

  p. 55: the introductory paragraph was revised

  p. 56: a discussion of DGEIS comments and their ramifications was added

- Section 6 Timeline

  p. 61: the need to slow implementation is recognized

1. GOALS AND OBJECTIVES

1.1. Introduction

A public policy plan requires a clear statement of the purpose and intent. This is necessary for many reasons. Among them are:

- To provide overall guidance for technical managers
- To underscore key issues for those setting governmental directions
- To clearly explain to the interested public the intent of the proposal

The Long-Term Plan requires a water management component. This is because modern mosquito management follows the tenets of Integrated Pest Management (IPM). IPM requires that all actions be commensurate with the problem at hand, and establishes a general hierarchy for acceptable pest control. In this hierarchy, source reduction is always preferred over pesticide use.

For mosquito management, source reduction entails taking steps to make the environment less hospitable for mosquitoes. Because mosquitoes are concentrated as larvae, and then disperse to some degree as adults, it is imminently more practical and generally environmentally preferable (if only to reduce the area impacted by actions) to try to control immature mosquitoes. These larvae require still, shallow water bodies that are often impermanent to develop, which means wetlands are often important mosquito habitats. Therefore, in order to accomplish larval mosquito control, actions must be taken in these wetland environments to minimize mosquito breeding.

New York State Department of Environmental Conservation (NYSDEC), generally but not entirely, does not allow alteration of fresh water wetlands. Suffolk County appreciates the ecological and environmental reasoning behind this opinion, and is in accord with the regulatory restrictions. This means the focus of mosquito source reduction is on water management activities in coastal marshes (primarily salt marshes).

Mosquitoes that breed in salty and brackish waters found in the County's coastal wetlands include some of the species of greatest concern for mosquito managers. These species include:

- *Aedes vexans* (the flood water mosquito), which is predominantly a fresh water breeding species, but will breed in the upper edges of salt marshes. *Ae. vexans* is considered to be a vector of both Eastern equine encephalitis (EEE) and West Nile virus (WNV), and also can cause quality of life impacts due to its tendency to feed readily in the hours around dusk.

- *Culex salinarius* (the unbanded salt marsh mosquito), which, because of its habits of feeding indiscriminately on birds and mammals, and for often feeding several times during each egg-laying cycle, has been identified as the key species for WNV transmission in Connecticut and is gaining greater attention in Suffolk County as monitoring finds it is more prevalent than previously thought. It readily enters houses in search of meals.

- *Ochlerotatus cantator* (the brown salt marsh mosquito) is a spring-time mosquito that is a very aggressive biter. Primarily active in the evening, it will bite if disturbed in the day. Although capable of causing quality of life impacts when its numbers are great, it is not a vector concern as its population peaks are mismatched with the cycling of the arboviruses of concern in Suffolk County.

- *Ochlerotatus sollicitans* (the Eastern salt marsh mosquito), a very aggressive biting mosquito that has been identified as the primary human vector for EEE in New Jersey, and has been detected as a WNV vector in Suffolk County. Although generally a crepuscular (dawn and dusk) flier, this mosquito will attack at any time of the day when disturbed, and so causes the greatest quality of life impacts of all mosquitoes found in the northeast US. It is generated in broods that are sparked by tidal cycles, and millions of mosquitoes can invade a neighborhood seeking meals, and persist in large numbers for a week or more, sometimes. Prior to destruction of many salt marshes and the development of screens and air conditioning, this mosquito species inhibited development in coastal areas along the East Coast.

- *Ochlerotatus taeniorhynchus* (the black salt marsh mosquito) is also a very aggressive biting mosquito that can cause considerable quality of life impacts when a brood develops. Its numbers peak in late summer when risks for WNV are greatest, and it has the potential to be a WNV vector.

Salt marsh mosquitoes thus present a combination of potentially great quality of life impacts and also are identifiable disease threats. Reductions of risk for disease concerns are most efficiently realized, as with all forms of mosquito control, when targeted at mosquitoes prior to dispersal from larval habitats as adults. The particular diseases of concern are horizontally transmitted in mosquitoes (that is, mosquitoes acquire the infectious agents only by biting an infected blood source, which can only occur when the mosquito is an adult). Therefore, larval control, the most effective means of ensuring that disease transmission to people does not occur, must be initiated prior to the awareness of whether or not pathogens are cycling in the mosquitoes. Of the potential actions that result in larval control, source reduction has been found to be more reliable and effective than pesticide use. This is because several problems can reduce larvicide efficiency, such as:

- Poor weather that prevents applications when needed
- Incomplete surveillance that does not identify a potential problem in a timely manner
- Inaccurate application of the pesticide so that it is not put where it is needed
- Weather or other environmental factors after application that prevent the pesticide from acting exactly as intended to prevent mosquito maturation

Source reduction, as achieved by water management, prevents mosquito adults from emerging through two agencies:

- Physical alteration of the marsh, so that potential habitat is eliminated, kept too wet to allow oviposition, or drained too quickly following flooding to allow for complete larvae development.

- Biological alteration of the marsh, so that marsh interior water quality is maintained at levels killifish find tolerable, and the fish have refuges near mosquito breeding sites. Killifish so voraciously feed on mosquito larvae that it is a truism that sighting killifish mean mosquito larvae will not be found. If larvae are present, the fish must be absent or unable to reach mosquito breeding locations.

Water management techniques developed over the past 40 years for mosquito control purposes have been found to provide enhancements to other salt marsh functions. These more progressive means of water management may provide habitat enhancements for water birds and marsh nekton. They may serve as means of physically restoring other marsh functions that were altered by less enlightened marsh management activities, including grid ditching for mosquito control. These kinds of water management activities are commonly conducted throughout the northeast US as the best means of addressing salt marsh mosquito breeding. There are a variety of means to achieve mosquito control goals, and so implementation choices can be made to suit managerial purposes and site specific conditions.

Water management, as proposed in this Wetlands Management Plan, does not address the very real problems associated with upland mosquitoes. Mosquito species, including *Culex pipiens* (the house mosquito) and *Culiseta melanura* (the black-tailed mosquito), which breed in places other than salt marshes, are essential factors in the disease transmission cycles for EEE and WNV. Fresh water mosquitoes can also cause some of the more troublesome quality of life impacts in the County. The County has a very active source reduction program targeted at fresh water mosquitoes; where such efforts are not successful or are prohibited by regulation, the County endeavors to prevent the onset of adult mosquitoes through the use of biorational larvicides. Therefore, although the Wetlands Management Plan is heavily biased towards the control of salt marsh mosquitoes, the Long-Term Plan as a whole maintains an appropriate balance in seeking to reduce problems associated with disease risks and quality of life impacts from mosquitoes.

For more than 100 years, ditching marshes and then maintaining those ditches has been the most common means of water management in the northeast US. More progressive means of water management have been developed and adopted by other jurisdictions. However, New York State

has conservatively determined (in the Tidal Wetlands Land Use Regulations) that ditch maintenance is generally compatible with its goals for salt marshes, but that other measures require proof that they will not cause damage to these resources. This has helped to limit the use of alternative means of water management in Suffolk County heretofore.

However, it is clear that implementing more progressive means of water management holds the promise of helping the County achieve two notable objectives:

- to significantly reduce the amount of larviciding needed to control persistent mosquito breeding, and

- to enhance the natural resource qualities associated with the County's salt marshes.

This Wetlands Management Plan thus emphasizes progressive water management techniques other than ditch maintenance, designed for long-term management of the marshes.

The County is aware that modifying salt marshes has the potential to reduce the ecological and environmental functioning of these ecosystems. The County has also been made aware of the many reservations that interested parties have regarding changes to existing conditions of the marshes. Therefore, the default action under the Wetlands Management Plan is to take no action – allowing the marsh to follow natural processes. Where careful assessment of the conditions at a particular marsh suggests some more active management is warranted, the County has established a robust and thorough review process that requires satisfying the concerns of a range of stakeholders and interested parties. These self-imposed policies plus the thorough regulatory review by local, state, and federal agencies are intended to reduce the potential to cause environmental harm to the County's wetlands. Explicitly, the County has created a forum, the Wetlands Stewardship Committee, where determinations of marsh health will be used to develop a comprehensive marsh management plan for the 17,000 acres of coastal marsh in Suffolk County. Creation of an Integrated Marsh Management program will set mosquito control needs into an overall context, and allow for marsh restoration based on other environmental factors other than mosquito control. In addition, formal review of most projects will be conducted according to the State Environmental Quality Review Act (SEQRA). Suffolk County Vector Control (SCVC) is the agency best suited to lead those restoration efforts (as the public agency

with appropriate equipment and expertise to undertake these kinds of projects). Nonetheless, for many salt marshes, from a vector control standpoint, no action will be necessary as they do not constitute mosquito problems for the people of Suffolk County.

Where mosquito problems requiring action are determined to exist, projects will be developed on the basis of appropriateness to the nature of the problem. Criteria specifying the conditions appropriate for each kind of action are spelled out in the Revised Best Management Practices (BMP) manual. Landowner management concerns will be the primary determinant of the scope of each project. With the understanding that other environmental and ecological factors may be more important in determining the choice of activities at a particular site, generally marshes with small breeding areas or relatively good existing marsh quality will not receive major management efforts, while those that have a great deal of mosquito habitat or where the marsh is degraded or degrading could be targeted for more complex alterations. The determination of the appropriate scope of the project will be developed in a cooperative process among the land manager, the County, local environmental officials, involved regulators, and other interested parties, especially through the Wetlands Stewardship Committee.

Initial evaluations of the County's coastal wetlands project that approximately 4,000 acres of salt marsh will be found to require no water management for mosquito control purposes, for various reasons. Approximately the same amount of acreage has been identified as potential priority sites for water management, as they currently receive regular aerial applications of larvicides. The remainder of the County's wetlands will be assessed to determine any mosquito control needs over the coming years. While these longer-term management programs are being implemented, the County has identified a suite of interim and on-going maintenance activities to allow for short-term source reduction and mosquito management. The presumptive policy of the County for its wetlands is one of non-intervention in wetlands processes, generally allowing for marsh reversion, unless other considerations indicate an alternative action should be taken.

The Long-Term Plan, through copious compilation of documentation regarding the potential for impacts and the ability for these actions to result in environmental enhancements in the Draft and Final Generic Environmental Impact Statements, and the background documentation developed in the Long-Term Plan project process, will provide resource agencies with information that will

allow them to consider the proposed approaches to water management as a step forward in wetlands restoration. This will allow the County to implement more progressive means of controlling mosquito problems, reducing the use of chemicals.

As the Wetland Management Plan's progressive water management policies are implemented, the general practice will be to seek alternatives to maintenance of the legacy grid ditch systems. However, existing structures may be maintained when the following conditions are met:

- Deterioration of or damage to existing structures such as a collapsed pipe, restricts tidal flow into a marsh. Larval and/or adult surveillance may indicate a significant mosquito problem, serious enough to require control through the use of larvicide. Or:
- Failure to maintain the existing structures would result in the loss of resource values, such as fish and habitat, or loss of vegetation due to fresh water impoundment. Or:
- Failure to maintain the existing structures would result in a hazard or loss of property as a result of flooding.

Benefits to be expected include:

- Maintaining or reconstructing the existing structures will improve water circulation or provide fish habitat sufficient to reduce the need for pesticide application.
- Maintaining the existing structures is compatible with habitat values that existed prior to the failure or deterioration of the structures.
- Maintaining the structure will prevent flooding.

Constraints on any maintenance of a pre-existing ditch system include:

- Existing structures will be maintained essentially in-place and in-kind.
- Disruption of wildlife habitat due to construction will be minimized by limiting work areas and/or by using seasonal constraints.
- Listed species will not be adversely impacted.

- Interim maintenance will not lead to excessive drainage that would result in a loss of wetlands values.

- The action will not lead to increased or more direct conveyance of inputs from storm drains or other structures.

- The action will not preclude the implementation of BMPs when resources and/or institutional considerations allow.

Given the above, it is expected that less than 50 acres of tidal wetlands per year will be subject to ditch network maintenance. All maintenance will be summarized annually, and will be conducted in accordance with a Memorandum of Understanding (MOU) with the Suffolk County Department of Health Services Office of Ecology and the Suffolk County Department of Environment and Energy.

Such practices may be perceived as being in conflict with certain other planning guidances, such as the Peconic Estuary Program (PEP) Comprehensive Conservation and Management Plan proposal to stop the maintenance of existing mosquito control ditches. However, the PEP plan also stresses the need for reduced pesticide applications, and espouses IPM. IPM, as discussed above, calls for source reduction before pesticide use, which means that if mosquito populations are to be controlled using IPM, water management should be favored before pesticide applications.

1.2. Principles

In order for Suffolk County, particularly SCVC, to properly prioritize its wetlands management efforts, it is necessary to develop some overarching goals, and to set associated achievable objectives. These goals are to be identified under two guiding principles. SCVC should always act so as to preserve public health and well-being for all citizens. Secondly, SCVC should maintain and, where possible, enhance the Suffolk County environment. This can be best achieved through an IPM program, where actions taken are commensurate with the detected problems, and are selected so as to cause the least harm and reap the greatest benefits in terms of curbing the mosquito problem.

These goals and objectives will need to be reconsidered, reworked, and reaffirmed at set intervals. This will allow knowledge gained through better understanding of the wetlands systems, and experience from implementing the various management techniques, to be incorporated to improve the overall Wetlands Management Plan.

In addition, the development of a comprehensive wetlands management plan through the Wetlands Stewardship Committee will establish the foundation for a County Integrated Marsh Management program. Under such a program, marsh management for mosquito control purposes can be set in proper context, and addressed in terms of other, overriding principles of marsh health.

1.3. Scope

This document focuses on salt marshes and associated upland fresh water wetlands. This is because active water management in fresh water habitats for mosquito control is generally precluded under State wetlands regulation. The exceptions to that general prohibition would be the maintenance and potential modification of existing structures such as culverts and existing ditches, and activities associated with storm water control that are proposed as part of compliance with US Environmental Protection Agency Phase II Stormwater rules. Phase II Stormwater compliance activities are unlikely to result in much fresh water wetlands modification, manipulation, or creation on Long Island, although this is not the case elsewhere. Insofar as any Phase II actions do impact existing wetlands, however, it is anticipated that SCVC will be asked to review the plans, in which case the goals and objectives established here will serve as guiding principles for those reviews.

Nonetheless, it should be a goal for SCVC to continue discussions with NYSDEC to determine if there are ecologically sound techniques that can be implemented, at some future time, in order to reduce the application of pesticides for mosquito control in fresh water environments.

1.4. Goals

When conducting water management, SCVC is to consider the following overlapping set of goals:

1) Reduce mosquito populations

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

3) Control *Phragmites* and other invasive plant and animal species

Attaining these three goals will preserve public health and well-being while enhancing environmental conditions within the County.

It is clear that to achieve the second goal (foster biodiversity and enhance the general mosaic of ecological communities in many salt marsh settings), the third goal (control of invasive *Phragmites*) will need to be addressed. However, certain means of controlling *Phragmites* may result in unacceptable collateral ecological impacts. Therefore, the control of *Phragmites* is secondary to fostering and preserving other desired environmental features.

The reason for the existence of SCVC is to control mosquito populations and to minimize any associated disease risks in the service of the protection of health and public well-being. Therefore, it is clear that mosquito control must always be a factor in any action undertaken by SCVC. SCVC has long recognized that mosquito control, not extermination of mosquitoes, was its mission. In the 21st century, advances in mosquito control and wetlands management techniques open the possibility that SCVC can not only operate to protect the public from mosquitoes, but that it can often accomplish this work while achieving desired environmental ends. Therefore, this Wetlands Management Plan views the first two priorities as being intertwined in a fashion that precludes setting one before the other in any hierarchical sense. That is to say, SCVC will not undertake any mosquito control project without first determining there is little to no possibility of causing negative environmental impacts.

Its long history of operations in wetlands and its array of specialized equipment and expertise place SCVC in a unique position among wetlands stakeholders. While many agencies have an interest in wetlands management, only SCVC has in-house and fully funded abilities, and an associated mandate, to maintain and restore wetlands throughout the County.

A tenet of IPM is that source reduction is preferable to the use of pesticides. In addition to environmental concerns, an excessive reliance on pesticides can leave a control program vulnerable to resistance, poor application conditions, discontinuation of materials in the marketplace and other factors that can prevent control with these materials. Water management is preferred as a management tool to the use of larvicides and adulticides under IPM programs. Water management is often more difficult to implement than pesticide use. Difficulties include having greater initial costs for equipment and manpower, requiring greater and more technical environmental monitoring, having more permitting and other regulatory requirements, and often needing cooperation and assistance from organizations other than SCVC. Thus, water management generally requires endorsements from the managers of the mosquito control agency and area natural resource agencies for projects to be considered. Water management often involves structural changes to natural systems; alterations to such complex systems can lead to unforeseen results. That this can occur can make some involved parties reluctant to allow such projects to be undertaken. However, water management also has the potential to have continuing impacts on mosquito populations. This can be accomplished with little to no operational costs, with little or no collateral environmental impacts, and with auxiliary environmental benefits such as a greater mosaic of ecological communities, improved biodiversity, and even reduced *Phragmites* incursions. These projected measurable benefits, which have been achieved in other municipalities with active, progressive water management programs, have led the County to embrace the concept of modern water management, as presented in the BMP manual.

1.5. Objectives

The following are meaningful and quantified objectives that will assist SCVC in achieving its three overarching goals, by means of the stated principles.

Goal 1: Reduce Mosquito Populations

- Objective 1: salt marsh mosquito populations will be maintained at 1996-2004 levels, as measured in New Jersey light traps.

- Objective 2: the number of days that complaints associated with salt marsh mosquitoes are received will not increase despite anticipated changes in population densities and development patterns near salt marshes.

- Objective 3: control of important bridge vector mosquitoes will continue to reduce the risk of mosquito-borne disease below levels experienced in jurisdictions lacking these efforts.

- Objective 4: approximately 4,000 acres of tidal wetlands will be evaluated for water management to reduce routine aerial larviciding.

Goal 2: Preserve or increase acreage of coastal wetlands, including vegetated tidal wetlands, and to foster marine and estuarine biodiversity and a mosaic of ecological communities

- Objective 1: salt marsh management will be conducted so as to provide overall habitat diversity, generated by a mosaic of tidal creeks, ponds, low and high marsh, pannes, mudflats, salt shrub, associated fresh water wetlands, and adjacent beaches or sand berms (although every marsh may not have all habitats), providing a variety of microhabitats and ecotones, which should support appropriate plant and animal diversity, as measured by monitoring and project evaluations.

- Objective 2: there will be no net loss of vegetated tidal wetlands in Suffolk County

- Objective 3: major salt marsh restorations (those projects of at least 50 acres) will have the specific project goal of restoring significantly degraded systems and limiting larvicide applications to extreme, unforeseen circumstances.

- Objective 4: 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 eight years, and 75 percent once all priority sites are evaluated, assuming regulatory

cooperation so as to allow implementation of the necessary projects (as measured by acres of marsh treated in a year, in comparison to a baseline over the period 1999 to 2004 of 30,000 acres).

- Objective 5: similarly, adulticide use to control salt marsh mosquitoes will be reduced, in terms of application frequencies and acreage treated, as a result of the more effective control measures associated with progressive water management. This is in comparison to a baseline level of approximately 25,000 acres per year (2001 to 2004).

- Objective 6: vector control initiatives will be integrated by SCVC with other initiatives having more general marsh restoration aims, which are sponsored or proposed by organizations such as the Long Island Sound Study, the Peconic Estuary Program, the South Shore Estuary Reserve, State agencies, Towns, and other organizations, and as developed by the County itself through the Wetlands Stewardship Committee as a comprehensive Integrated Marsh Management program.

- Objective 7: SCVC will use its position as the major County salt marsh manager to assist other County departments and organizations to take steps to improve salt marsh conditions, including (but not limited to) permit issuance, appropriate controls of storm water, land use considerations, and shoreline and marine activities such as dredging.

Goal 3: Control *Phragmites* and other invasive species

- Objective 1: enhancement of salt water circulation will be a design priority where *Phragmites* expansion has been determined to occur.

- Objective 2: all major marsh restoration projects (50 acres or more) will necessarily include *Phragmites* control as a design element.

- Objective 3: county-wide, by 2017 the percentage of acres of salt marsh dominated by *Phragmites* will have decreased.

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2. OPERATIONAL STRUCTURE

Salt marsh management projects that will be addressed by SCVC must undergo thorough evaluation to ensure that the project:

- is in agreement with the goals and objectives of the County Wetlands Management Plan (as presented here and as modified through the development of a comprehensive Integrated Marsh Management program)
- is well-designed
- is environmentally sound, and
- can be implemented under current permitting requirements and strictures.

It was intended that the extensive environmental review of potential impacts associated with the proposed Wetlands Management Plan (as the wetlands management implementation element of the Long-Term Plan) along with certain specific project review activities should suffice for project evaluation. However, review of the proposed Long-Term Plan by interested parties has resulted in extensive revision associated with wetlands management processes. A primary element of the revised process is the creation of the Wetlands Stewardship Committee. This committee has charged with developing a definition of wetlands health and to use that definition to develop a comprehensive marsh management plan for the County (an Integrated Marsh Management plan). Its membership has been proposed so as to ensure that projects receive evaluation by a broad spectrum of the interested parties involved with wetlands and their membership. The Wetlands Stewardship Committee has also been given a powerful role in terms of project review for County-sponsored wetlands management. In addition, all projects associated with BMPs 5 to 15 will require additional SEQRA review prior to implementation.

Other refinements to the process of developing, reviewing, implementing, and assessing marsh management projects have been made. These changes may result in more measured implementation of progressive water management under the revised Wetlands Management Plan. The County anticipates that the revised process will lead to the selection of sound, well-

considered, well-designed, and well-executed projects to meet the mosquito management and overall marsh management needs of the County.

Discrete elements of wetlands management projects include:

- project development and design
- project review
- project implementation
- project assessment
- potentially, mitigation for unsuccessful projects

The following sections will review the proposed protocols for each element.

2.1. Project Development and Design

The initial step is the identification of a potential project. Projects can be identified in several ways. One way is for the marsh to be a priority site for SCVC, due to identified mosquito control issues warranting the use of aerially-applied larvicides. Another is for the landowner/land manager to nominate the marsh to SCVC as a project suitable for County action. A third is for a landowner or land manager to independently develop a project, and then submit it to the review process to receive Wetlands Stewardship Committee approval. Although such approval is not technically required for projects without County involvement, it may be of use in permitting processes or to support grant or other funding proposals. .

Potential project sites need to undergo some initial site assessments. The intention of the initial assessments is to develop a set of project goals. These goals can be developed in several ways. One is through land manager conceptual plans for the site. In some instances, the land manager will have well-developed management plans for a particular site. For instance, USFWS has mandates to manage its holdings so as to support migratory water fowl populations. The three estuary programs have identified certain wetlands as candidates for restoration to achieve certain environmental or ecological goals. Some of the Towns or Town Trustees, through draft Local

Waterfront Revitalization Programs or other land use planning, have identified aspects of wetlands that may require enhancement or other management. In many instances, however, specific plans have not been formalized. In those cases, site assessments made cooperatively with land managers, SCVC, and local natural resource managers can identify some draft goals to be achieved as part of the project implementation.

The collection of specific environmental information about the site is also important so that project development accounts for all key project parameters. The kinds of information that should be used in project development include:

- the need for mosquito abatement, and the means by which this was determined (from complaint logs, anecdotes and experience, larval sampling, trap records);
- ownership of the marsh and adjacent land;
- flow of salt water into the marsh (can include levels of inundation, determinations of tidal restrictions, surveying the salt water table, fresh water source determinations);
- health of the marsh (preferably using the Wetlands Stewardship Committee criteria);
- presence or absence of listed species; and,
- general depictions of vegetation patterns (using photo stations or aerial photography interpretations).

Further efforts can include:

- water quality of major bodies of water and tidal creeks/mosquito ditches;
- distribution of vegetation on the marsh and along the upland edge of the marsh; and
- wildlife surveys.

The more extensive the project is likely to be, the greater the need is for good information.

Local natural resource managers at the Town or through the Town trustees need to be contacted early in the project development process. These personnel can often identify key resource issues and potential areas of local interest to the marsh manager and SCVC. Ensuring that the goals of the project are consonant with Town/Town trustee priorities is important, and is a key step in the process of ensuring that the project is less likely to have serious environmental impacts.

It is important to have early involvement of regulators in these kinds of projects. The key regulators for County projects are likely to be the NYSDEC Region I Tidal Wetlands program. As the project begins to take form and the scope of the project is being developed, informal consultations with NYSDEC may enable regulator concerns regarding compliance with the land use regulations and scope of monitoring to be minimized when formal submissions are made.

When the project goals have been refined, two more concrete aspects of the project should be developed. One is the development of objectives to determine that the project goals are realized. Objectives should contain quantitative criteria, where possible, that can be measured so as to determine if the project has been a success or not. The project goals are the conceptual basis for the project, describing the mosquito management and/or environmental and ecological reasons for conducting the project. The objectives are the determinants of the scope of the project, lying out in concrete terms exactly how the project should be evaluated. More ambitious goals and broader objectives may require more intrusive management techniques. Smaller sites with tightly scribed goals and limited objective sets may require more minimalistic water management techniques.

The second aspect of the project is tentative identification of the BMPs that will enable the goals to be met in this particular setting. The identification of BMPs is described as tentative at this stage, as the review process may lead to iterative design efforts, depending upon the reception of the proposed project by reviewer groups.

For more complex projects, an early outside reviewer of the project could be the Wetlands Subcommittee. This group was formed out of the Technical Advisory Committee to the Long-Term Plan project. It was used to develop and review the original Wetlands Management Plan. The County intends this group to be composed of local wetland experts, drawn from academia, local governments, and key non-governmental groups that have technical expertise and interest

in wetlands management. This committee would be used as a voluntary advisory group, a sounding board for design elements, so that a feedback process could help technical designers meet concerns and to address potential issues prior to formal reviews. In addition to serving as an advisory group to project designers, the County would like to see the Wetlands Subcommittee serve as a technical advisor to the more policy-oriented membership of the Wetlands Stewardship Committee. In addition to whatever staff the Wetlands Stewardship Committee may have, the Wetlands Subcommittee could advise the Wetlands Stewardship Committee on design elements of particular projects, or provide technical input as the Wetlands Stewardship Committee develops its marsh health definition, and develops the County-wide, comprehensive Integrated Marsh Management plan.

Finally, adequate plans and written proposals to meet various reviews should be developed (as discussed below). It is likely that more complicated projects may undergo an iterative design process, passing from project development to review and back again, as input is received from the reviewers.

2.2. Project Reviews

Interested parities that will be involved in project oversight and formal reviewers of project plans (whether to meet County or permit requirements) will include some or all of the following organizations and groups:

- Town planning departments
- Town natural resource/marine departments
- Town Trustees
- Suffolk County Department of Publics Works, Division of Vector Control (SCVC)
- Suffolk County Department of Health Services (SCDHS), Office of Ecology
- Suffolk County Department of Environment and Energy (SCDEE)
- Suffolk County Department of Planning (SCDP)

- Suffolk County Council on Environmental Quality (CEQ)
- Estuary program offices (LISS, PEP, SSER)
- New York State Department of Environmental Conservation (NYSDEC) Region I Office of Permits
- NYSDEC Region I Tidal Wetlands Program
- NYSDEC Marine Resources Bureau
- New York State Department of State (NYSDOS) Division of Coastal Resources
- US Army Corps of Engineers (USACOE), District 2
- National Marine Fisheries Service (through USACOE)
- US Fish and Wildlife Service (USFWS) (through USACOE)
- Interested and involved non-governmental organizations, such as The Nature Conservancy or Group for the South Fork
- The Wetlands Stewardship Committee
- The Wetlands Subcommittee

Not all of these will have involvement in particular projects. For larger, more complex projects, it is likely that more groups will be involved, and will want to have more input into these projects. Therefore, especially for larger, more complex projects, early consultations with involved and interested parties, even if on an informal basis, will probably serve to streamline the review process (although it may seem more cumbersome initially).

For almost all projects, it is assumed that SCVC will be involved in project design, at a minimum. SCVC has a certain level of expertise and practice in meeting the permit requirements and will develop experience with this revised review process over time. Nonetheless, the land manager should not assume that the County will manage this process

alone. The land owner/manager must be an integral member of the process, as the land owner will be required to hold all permits, and thus will have great formal responsibility for ensuring the project is acceptably implemented and evaluated.

Early contact with these involved parties can result in more than permit or process guidance. These organizations often have invaluable information regarding the sites under consideration. Especially with local agencies, it may be that early contacts result in information exchanges that lead to project modifications, and the construction of more suitable approaches to achieve the project goals and objectives.

2.2.1. Wetlands Stewardship Committee

The Wetlands Stewardship Committee is extremely important for the project review process. The County has agreed that it will not participate in any project rejected by the Wetlands Stewardship Committee. In addition, the Wetlands Stewardship Committee has agreed to address vital policy issues that will allow the creation of an Integrated Marsh Management program for the County.

The membership of the Wetlands Stewardship Committee is to be comprised of representatives from the following groups and organizations:

Estuary programs:
- LISS representative
- PEP representative
- SSER representative

State
- NYSDEC Region I
- NYSDEC Bureau of Marine Resources
- NYSDOS
- SSER representative

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 diverse and accomplished membership brings a spectrum of viewpoints and backgrounds to the Wetlands Stewardship Committee, and is intended to foster robust reviews and assessments of the projects that it reviews and the policies it establishes. At least initially, the workload for this group is formidable, and the County intends to provide staff support to enable the technical assignments of the group to be addressed (funding options are being reviewed).

The Wetlands Stewardship Committee has responsibilities in two broad areas. One is to establish important marsh management public policy. The second is to review and approve proposed projects.

The policy determinations that the Wetlands Stewardship Committee has committed to include the initial development of a definition of "marsh health" for Suffolk County. Because an agreed upon definition of marsh health has not been determined, various stakeholders may not agree on the essential considerations associated with marsh management projects. This lack of agreement means that dialog is difficult to maintain, and grievances are easy to assemble. The County would like to have an independently developed definition of marsh health that can be used to assess how potential projects might affect the settings they are proposed for.

The second major policy determination of the Wetlands Stewardship Committee is to develop a County-wide comprehensive marsh management plan. This plan is intended to build from the considerations of marsh health. At this time, it is not clear if the comprehensive plan will be conceptual or specific. A conceptual plan is likely to be somewhat less daunting to accomplish. A specific plan has the benefit of concretely addressing issues in ways that are less ambiguous. It is most probable that a plan that combines the two approaches will be best. This could be done by deriving broader categories for the County marshes in a way that makes technical sense (potentially, geographically, such as by the three estuary systems; or potentially, geomorphically, such as by fringing marshes, stream marshes, barrier island marshes, and island marshes; or in

some other fashion, such as high marsh dominated, low marsh dominated, high-low tidal range, tidally-restricted). Particular examples could then have specific management plans described for them, to serve as templates for applications at other sites. In any case, this is an important work for the County. Projects proposed for consideration by the Wetlands Stewardship Committee will need to comply with this overarching management plan. The County, since it is intended to address all marsh management issues facing coastal marshes across the County, sees this as the basis for the establishment of an Integrated Marsh Management program, similar to that in place in Connecticut. There, projects are not considered in isolation as a "mosquito control project" or a "marsh restoration project," but rather are considered in a holistic fashion that incorporates all interested parties' concerns.

In addition to these specific policy projects, the Wetlands Stewardship Committee will also be the forum through which the County will adjust wetlands management policies and practices for the Long-Term Plan. The County has intended the Long-Term Plan to be an adaptively managed plan. This means that mechanisms to adjust the Long-Term Plan, as is deemed necessary, must be identified. The County has identified the Triennial Reports as the means for changing the Long-Term Plan in consequential ways; and the Wetlands Stewardship Committee will have the responsibility for determining what water management policy, protocol, or practice changes will be included in each Triennial Plan.

The Wetlands Stewardship Committee shall also have certain defined review responsibilities for proposed projects. As defined in the Revised BMP Manual, the Wetlands Stewardship Committee will review all projects that use BMPs 10-15, and must positively approve the projects for the County to maintain any involvement. The Wetlands Stewardship Committee will review overall project goals, the project objectives, proposed designs, the means of implementation, and the assessment protocols (monitoring) proposed for the project. The committee is to evaluate the project in light of the definition established for marsh health, the comprehensive County marsh management plan, and any policy considerations associated with the representative organization (meaning that local representatives can consider Local Waterfront Revitalization Program or long-held Trustee policies, NYSDOS can invoke its Coastal Management Program, estuary representatives the respective Conservation and Management Plans, etc.). The intent is that the project designers will have thoroughly reviewed the potential

for negative impacts and mitigated them as is possible, identified any natural resource conflicts and created acceptable trade-offs to resolve or minimize these effects, and have selected project goals and objectives to further the improvement of the County's natural resources according to well-considered policies and plans. Such projects not only are more likely to be successful, but also are less likely to engender public conflicts and controversy. The Wetlands Stewardship Committee will need to formally approve projects, as mentioned, and also can make recommendations regarding further SEQRA review to CEQ (see below).

The Wetlands Stewardship Committee will also be notified regarding all other projects (save those involving marsh reversion, BMP 1). The kind of notification will vary depending on the BMPs being considered; for BMP 2, notice will probably be limited to the project location and estimated implementation date. For BMPs 5-9, more descriptive notices that sketch the project more thoroughly will be sent. In any case, the membership of the Wetlands Stewardship Committee can identify a project as requiring formal review, and cause the project to undergo the kind of review described above for the projects associated with BMPs 10-15.

The Wetlands Subcommittee shall be advisory to the Wetlands Stewardship Committee. This committee may be of use to the Wetlands Stewardship Committee as it develops the policies on marsh health and the comprehensive management plan. The Wetlands Subcommittee may also be helpful to the Wetlands Stewardship Committee to elucidate technical issues involved in natural resource trade-off considerations, or other scientifically oriented assessments.

2.2.2. Permits

Acquisition of permits, and adherence to the permit conditions, will formally be the responsibility of the landowner. However, in many (if not most) instances, the County will be involved in the development of permit applications, and in helping the landowner to meet permit obligations.

No project shall be considered by SCVC for implementation without the necessary permits. It should be understood that in some instances, projects on federal lands or sponsored by federal agencies may be exempt from the need to acquire state and local permits, according to interpretations of legal sovereignty. Similarly, projects on State lands or sponsored by State

agencies may be exempt from local permitting requirements, and projects on County lands or sponsored by County agencies may be exempt regarding other local permits. Nonetheless, it is expected that all agencies will respect the regulatory authority that could potentially be raised by any level of government. Collaboration and cooperation are expected to be the means by which the design of the project is reached. Respect for the expertise and concerns of regulators can allow projects to be developed that otherwise might collapse due to agency concerns or requirements.

The primary permitting agencies for water management projects are NYSDEC and USACOE. It is strongly recommended that SCVC meet with USACOE on an annual basis. At this meeting, the USACOE can be informed of proposed new projects, and the status of past projects. This will allow for smoother implementation of whatever permitting process the USACOE deems necessary for particular classes of actions.

NYSDEC has evinced much interest in the potential for changes to the current marsh management program. NYSDEC offered many specific comments on the DGEIS and the associated May 3, 2006 versions of the Long-Term Plan and the Wetlands Management Plan. The tables of BMPs have been altered to meet concerns raised by NYSDEC regarding the potential regulatory classification of the BMPs. Because of this strong interest, it will be of utmost importance that early and frequent meetings occur on potential wetlands management projects.

It is important that NYSDEC be given good reasons to consider potential projects. In order for this to occur, projects should be presented to NYSDEC in a framework that fits its regulatory concerns. In order for this to work well, projects need to consider the salt marsh functions that NYSDEC has been given responsibility to protect and preserve:

- Marine food production
- Wildlife habitat
- Flood and hurricane and storm control
- Recreation

- Cleansing ecosystems
- Sedimentation control
- Education and research

Ensuring that permit applications focus on project goals and objectives, clearly describe how the project is to be evaluated (including determinations of whether the project was a failure or a success), and parsing the project clearly in terms of the essential salt marsh functions will assist NYSDEC in coming to a determination regarding the feasibility of permitting a project or not.

2.2.3. SEQRA

The FGEIS clearly laid out the conditions under which additional SEQRA reviews must be conducted. Any project involving BMPs 5 to 15 will undergo additional reviews, ranging from an Environmental Assessment Form filing to the preparation of a Supplemental Environmental Impact Statement. The CEQ, albeit with the recommendation of the Wetlands Stewardship Committee, is the final arbiter of the need for and extent of SEQRA reviews for County projects.

It is likely that all NYSDEC permit reviews will require a SEQRA determination. Unless the County has engaged in coordinated review through its own SEQRA process, NYSDEC will conduct its own evaluation of its permit decisions.

2.2.4. Other Reviews

Projects may receive reviews under other agency processes and needs. The presence of an approved Local Waterfront Revitalization Program will trigger local review of projects in many cases. The estuary programs and other policy groups may wish to evaluate projects separately from the Wetlands Stewardship Committee procedures. The scope and nature of such reviews will be determined on a case-by-case basis, most likely. As discussed above, the more complex and ambitious a project, the more likely that additional reviews will be offered.

2.3. Project Implementation

Once a project has been sufficiently reviewed and has received all necessary permits and permissions, it can move towards final technical design. Any project that seeks to have SCVC involvement in construction should have SCVC involvement in the design phase. At this time, the practical experience of SCVC in marsh management and manipulation would serve as an asset to wetland projects. Following the initiation of the Wetlands Management Plan, it is expected that SCVC expertise will be augmented by even more practical experience.

SCVC has the capabilities to design major projects of all kinds. The Long-Term Plan expects to augment the technical staffing at SCVC to enable it to undertake more projects, with the potential for projects to be more complex than has been the case hitherto. It is likely, however, that the Wertheim National Wildlife Refuge Wetlands Management project represents the most complex project likely to be considered here in Suffolk County, although some technical aspects of that project and its design may be addressed in a more sophisticated fashion in some future work.

The design process is meant to be collaborative. SCVC will have certain preferences to meets its agency goals. However, many natural resource needs can be addressed while allowing mosquito control needs to be satisfactorily addressed at the same time. It is a fundamental precept of this Wetlands Management Plan that the landowner/land manager is the determinant of the overall approach of the project, in conjunction with any regulator interests. The degree to which various natural resource concerns are addressed is the province of the landowner/land manager. SCVC will use its expertise to suggest various options that can be used to meet overall goals selected for it. SCVC's experience will also allow it to practically determine the scope of the project, and enable issues such as timelines, construction resource needs, and funding to be better estimated by the project sponsor.

The design process will involve drawing from the BMP Manual, in light of project sponsor needs and goals. The BMP Manual is not intended to be restrictive, but rather to serve as a collection of methods that have been shown to achieve certain ends. They can be modified or adapted to meet individual sites needs, or as project goals require. Each marsh has individual characteristics that may require modifications to past marsh modification implementations, to ensure that the

project plans are optimal, and that the proposed modifications have the greatest chance of success. Cookie cutter approaches of past marsh modifications may lead to many failures, due to site specific conditions that do not mesh with archetypes.

Final technical design must be in keeping with all representations made to the various review agencies.

Involvement in this process assumes that SCVC will assist in construction. With that understood, it is still necessary that the landowner maintain an active role in construction oversight to ensure that project goals and objectives are followed, and that the project design is adhered to. Deviations from designs to meet site setting particularities are understood to be necessary; however, major changes from approved designs will not be allowed absent approvals from those agencies involved in review processes.

All projects will require "as built" drawings (or other forms of project representations) to be generated. The as built plans will be submitted to all reviewing agencies as a means of ensuring that the project that was approved was the project that was implemented.

2.4. Project Evaluation

The development of a set of project goals, and associated, quantitative objectives (where possible), is intended to allow for a clear identification of project success or failure. Monitoring the identified parameters that define the objectives should allow the County and its reviewers to determine whether or not the project has attained the goals it set for itself. Monitoring is also conducted to ensure permit conformance. In addition, monitoring under the Integrated Marsh Management program will determine compliance with Wetlands Stewardship Committee marsh health and marsh management plan guidelines.

Thus, the development of appropriate project monitoring protocols is necessary for every project. NYSDEC has correctly identified a major fault in almost all water management projects undertaken by a variety of organizations in Suffolk County over the past 20 years. That is the lack of appropriate monitoring for these projects. This continuing failure must be addressed, and the County has set forth this overall project development approach to ensure that monitoring is integral to all projects. The County believes that the use of the goals and quantitative objectives

(intended to derive measurable monitoring parameters) is a conceptually sound and imminently practical approach to the usually difficult process of identifying appropriate monitoring scopes for projects.

All reversion projects will also be carefully monitored. Through remote sensing, the overall area of vegetated marsh and gross measures of individual communities (low marsh, high marsh, mixed vegetated areas, and *Phragmites* areas) will be quantified. It is intended that remote sensing measurement be taken at intervals ranging from one to three years on a County-wide basis. Trends will be developed, and it will be determined if the trends indicate wetlands degradation. A site investigation will be undertaken to determine if reversion has been a factor on the impacts.

In practical terms, it is likely that agencies such as Town natural resource departments, the SCDHS Office of Ecology, and/or Cornell Co-operative Extension are best equipped, and have the most appropriate kinds of experience, to conduct the kind of monitoring that is likely to be required. Various environmental consulting companies and some non-governmental organizations also have the required expertise.

2.5. Mitigation for Unsuccessful Projects

It is possible that certain of the identified objectives may not be attained for certain water management projects. In these instances, the County is proposing that a three-part procedure be followed to determine how the failure to attain the objectives can be mitigated. These steps are:

- identify the problem
- identify and implement a mitigation of the problem
- continue to track the project through appropriate monitoring

In most cases it is assumed that the implementation of the project resulted in a failure to achieve an appropriate objective (one that was properly measured and analyzed). The inability to meet the objective must be analyzed, and determined not to be the result of measurement or laboratory error. In that case, the process associated with the objective needs to be identified, and the problem clearly characterized.

Once the problem is identified, appropriate mitigation steps must be identified. This will probably include revisiting the implementation of the original design, to determine if the planned project was properly constructed, designed, and implemented. Technical support from the Wetlands Subcommittee and other outside experts may be useful at this juncture to ensure that the design analysis process was appropriate.

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. 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 Wetlands Stewardship Committee; it also seems likely that review by the Wetlands Subcommittee leading to concurrence with the proposed remedial plan would assist in gaining Wetlands 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.

On completion of the mitigation implementation, monitoring needs to be continued to ensure that the revised project goals and objectives are met.

2.6. Summary of Wetlands Project Processes

Figure 1 displays the hierarchy of Best Management Practices, as discussed in the BMP Manual. Note that Management Activities with the Potential for Major Impacts trigger Wetlands Stewardship Committee review in all cases.

Figures 2-6 display the major review activities associated with the five major classes of wetlands activities. NYSDEC permit requirements, Wetlands Stewardship Committee review and noticing, and SEQRA requirements (per the FGEIS) are displayed.

Figure 1. Overall Hierarchy of Proposed Best Management Practices

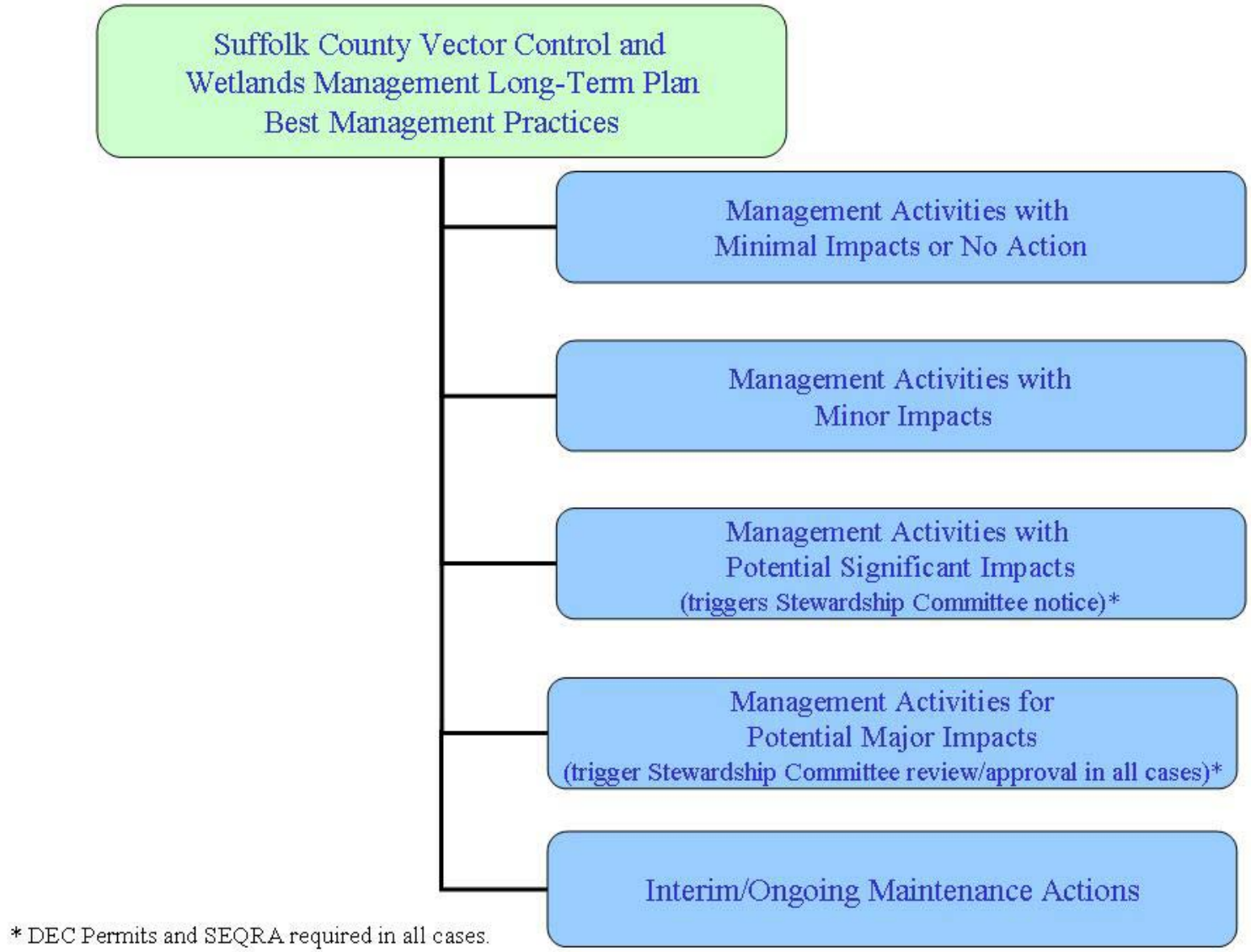


Figure 2. Review Process for Management Activities with No or Minimal Impacts

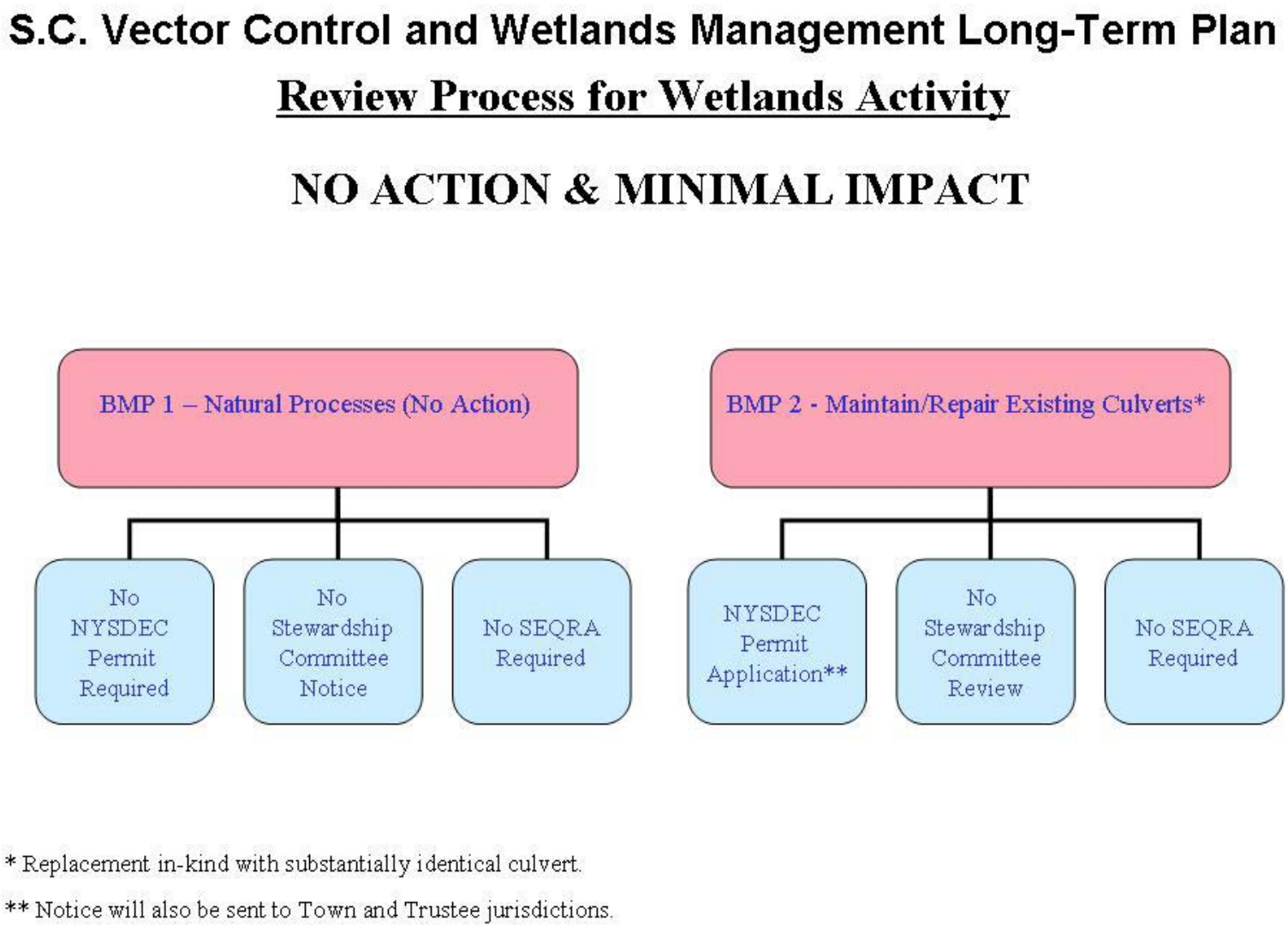
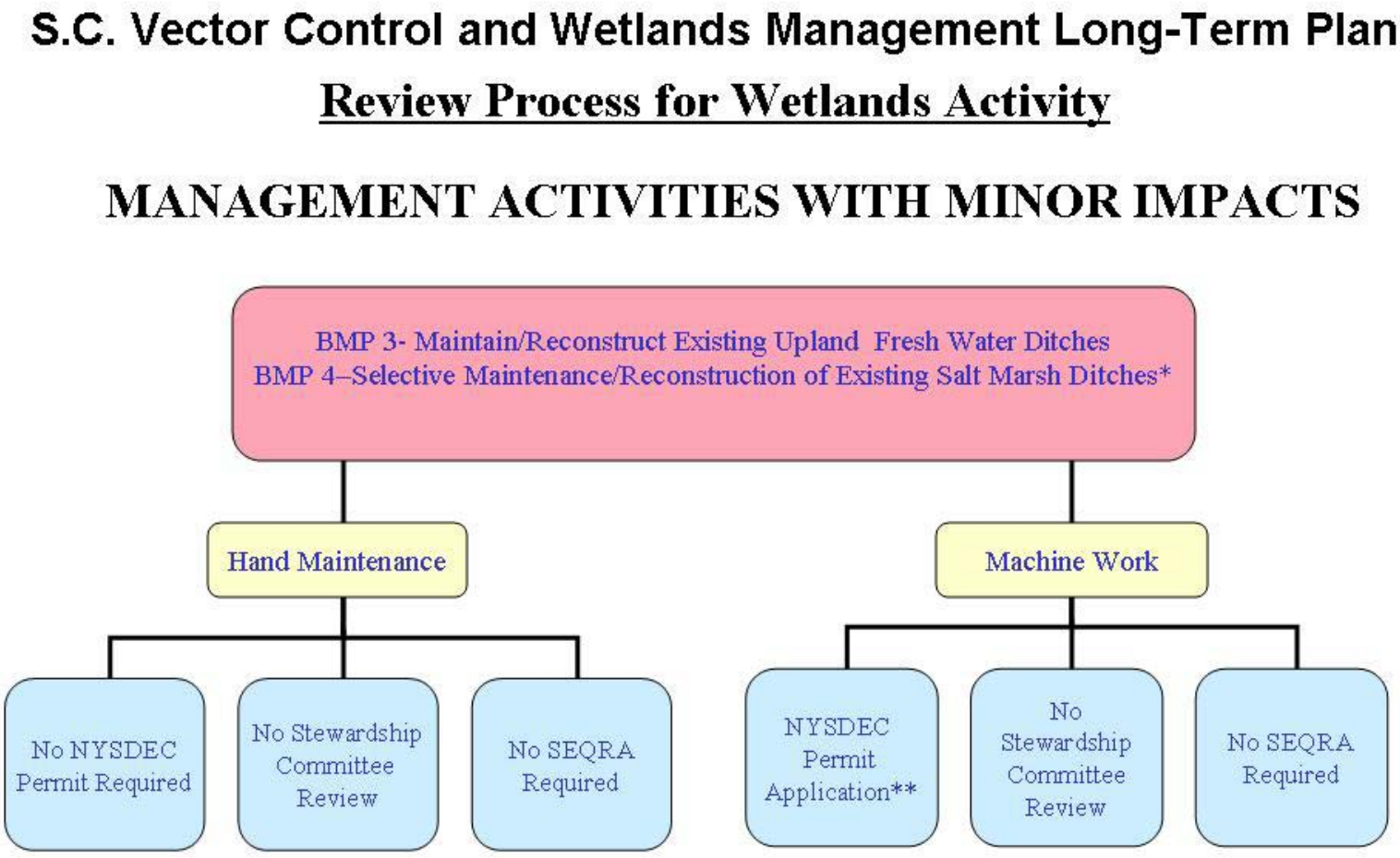


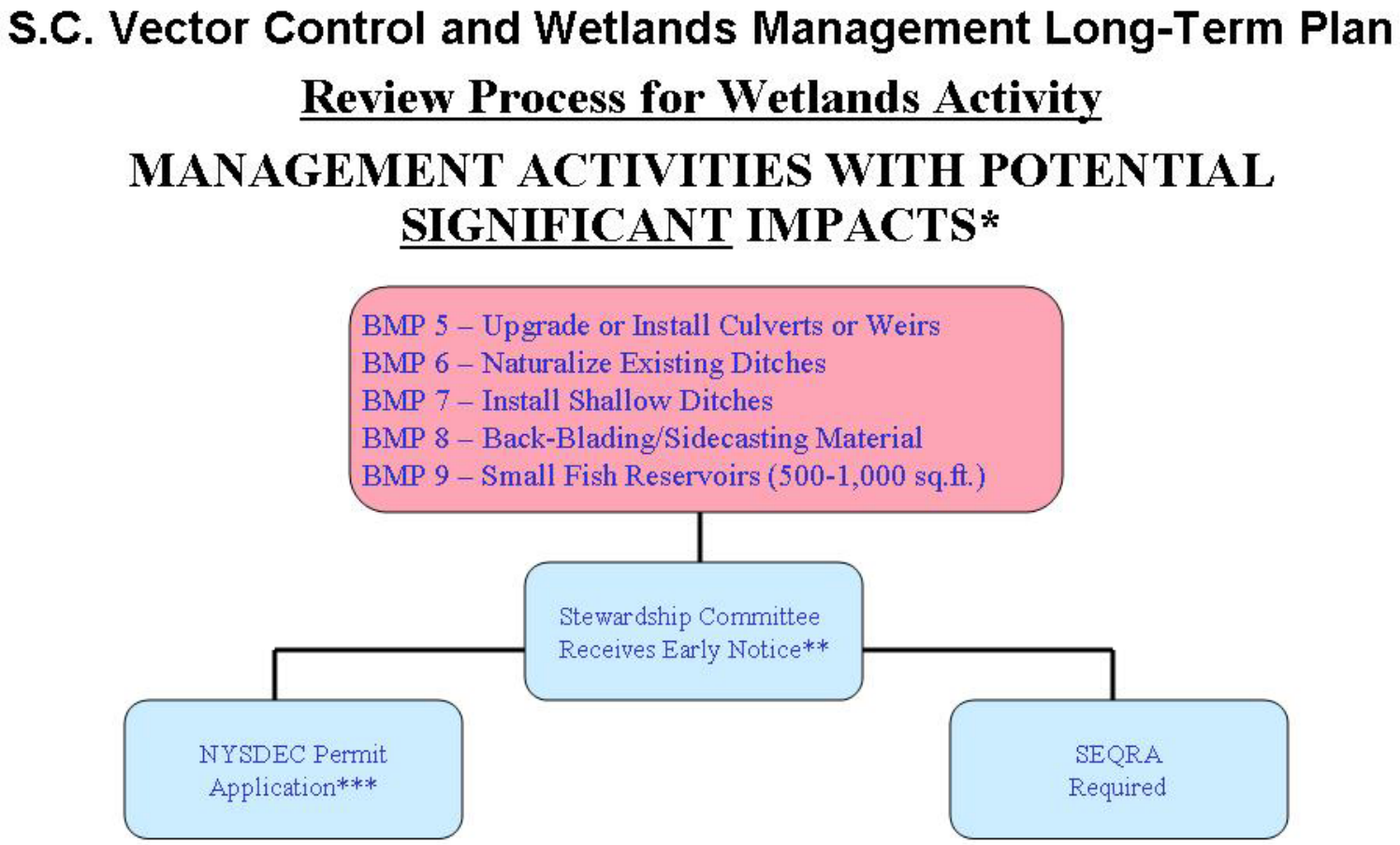
Figure 3. Review Process for Management Activities with Minor Impacts



* 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 4. Review Process for Management Activities with the Potential for Significant Impacts

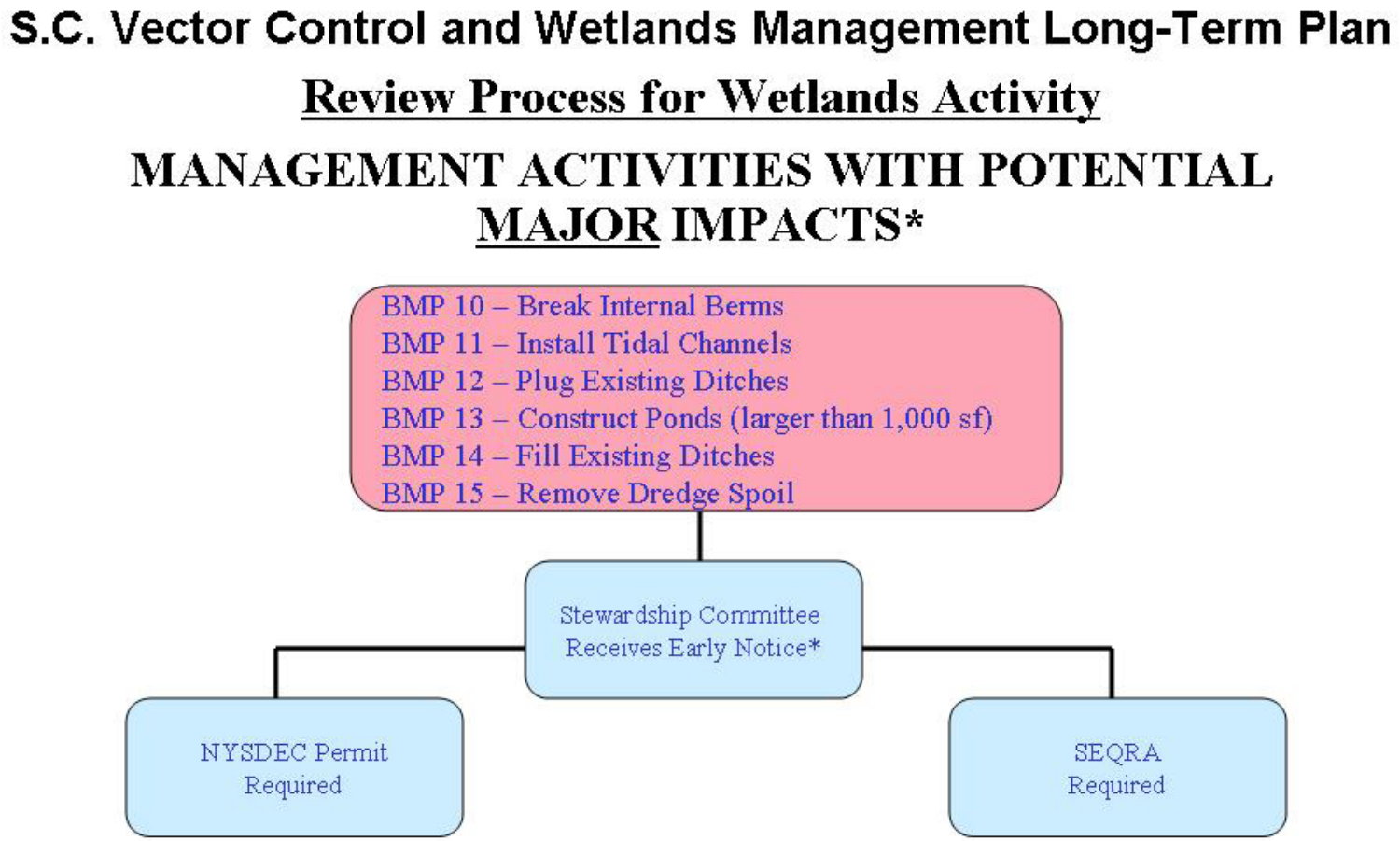


* In former plan drafts, BMP's 5-9 were designated "minor impacts" unless they affect 15 or more acres. In the current plan all are presumed to have "potential significant impacts," irrespective of size.

** 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.

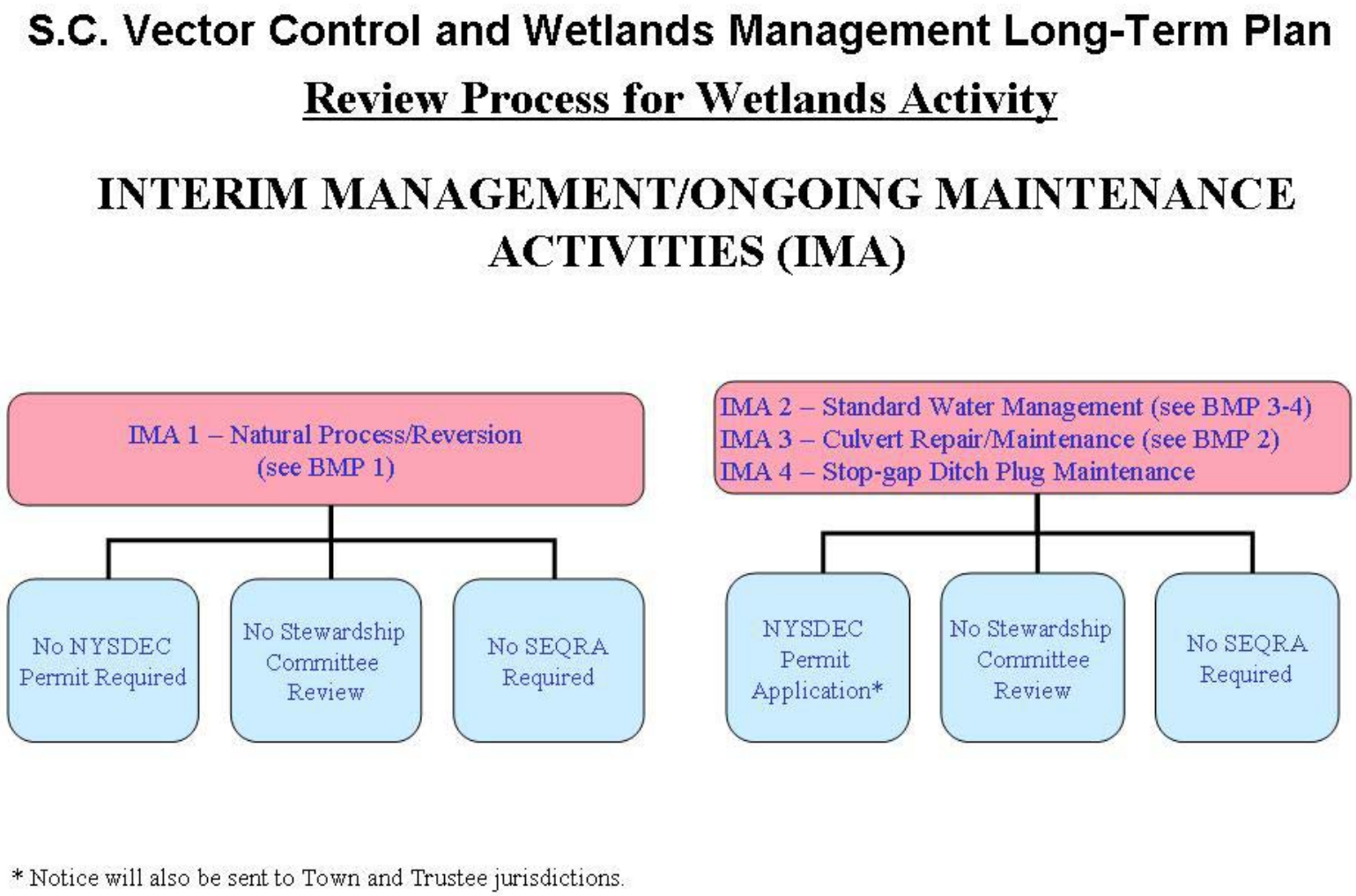
*** Notice will also be sent to Town and Trustee jurisdictions.

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



* Includes representation from local jurisdictions.

Figure 6. Review Process for Interim Management/On-going Maintenance Activities



3. ACTION HIERARCHY

The BMP manual (see the Appendix) outlines how the needs of SCVC will be met through wetlands management and restoration projects. As stated above, the manual is intended to be a flexible guide, not a cookbook. Specific implementations at any site will be dependent on site-specific factors, and landowner/project sponsor requirements and desires.

The BMP Manual is organized hierarchically, first presenting those actions that are likely to cause the least change to the existing wetland, followed by those that are likely to have greater impacts, but may be the most appropriate action in terms of goals of the project and/or wishes of the landowner/manager. This structure was adopted so that decisions could be made in a setting where it is understood that it is preferable, in many situations, to try to meet project needs while impacting the existing environment least.

Nonetheless, it is not certain that it is preferable to select projects on the basis of causing the least disturbance to the existing environment. Where the existing marsh has been judged to be degraded, it is likely that particular project goals will include enhancing the existing environment so as to upgrade marsh functionalities. Therefore, it is entirely possible that projects will be selected because they promise to result in changes to the existing marsh. All marshes on Long Island have been subjected to some form of manipulation and management. More than 95 percent of all remaining salt marshes in Suffolk County were grid ditched for mosquito control purposes. In many instances, it may be the judgment of the land manager, reviewers, and regulators that more alteration of existing conditions has the potential to meet site-appropriate goals for management of a particular marsh. At such times, selections of BMPs will be made from the ones lower on the hierarchy rather than those that appear to have the least potential impacts. This, for example, was what occurred during the project design of the Wertheim demonstration project. Both USFWS and NYSDEC determined that more extensive changes to the existing marsh were in order so that particular natural resource needs might be fulfilled. USFWS wanted to have larger amounts of open water, with particular ponds exceeding certain sizes, in order to maximize potential water fowl and other migratory bird usage of the marsh. USFWS wanted as many existing ditches to be filled, for aesthetic reasons and to remove an aspect of the extant marsh that was clearly unnatural. USFWS also wanted to try to enhance

back-marsh salinities in order to affect the spread of *Phragmites* across the marsh. NYSDEC was concerned with many elements of the preliminary designs, but especially wanted open connections between in-marsh waters and the Carmans River-Great South Bay, in order that estuarine fish might continue to have foraging, nursery, and refuge access to the marsh interior. Meeting these concerns determined the selection of the final design elements, which certainly exceeded the scope of the project as initially conceived by SCVC. However, the selected final design also intentionally met SCVC concerns regarding elimination of mosquito breeding habitat in the high marsh, and the creation of killifish access and refuges in the areas where breeding may not have been entirely eliminated by the physical alterations made to the marsh. Thus, cooperation among key players resulted in an approach that holds the promise of meeting expectations of all who were involved.

The following is a summary presentation of the BMP Manual. All manipulations of complex systems such as salt marshes have some potential for serious impacts to the systems. Nonetheless, theoretical considerations, local history of activities, and experiences drawn from other jurisdictions have enabled the County to more clearly distinguish between potential impacts of the various BMPs. The BMPs have been hierarchically divided into five kinds of action:

- those with the potential for no or minimal impacts

The presumptive interim action for County wetlands is reversion. Non-intervention in natural systems can reap environmental benefits, although extensive monitoring of these sites will be conducted to ensure impacts do not occur before long-term restoration management plans are adopted.

- those with the potential for minor impacts

These activities involve maintenance of existing ditch systems, either in fresh water or salt water settings. Nearly all of Suffolk County's marshes were ditched at one time or another. These ditches may very often have value as a source reduction measure for mosquito management. Where the general marsh setting has been judged to provide the kinds of functions that it is expected to, and there is a localized, excessive mosquito breeding problem that may impact

human health, in conjunction with hydrological failure of the existing ditches, it is possible that selective, limited maintenance of the ditches will be the kind of action that should be pursued. Needs for additional natural resource enhancements may result in selecting against ditch maintenance. No ditch maintenance will occur without review of the project by SCDHS Office of Ecology and SCDEE. In addition, the concerns and issues of local agencies and other interested parties will be cooperatively and appropriately addressed. In any event, the County projects that the maximum area of salt marshes affected by ditch maintenance each year will be on the order of 50 acres – including acreage addressed under Interim Management/Ongoing Maintenance Actions. Given that the County has an inventory of approximately 17,000 acres of salt marsh, it is clear that the Long-Term Plan does not envision ditch maintenance being a major marsh management tool for SCVC. In no case does the Wetlands Management Plan call for the construction of new grid ditches.

- those with the potential to have significant impacts

The activities may change the system hydrologies in more significant ways. This brings with it the potential for more serious impacts to the system – although most implementations in other settings have not caused serious environmental impacts. Such activities will necessarily undergo further SEQRA review.

- Those with the potential for major impacts

Actions that risk major impacts to the marsh also hold the potential for major improvements to key attributes of the marsh ecosystem. The determination of land managers and involved regulators that the reward is worth the risk is necessary for the implementation of any of these BMPs. These activities will also necessarily undergo further SEQRA review.

- interim actions

As mentioned above, the presumption interim action is for reversion of the marsh, through a policy of non-intervention management. Interim actions are only selected because a preferred alternative cannot be implemented. At certain sites, when some degree of water management is needed, and, in some cases, where the need is carefully documented, ditch management may be

undertaken. As discussed above, the sum of BMP and IMA ditch maintenance is expected to sum to less than 50 acres in any particular year of the Long-Term Plan.

The following five tables, drawn from the BMP Manual, provide some details regarding these groups. The BMP Manual itself provides much more detail and explanation regarding these choices.

Table 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 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 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. 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. Interim Management/On-going 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.

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4 IMPLEMENTATION

The County believes that aggressively implementing the actions described above would result in benefits to the County and its wetlands. For one, it appears there is a confluence of available funds, through federal, State, and local restoration sources to allow for fiscally reasonable implementation of the Wetlands Management Plan. Secondly, implementing source reduction would lead to large reductions in larvicide use across the County. Thirdly, the experiences in other jurisdictions indicate that the County might expect to reap significant environmental and ecological benefits from implementing more progressive forms of water management in its marshes. However, two important factors have tempered County enthusiasm.

Regulators, especially those at NYSDEC, have been very cautious regarding water management projects proposed under other management programs. This stems from several general considerations:

1. Jamaica Bay, which has been manipulated in many ways over the past hundred years or so, has experienced ongoing losses of salt marsh since the early 1900s. However, the loss rates have accelerated recently, leading to very sudden losses of large expanses of salt marsh. The processes driving this wetland loss are not yet completely determined. It is not clear if the wetlands are disappearing because of actions outside of the marshes that are impacting them, or because of forces acting within the marsh itself (or, some combination of the two). Therefore, it is far from clear that the condition(s) that may be causing the problem is (are) unique to Jamaica Bay. This makes regulators loathe to allow actions that may create some of the conditions found in Jamaica Bay.

2. Many natural resource specialists think many salt marshes in Suffolk County are functioning well, in terms of certain specific ecological services such as providing fish habitat. Alterations to existing conditions could lead to diminishments of this or other functionalities.

3. NYSDEC has a legislative mandate to ensure that there is no loss of salt marsh acreage. Salt marsh acreage is measured in terms of vegetated areas. Therefore, projects proposing to add to surface waters within a marsh are in potential conflict with State law.

4. Local regulators have expressed concerns that some proposed projects have not been well defined or have not had goals and objectives clearly expressed.

5. Because of a lack of dedicated resources, some past marsh manipulations have not been well-documented, and have not been shown to have met goals and objectives associated with them. Regulators do not want to allow projects to be implemented without assurances that the success (or failure) of the project will be demonstrable.

To address the concerns raised by interested parties during the DGEIS comment period, the County expanded the project review process, strengthening the role of the Wetlands Stewardship Committee, and requiring the production of a definition of marsh health to drive project evaluations. In addition, the County has embraced the concept of creating a comprehensive marsh management plan, to establish an Integrated Marsh Management program. This program will ensure that marsh management is driven by concerns other than merely those associated with mosquito control. Finally, the County has determined that additional SEQRA review for those projects using BMPs 5 to 15 is warranted.

The County believes that this more deliberative approach to water management, coupled with successful implementation of a few key projects, will allow for the kind of projects envisioned in the Wetlands Management Plan to be implemented. However, it is clear that they cannot be implemented over the more aggressive schedule proposed in earlier iterations of the Wetlands Management Plan.

There is one major barrier towards implementation of the BMPs that the County clearly has no control over. That is the NYSDEC ownership of many salt marshes throughout the County, especially a great many sites identified as containing mosquito breeding problems. As a measure of this, approximately 40 percent of County aerial larviciding occurs on State lands with a little more than 25 percent occurring on State Tidal Wetlands. NYSDEC has a regulatory requirement to execute a process called "Unit Management Plans" for its holdings, prior to making major management decisions about them. This is intended to be a public process, with formal filings requirements and hearings. It is designed to ensure that the State manages its lands in such a way as to account for the sometimes divergent opinions about the best means for the lands to be

used and kept. Under the best conditions, the process requires at least a year to complete, if the resource managers involved in the process can devote extensive time to it.

Unfortunately, NYSDEC Region I resource managers are almost exclusively assigned to permit assessments and similar regulatory needs. In addition, Albany has not made it clear whether each Tidal Wetland area will need to be assessed separately, or if a more generic assessment and plan can be undertaken. Therefore, due to a lack of personnel and policy determinations, no Tidal Wetland has undergone the Unit Management Plan process yet, nor is there any likelihood of the process occurring in the foreseeable future. This limits the scope of the Wetlands Management Plan, and handicaps its overall goal of reducing pesticides applications.

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5. RESOURCE ALLOCATIONS

The BMP manual describes personnel and equipment needs associated with the kinds of actions considered. The Long-Term Plan discusses possible reconfiguration of SCVC to meet the needs and demands of the Wetlands Management Plan outlined here, as well as other SCVC requirements under the overall Long-Term Plan.

This requires additional personnel to meet responsibilities. The priority position for water management is the principal engineering aide, to permit the quick production of accurate project drawings to address new technical needs. The second priority would be the Director of Natural Resources, to allow for expanded planning for future projects. Another important component of the wetlands management approach is the Assistant Civil Engineer. Other identified positions are important for SCVC to meet all of its assumed responsibilities under the proposed plan.

In the 2006 County budget, the County Executive added two positions to SCVC (an Entomologist and an Engineering Aide), which were described as the highest priority positions needed to begin implementing the Long-Term Plan. The Engineering Aide had been described as the top priority for initiating the Wetlands Management Plan. These positions are to be funded from Quarter-cent Fund revenues.

Positions identified by SCVC to meet needs for the Long-Term Plan appear to require approximately $600,000 in salary commitments at entry level salaries, if all were to be filled. Approximately half of that salary commitment would appear to meet the requirements associated with Quarter-cent funding, if available. Staff associated with the on-going construction-restoration activities in wetlands may also be eligible for cost sharing under various environmental restoration funds at many levels of government.

The Wetlands Management Plan, as currently constituted, will require the purchase of a 16-inch rotary-arm ditcher attachment ($25,000), a long-reach excavator ($125,000 - $150,000), a four-foot wide grading bucket for the excavator ($10,000), and two personnel transporters (at $15,000 each). The justifications for these purchases are given in the BMP Manual. This $200,000 capital purchase may be recoverable through marsh restoration grant opportunities.

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6. TIMELINE

The original intent of the Wetlands Management Plan had been to assess all of its salt marshes within the next 10 years (by 2015) and to implement the identified projects within 12 years. This is no longer feasible.

It should be remembered that the intent of all these marsh management activities is to drastically reduce the use of pesticides for mosquito control. The County envisages that the acreage of larvicide applications will be reduced by on the order of a third within eight to ten years, and approximately 75 percent by the end of the implementation period (on the order of 15 years). This goal will be measured in terms of acres of marsh larvicided over a season. The baseline is 30,000 acres which is the approximate acreage receiving larvicide applications for the 1999 to 2004 time period. This results in a target goal of reducing the area larvicided in the County to 7,500 acres by the end of the planning period including repeat applications at the same sites. The calculation is based on the individual applications, so that if 30 acres of a 100 acre marsh were larvicided twice (once in June, and once in August), this would be recorded as 60 acres of larviciding. Area treated is used as the measure because chemical formulations can change, making amounts of pesticide a potentially unreliable indicator. The acreage of applications is preferred over the area of marsh receiving treatment, or the acreage of marsh as a whole, because the application acreage will accurately reflect application frequency and decreases in the areas needing treatment. Meeting these goals assumes that permits for these kinds of projects, as outlined by the BMPs, were received so that progressive water management has been considered for implementation across the 4,000 acres of marches that currently receive aerial larviciding.

At this time, the County believes that wetlands restoration work will be restricted to the Wertheim National Wildlife Refuge and Suffolk County holdings for the period 2007 to 2009. Continuing partnership with USFWS is feasible for the following reasons:

- USFWS wants to have restoration work conducted across the marsh, and has a mandate to reduce/eliminate the use of pesticides.

- USFWS Region 5 has an interest in exploring different means of conducting progressive water management. This could enable the County to explore implementation of different BMPs at some other areas of the Refuge.

- Monitoring associated with the current demonstration project and work conducted by USFWS itself on the Refuge may allow the County to meet current pre-project monitoring requirements of NYSDEC more expeditiously.

County holdings are also sensible sites for low impact, demonstration-type projects, as the County program managers, due to internal leadership from the County Executive's branch, can be expected to agree on management priorities.

The County intends to implement all of the processes and procedures described in Section 2 through 2009 (meaning that a comprehensive marsh management plan will be in place by that time). In practical terms, that means that baseline monitoring of potential other sites for marsh management might begin in 2008 to allow for the possibility of at least some other site work beginning in 2009.

7. PRIORITIZED WETLANDS

Suffolk County has approximately 17,000 acres of tidal wetlands. Approximately 4,000 acres of salt marsh (as measured by the total area of at least 46 distinct salt marshes) is larvicided on a consistent basis using aerial applications. These 46 sites represent major, persistent mosquito breeding problems. They clearly are the priority sites for SCVC to address, in order to significantly decrease its use of larvicides. Table 6 lists these marshes (by Town). Selection of major projects for progressive water management for mosquito management purposes is almost certainly going to be from Table 6. It needs to be understood, however, that most of the major mosquito breeding problems in the County, as defined by the need for persistent aerial larviciding, will be addressed by projects that do not rise to the level of major salt marsh alterations.

Table 6. Aerially-Larvicided Salt Marshes

Town	**Marsh**
Babylon	Captree Island East of Robert Moses Causeway Captree Island West Cedar Beach Gilgo Gilgo Island Helicopter Island Oak Beach/Sore Thumb Oak Island West Gilgo
Brookhaven	Beaverdam Creek Fireplace Neck/Manor of St. George Hedges (Abbotts) Creek Johns Neck Creek Lyman Marsh Mastic Beach Pattersquash Island Sayville Yacht Club Smith Point North Stillman Creek Wertheim NWR
East Hampton	Accabonac Harbor Napeague Harbor
Huntington	None

Town	Marsh
Islip	Captree Island East of Robert Moses Causeway Clam Pond Heckscher State Park/Quintuck Creek/Scully & Webster Estates/Scully Audubon/Islip Preserve Gardiner Estate/Gardiner Park Ludlows Creek/Benton Bay Namkee Creek Nature Conservancy Isbrandsen State TW/ Admiralty Island Quintuck Creek Pepperidge Hall State TW Pickman Remmer State TW/Idle Hour Seatuck NWR Timber Point State TW West Sayville/Indian Creek/ West Oak Recreation
Riverhead	Baiting Hollow Indian Island
Shelter Island	None
Smithtown	Sunken Meadow
Southampton	Iron Point Moneybogue Bay North Haven/Short Beach North Sea Harbor Shinnecock Bay, South Side/Meadow Lane/Westhampton Dunes Stokes-Poges/Jagger Lane
Southold	East of Pipes Cove/Pipes Neck Creek West of Pipes Cove/Kerwin Boulevard

Similarly, it seems fairly certain that several marshes in the County do not and will not, as can be foreseen, constitute a mosquito problem. This is not to say that these marshes do not breed mosquitoes. However, some of the sites are off-limits for marsh management, and others do not have enough people in close enough proximity to create a mosquito problem. Some of these marshes do not seem to breed large numbers of mosquitoes under any conditions. Because of this, these marshes will not be considered by SCVC for marsh management. The marshes are listed in Table 7.

Table 7. Non-Intervention Marshes (Marshes with no SCVC Mosquito Problems)

Town	Marsh
Babylon	Captree Island East Captree Island West Cedar and surrounding islands Eldar, Great and Helicopter Island & Bay Islands Seganus Thatch, Oak Island West Cedar Island Complex

Town	Marsh
Brookhaven	East Fire Island Flax Pond Great Gun Marsh Mt. Sinai Harbor Otis Pike Wilderness Area Ridge Island Stony Brook Harbor Wading River West Watch Hill
East Hampton	Gardiners Island Northwest Creek
Huntington	Crab Meadow Lloyd Neck, Caumsett State Park
Islip	Captree Island East of Robert Moses Causeway
Riverhead	Wading River
Shelter Island	Mashomack Forest Preserve
Smithtown	Nissequogue River Stony Brook Harbor
Southampton	Cowyard Beach to Goose Creek Hubbard Creek Jessup Neck Robins Island Sebonac Creek
Southold	None

The marshes in Table 7 may be considered for restoration for other, non-vector control reasons. For example, Crab Meadow is listed as one of the marshes that currently does not exhibit a mosquito problem. It has been identified by the LISS for marsh restoration. The reason it was so identified is probably the presence of the mosquito ditches. However, those ditches may also be the reason that the marsh does not breed mosquitoes in any large numbers. Therefore, if Crab Meadow is selected for marsh restoration by some organization, SCVC may have an interest in the project. Prophylactic water management measures that meet the other needs of the restoration may ensure that the marsh continues to not support mosquitoes. Therefore, presence on the Table 7 list does not signal an absolute disinterest in a particular marsh for SCVC. The development of a comprehensive County-wide salt marsh management plan will most certainly determine additional management needs in marshes that seem to have no mosquito control management requirements.

Table 8 lists marshes that do not have a current determination regarding a need for mosquito management. These are the marshes that clearly need research to determine if a mosquito

problem requires addressing, and, if so, the optimal means of mitigating the problem while meeting all of the Goals and Objectives that have been set forth here.

Table 8. Marshes Needing Assessment

Town	**Marsh**
Babylon	None
Brookhaven	Bellport Bay State Tidal Wetlands Conscience Bay Cupsogue County Park/Swan Island Dunton Creek Forge River Harts Cove Havens Point Heils Creek Moriches Inlet Mud Creek Port Jefferson Harbor Radio Point Setauket Harbor Smiths Point Park Swan River Terrell River Tuthill Cove West Meadow Creek, Stony Brook William Floyd Estate
East Hampton	Alewife Pond and Cedar Point Fresh Pond Georgica Pond Lake Montauk Little Northwest Creek Montauk Point Oyster Pond Three Mile Harbor
Huntington	Asharoken, Southeastern End Duck Island Harbor North Cove Duck Island Northeast Side Duck Island West Side Eatons Neck, Winkle Point Huntington Harbor, West End Lloyd Neck, East Beach Lloyd Neck, South Shore Lloyd Neck, West End Morgan Estates Northport Harbor, Island and Yacht Club St. Johns Marsh, Cold Spring Harbor
Islip	Browns River State Tidal Wetlands Sexton Island
Riverhead	Browns Point Iron Pier Area Reeves and East Creeks South Jamesport Terry Creek-Meetinghouse Creek

Town	**Marsh**
Shelter Island	Cattail Pond Coecles Inlet Crab Creek Deering Harbor Smith Cove, South Ferry Town Beach West Neck Harbor
Smithtown	None
Southampton	Cold Spring Pond Cowyard Beach to Goose Creek Cupsogue County Park/Swan Island North Haven, South and East Sides Mecox Bay Peconic River Penniman Cove Penniman Creek Pine Neck Quantuck Bay Red Creek Pond Reeves Bay Sagaponack Lake Speonk River Squire Pond Stock Farm Taylor and Heady Creeks & Shinnecock Indian Reservation Westhampton Beach Wooley Pond
Southold	Brush Creek Cedar Beach Corey Creek Cutchogue Harbor, East Creek, Mud Creek, Haywater Cove, Broadwater Cove Cutchogue Harbor, Wickham Creek Dam Pond and Orient Causeway Deephole Creek Downs and West Creeks Goldsmith Inlet Park Goose Creek Gull Point and Sterling Creek Hashomomuck Pond Hippodrome Creek James Creek Jockey Creek, Town Creek Little Creek Long Beach Bay Mattituck Inlet and Creek Meadow Beach Preserve Nassau Point Orient State Park Paradise Point Reydon Shores Richmond Creek

The attached map (separate file, if an electronic version) shows the three sets of marshes (Map 1, Suffolk County Wetlands Management Plan).