10 Economic and Social Considerations

10.1. Mosquito Control and the Economy

It has been suggested that mosquito control can have major impacts on economic conditions in Suffolk County. With no or ineffective mosquito control, it is postulated that the economy would be negatively impacted in places where quality of life is reduced.

Each summer coastal communities come under attack from the most dangerous vector on earth, the mosquito (Spielman and D'Antonio, 2001). The economic value of those portions of the county's economy that would be jeopardized by a lack of mosquito control can be inferred from many sources. Tourism is an important part of the county's economy because Suffolk is an attractive place to live and visit. The county boasts 986 miles of shoreline, 185 bathing beaches, more than 70,000 acres of parkland and 38,000 seasonal homes (SCDP, 2005). The County Legislature's Budget Review Office (2003) has placed the value of the county's Atlantic Ocean beaches alone as contributing $341 million annually to the county's economy and supporting 3,855 jobs. The PEP CCMP estimated the gross revenues (in 1993) of estuarine related businesses at more than $450 million per year, and employment at 7,300 people.

It is difficult to accurately determine the impact of the elimination of mosquito control on these areas of county's economy, but it is inarguable that impacts would occur. The following section compiles some relevant qualitative information on the subject and a simple analysis of how the various alternatives may bear on the question of economic impacts.

There have been claims made that mosquito control has had a negative impact on the county's fishing industry. However, the results of a four-year investigation by consortium researchers under federal and local sponsorship indicates that mosquito control pesticides did not play a role in the lobster die-off in Long Island Sound in 1999 (Pearce and Balcom, 2005). The conclusions of the risk assessment and Caged Fish studies on pesticide impacts (see Section 7), conducted by the Long-Term Plan team, echo the conclusions of these independent researchers.

10.1.1. Tourism

Tourism is an important part of the Long Island economy, particularly in Suffolk County. In 2003, nine million people visited Long Island (Newsday, 2003). The Long Island Partnership (Island Publications, 2005) estimates that Long Island tourism employs more than 122,000 people and has an economic value of $4.88 billion. Tourism has also become an important component of Suffolk County's agricultural industry, as visitors purchase Long Island farm products directly from the producers at farm stands. "Agri-tainment" draws thousands of visitors to the county with activities including, vineyard tours and tasting, pick-your-own pumpkins, strawberries, apples, etc., corn mazes, and hayrides.

Much of the tourism industry in Suffolk County revolves around beach going and other outdoor activities such as swimming, hiking, boating, fishing, bicycling, and golf. These types of activities can be severely impacted by mosquito infestations, even without the threat of disease. People will choose not to engage in recreational activities where the presence of mosquito-borne diseases have been reported. There are a myriad of other choices individuals can make regarding recreation, vacations, and day trips.

Some tourism activities such as camping, hunting, or fishing are less impacted by the presence of mosquito infestations. Expectations for these outdoor activities do not require a mosquito-free environment and a certain amount of nuisance can be tolerated, but clearly mosquito control would improve the quality of the experience and the likelihood of re-visitation. However, risks from disease may not be tolerated, e.g., there were no complaints lodged with the County when camping areas have been closed due to mosquito-borne disease risks. On the other hand, some fishermen did complain when access to prime East End fishing beaches was reduced in the face of EEE activity in 2003 (The Fishing Line.com, posts in October 2003).

Suffolk County has been strongly lobbied by many Fire Island communities for mosquito control. Unlike the traditional "marsh shacks" actually set within island marshes in the South Shore estuary, the houses on Fire Island are largely seasonal and associated with use of the ocean and bay waterfront and related social activities. In the short summer season, the presence of

pestiferous mosquitoes and the threat of disease are not acceptable for persons seeking to engage in relatively high-priced recreation.

10.1.2. Housing Values

It has been noted that much of the "problem" associated with mosquitoes comes from people moving to where the mosquitoes are. The desire for people to live near or on the coast has increased tremendously. Housing values are market and location driven. Homes adjacent to or in the vicinity of estuarine or freshwater marshes are typically marketed as waterfront or water view, which typically places them in the upper tier of housing values. Changes in the County's approach to mosquito control could impact the market value of these homes and the dollars spent decorating, landscaping, and maintaining them.

10.1.3. Seasonal and Second Homes

Seasonal and second homeowners in eastern Suffolk County represent a significant portion of the area's population. There are 38,000 seasonal homes in Suffolk County. For example, 55,210 people live in the Town of Southampton on a year-round basis, whereas the summer population is estimated at twice that number (Town of Southampton, 2005). The same is true for other East End townships. In western Suffolk County, Davis Park, a small waterfront community on Fire Island and one of the risk assessment study sites, has a year round population of just three people, and a summer population that swells to approximately 2,000. Seasonal residents and second homeowners support a vibrant service industry as well as much of the retail and tourist trade, in coastal communities and on the East End. Quality of life issues are particularly important to seasonal residents and second homeowners as they have a choice in where they spend their time, and purchase or rent their vacation homes. Unusual mosquito activity and mosquito-borne disease can reduce the use of second homes and the associated economic activity.

10.1.4. Fishing

Fishing is an important part of the tourist and recreational economy. Much of the recreational fishing takes place in bays and harbors or just offshore in the Sound. Records of recreational fishing participation show that coastal fishing represents approximately 90 percent of all

recreational fishing effort in the State. Most of that effort is on Long Island. Four to 12 percent of participants come from out of state (Table 10-1) (NMFS, 2005).

Table 10-1. Number of People Participating in Recreational Fishing in New York

Year	Coastal	Non-Coastal	Out-of-State	Total
1994	693,483	11,624	65,055	770,162
1995	457,179	8,384	31,505	497,068
1996	490,370	10,760	38,410	539,540
1997	455,346	16,552	49,933	521,830
1998	426,974	6,252	42,494	475,720
1999	336,748	10,912	28,458	376,118
2000	468,794	11,877	19,523	500,195
2001	473,807	10,538	28,529	512,874
2002	387,247	7,647	41,223	436,116
2003	599,151	19,163	81,530	699,844
2004	582,591	19,105	75,118	676,814
Average	503,634	12,525	48,736	564,896

Recreational fishing involves a large number of individuals whose spending on the sport influences other related industries, such as boating, marinas, fishing gear and tackle, and bait shops. These individuals are influenced not only by the weather, but also by related conditions such as mosquito activity. Intense mosquito activity can be lead to a decline in recreational fishing and the businesses it supports. Again, as discussed above, activities with a strong natural component to them such as fishing tend to be more tolerant to mosquito problems.

In the fall of 1999, lobstermen in western Long Island Sound began to find dead and dying adult lobsters in their traps. This die-off was coincident with the discovery of WNV in New York City and the application of pesticides to control the disease vector, mosquitoes. It was noted that both forms of life had some similarities; these may have been overstressed, as mosquitoes and lobsters are both arthropods, however mosquitoes are Diptera (true flies – insects) while lobsters are Decapods, and so are actually not very closely related evolutionarily.

In response, the Federal government appropriated funds to research the cause of this impact to a substantial fishery. The funding was augmented by New York State and Connecticut, and a research initiative was administered by the New York and Connecticut Sea Grant agencies. After four years of study, as reported in Section 3, it was the general consensus of the researchers that use of pesticides to control WNV in 1999 was not the cause of the lobster die-off. Some

concerns are still raised as to whether the pesticides may have had a synergistic role in the event, although most of the participants seemed to think not (Clemetson, 2005).

Therefore, although the lobster fishery in Long Island Sound has been significantly reduced from its heyday in the 1980s, this does not appear to be the result of mosquito control. Researchers instead suggested that the combination of overcrowding (partially caused by the extensive use of lobster bait) and unusual water conditions (too warm, low in DO, and enriched in hydrogen sulfide) allowed disease to gain a foothold in the population and so decimate the fishery. Long Island Sound is at the limit of temperature tolerance for lobsters, and so it is unclear how well the population will reestablish itself in the future.

There have been various attempts to link salt marshes to fisheries. Some have denied the relationship exists (Nixon, 1980), while others have found strong correlations between declining marshes and declining fisheries (Teal and Howes, 2000). It is true that many important fish spend at least some time in shallow estuaries, and often use some part of the salt marshes generally associated with estuaries (Deegan et al., 2000). Therefore, those marsh management activities that may impact fish use of a marsh may have cascading impacts – for good or ill – to fisheries health. Fisheries benefits may be experienced through marsh restoration activities. Improving water quality in the marshes and, especially, increasing connectivity between the marshes and the estuary may increase production for important commercial species (see Section 5). However, it has been noted that there is a potential for negative impacts to the marshes in these restoration activities. These potential impacts result from changes to these complicated ecosystems, in that it is not possible to entirely predict all results from a marsh manipulation.

10.1.5. Boating

New York Sea Grant reported that recreational boating expenditures in 2003 for Suffolk County alone were approximately $600 million. Those expenditures included boat purchases, mooring expenses, winterization and storage, equipment, maintenance, repairs, insurance, and water sports equipment. Boating activities include fishing, sailing/cruising, water skiing, and scuba diving. Suffolk County boating may be impacted by mosquito activity as boating occurs close to shore where salt marsh mosquitoes may be active. Even a 10 percent decline in boating due to quality of life or disease concerns would have a very significant economic impact on the County.

10.1.6. Other Recreational Activities

Beach and park attendance can be impacted by mosquito population spikes and reported incidences of mosquito-borne diseases. Changes in park and beach attendance related to mosquito activity directly impact only municipal revenues. Indirect impacts on park and beach related economics include revenue from recreational equipment and clothing, and food and beverage services.

Local parks have been required to close or curtail certain kinds of activities due to mosquito-borne disease threats. Fishing access points in the Montauk Point area were restricted due to EEE threats in 2003, and camping has been prohibited for parts of 2004 and 2005 in Blydenburg County Park due to WNV disease potential.

10.1.7. Horses

Nationwide, horses were found to generate $25.3 billion in direct goods and services in 1996, with 1.4 million full-time jobs, paying $1.9 billion in taxes, based on a horse population of 6.9 million (Malinowski, undated). Long Island supports 60,000 pleasure horses and more than 12,000 thoroughbreds. The Long Island Farm Bureau (undated) estimates the economic impact of the industry at $1 billion.

WNV disproportionately impacts horses. It clearly threatens a valuable industry for Suffolk County. Vaccination costs for horses are between $50 and $75 per year, resulting in nearly 95 percent effectiveness. A study in Colorado and Nebraska found that, with relatively low value horses (average horse value was less than $1,500), the cost of vaccination for the states' horses exceeded the potential savings by a factor of less than five (APHIS, 2003). This suggests that more valuable horses can not only benefit in terms of avoided injury or death, but economic savings can be realized as well. Anecdotal information and declines in equine impacts in the area suggest this is the course of action taken by horse owners.

WNV mosquito control treatments are not made for the protection of horses. Horses can serve as sentinels of the disease, and so trigger treatment after illness, but Suffolk County does not initiate control measures merely to protect equine resources. Therefore, none of the alternatives directly

impact horse. However, it is likely the greater the control measures to control human illness, the more likely it is that horses will receive benefits as well.

None of the considered pesticides had any mammalian impacts, and so their use will not affect horse health.

10.2. Impacts Under IPM

10.2.1. Long-Term Plan

Changes to the way that operations are currently conducted, as proposed in the Long-Term Plan, may impact economic conditions, in several ways:

- Greater reliance on water management may lead to more consistent vector control efforts, diminishing mosquito impacts to visitors and others. The use of more progressive water management is expected to improve aesthetics in some marshes. Both of these may have some slight positive effects on tourism. If, as expected, marsh functionalities are improved due to implementation of the Wetlands Management Plan (in all its facets), that could improve nursery conditions for important sport fish. That could have a much more noticeable impact on fishing-related businesses, as recreational fishing seems to be an industry that is more sensitive to slight improvements in conditions (slightly improved prospects of catching fish seems to motivate many anglers).

- Achieving the goal of reducing larvicide applications, if publicized, may improve perceptions of environmental conditions in the County.

- Continued control of broods of potential vectors will ensure that quality of life is not diminished. The emphasis on efficacy verification will ensure that all people subjected to any adult control measures will understand the need for and the justification of any adult control measures.

- Examination of the environmental impact of the pesticides proposed for use under the Long-Term Plan did not find any evidence that their use would lead to reductions in

commercially valuable fish, or for any marine food chain impacts at all. This suggests that adoption of the Long-Term Plan will only have positive economic impacts.

- There is an economic benefit to preventing illness and loss of life. Although the analysis suggests that current operations prevent a substantial number of mosquito-borne illnesses, including some deaths, these are not quantified here. Such analyses require placing a speculative value on human life. The chosen value can be criticized for unfairly inflating or minimizing impacts, and often offends people by equating human life with dollar values. Nonetheless, any analysis of the Long-Term Plan should not forget that "savings" associated with the prevention of loss of life clearly exceed any of the operating costs discussed below for any generally used valuation.

The direct costs of the Long-term Plan include the current costs of the SCVC operations, and approximately half the costs of the ABDL. Estimates for the increased costs for extra personnel, should all positions be filled over the 12 year length of the Plan, appear to be on the order of $400,000 per year for SCVC (an increase of approximately 20 percent), and somewhat more for the ABDL ($600,000). The impact of extra personnel costs is assumed to be spread over several years, as it will take some time for the Long-Term Plan to become fully implemented. Some of the ABDL extra costs are not to be directly attributable to mosquito control, but are associated with the operation of the BSL-3 laboratory. Equipment that would be beneficial to have for water management projects has been estimated to cost $250,000. A substantial reduction in pesticides costs, assuming larviciding reductions meet the targets, may be realized, and may result in $100,000 or more in savings. Therefore, on-going cost increases of $750,000 and one-time costs of $250,000 may be associated with full implementation of the Long-Term Plan, including local operation of a BSL-3 laboratory facility. Reimbursement from various local, State, and Federal sources may offset much of these costs, however.

This analysis does not include some poorly defined costs. The full costs for the laboratory upgrade have not been determined, but will be substantial. A new, specially engineered building with special safety equipment and full laboratory stock will be required. Monitoring costs for water management projects are not well known. Some local municipal natural resource departments have indicated a willingness to assist the County with these tasks, and NYSDEC has

not set a specified scope for projects in general. Monitoring costs, especially if they require the County to use resources other than its own, can be substantial. If monitoring time periods extend over several years, then obligations will increase over time, as well, so that reasonable requirements for one project may become financially onerous when required at half a dozen sites.

10.2.2. IPM Alternatives

Current Program

Continuing the current program would be not changing any economic situation. This is because mosquito control activities, as currently considered, do not cause any change from the status quo. The sole exception is the understanding of the economic benefits assigned to the prevention of illness and death. Although these have not been quantified here, conventional values assigned to such considerations are clearly much greater than the annual costs of the current program.

Suffolk County is currently not identified by the general public as an area, certainly not as is the case for Florida, Louisiana, Alaska, or parts of upstate New York, as examples, where insects may curtail enjoyment of the out-of-doors (although Lyme disease incidence may be having a slight impact on that overall impression). This is attributable to the efforts currently undertaken to control mosquito populations.

Pesticide Alternatives

There are not substantial cost differences that would be found to be significant in terms of the program expenditures. Halving expenditures would result in a savings of $200,000 (10 percent of the current budget), while doubling expenses (as might occur were natural pyrethrum to be relied on) would increase costs by up to $400,000 (20 percent of the current SCVC budget). Similar cost variations might occur should the amount of pesticides used be reduced, or expanded to meet some unforeseen health threat. Thus, in light of all program spending, the opportunities for savings or impacts of extra costs did not seem to be significant.

Use of Mosquito Magnets in Place of Adulticides at Davis Park

There would not likely be an impact on tourism if these units prove as effective as adulticides in intercepting mosquitoes. Use of the Mosquito Magnets may garner greater public acceptance than use of adulticides. If this were the case, tourism could be influenced in a positive manner.

An estimate of the cost of establishing this network was $30,000. The notion was that the network might be tended by temporary employees, and thus have only a nominal personnel cost. Use of permanent employees would increase the costs associated with this project substantially.

Elimination of all Larvicides in Fresh Water Environments; Elimination of Methoprene Use in Saltwater Settings

Larviciding of freshwater environments and the use of methoprene in salt marshes has been used by SCVC to reduce the emergence of adult mosquito populations. Elimination of these tools for controlling adult mosquito populations may have a deleterious impact on Suffolk County tourism. Complaint calls would likely increase as would County mosquito trap collections. These would lead to greater reliance by the County on Vector Control adulticiding to maintain quality of life and reduce the likelihood of disease transmission. Increasing the use of adulticides may have a negative impact on Suffolk County visitations by those individuals concerned about pesticide exposure.

Cost savings in terms of eliminating larviciding might be offset entirely if adulticiding applications increased. Maximal savings on pesticides would appear to be in the $100,000 to $150,000 range. If additional disease ensued, any potential savings would be lost.

Adulticiding Only in Cases of Declared Human Health Emergencies

Under this scenario, areas that have routinely experienced quality of life issues with mosquito populations would not be treated unless mosquito-borne disease was detected. Quality of life complaints could rise and tourism might consequently be impacted. This would be the case only if larval control were not increased sufficiently to reduce adult mosquito populations.

The potential impact of this alternative on tourism would also depend on the definition of human health emergency chosen by SCDHS. CDC and NYSDOH give a great deal of latitude in the risk determination required for this declaration (see Section 2). It has been hypothesized that tourists will not visit a location in the midst of a major health emergency (this was true for the SARS epidemic of several years ago in several locations, such as Toronto). If Suffolk County uses fewer cases of mosquito-borne disease to determine a human health emergency, there will be a greater likelihood of applying adulticides. This would seem to reduce the chances of still further disease cases, and so minimize the overall impact on tourism.

Potential pesticide savings are on the order of $100,000. Potential losses associated with any increase in disease would be much more.

Adulticiding Only After Human Illness

The potential impacts of this alternative on tourism would likely be similar or greater than impact experienced in the alternative of adulticiding only in the case of declared health emergencies. Negative publicity may result from what could be perceived as preventable cases of human illnesses. Pesticide savings would be of the same magnitude as above. In this case, each and every illness might be perceived as potentially preventable, meaning that costs associated with all illnesses might be assigned to this option.

Elimination of all Adulticiding

Elimination of all adulticiding could have the greatest potential impact on tourism due to the quality of life issues generated by uncontrolled adult mosquito populations, and the potential for negative publicity due to what may be perceived of as preventable cases of human disease. Although substantial sums of money ($200,000 or so) might be realized as savings, economic impacts that are more difficult to quantify will also accrue.

Maintenance of all Ditches

There would be somewhat greater aesthetic impacts under this scenario than if progressive water management was not implemented, and also the full suite of benefits of progressive water management would not be attained.

10.3. Impacts Under No Vector Control

Without vector control activities, mosquito related complaints would be expected to increase. Quality of life in areas visited by tourists could decline, leading to fewer return trips and decreasing tourist revenues. Many of the areas preferred by tourists are by open water bodies, shoreline wetlands, and public parks with aquatic features. Even a small reduction in the $4.8 billion industry represents a very significant economic impact to the County.

No vector control would also result in general reversion for County marshes. Proponents of this course of action anticipate that naturally functioning marshes will provide as much if not more fish habitat protection and similar ecosystem values, but the FINS experience seems to suggest that may not be the case. Thus, it is not clear if the overall ecological impact will be positive or negative. It is assumed that negative ecological impacts will propagate so as to result in collateral impacts to maritime dependent businesses and industries.

It is not clear if aesthetic improvements will be generally observed, as many ditch systems seem to be somewhat self-sustaining, and *Phragmites* invasions may be enhanced in some settings. For these reasons, it seems unlikely that greater economic gains would be achieved under this option, although the expenses associated with active water management would not be incurred.

Generally, SCVC and ABDL operating costs in excess of $3 million will not be incurred if the Long-Term Plan is not adopted, and the current operations shut down. Additional savings will be realized from not undertaking additional monitoring requirements, and with the absence of much of the rationale for constructing a local BSL-3 laboratory.

Nonetheless, it is possible that these savings will be exceeded by costs associated with illnesses and deaths that may result. These costs, together with any impacts to the tourism industry or housing values, can be quite substantial, and do not appear to be offset by any similar gains besides the programmatic savings.

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