

CHAPTER 4.U

ALTERNATIVES

A. INTRODUCTION

The *Mosquito Population Control Program in the Rockaways* involves the application of adulticides to control adult mosquitoes due to concerns about the health and well being of citizens in the Rockaways. This section describes the alternatives for the *Mosquito Population Control Program in the Rockaways*. These alternatives have also been presented, in greater detail, in Chapter 3.U, “Alternatives,” of the *Mosquito-Borne Disease Control Program*. However, in this section, the suitability for these alternatives with respect to the *Mosquito Population Control Program in the Rockaways* are addressed. As discussed below, these alternatives have limitations and inability to reduce significant numbers of adult mosquitoes, which make them inadequate to wholly substitute for the use of adulticides.

B. ALTERNATIVES

Described below are the ways in which the proposed alternatives could assist in the control of adult mosquitoes under the *Mosquito Population Control Program in the Rockaways*, but not solely reduce the dense populations of mosquitoes that have created the concern for the health and well being of Rockaways’ residents. For a larger, more thorough discussion of alternatives with supporting research, refer to Chapter 3.U, “Alternatives.”

These alternatives are grouped into the following categories:

- ☒ No Action;
- ☒ Biological Control;
- ☒ Alternative Technologies;
- ☒ Unauthorized Programs;
- ☒ Program Alternatives; and
- ☒ Open Marsh Water Management (OMWM).

The No Action Alternative describes the future condition if the *Mosquito Population Control Program in the Rockaways* is not implemented and the *Routine Surveillance and Control Program (Routine Program)* continues as the mosquito control program in the Rockaways. The Biological Control Alternatives would employ biological control measures (e.g., introducing additional organisms—fish, birds, and other insects—that consume mosquito larvae or adult mosquitoes in the environment). Alternative Technologies include the installation of mechanical devices throughout the Rockaways to catch and kill adult mosquitoes (e.g., Mosquito Magnets? and bug zappers). The Unauthorized Programs Alternative includes actions by New York City Department of Health (NYCDOH) without obtaining the required approvals beforehand (such as applying larvicides in

every potential mosquito breeding location in the Rockaways, including private properties, or mandating the installation of window screens for every Rockaways residence). Program Alternatives would add, eliminate, or change one or more of the program elements (e.g., adding adulticide applications during daylight periods, eliminating buffer zones near waterbodies, including applications of new USEPA and New York State registered insecticides in the future). The OMWM Alternative would involve altering wetlands in the Rockaways to provide circulation and flow in these habitats to eliminate potential standing-water mosquito breeding grounds.

NO ACTION ALTERNATIVE

Under the No Action Alternative, NYCDOH would continue to employ their *Routine Program* elements. The *Routine Program* involves education and research and larviciding of probable mosquito breeding sites (e.g., storm drains/catch basins throughout the Rockaways, New York City Department of Environmental Protection (NYCDEP) Water Pollution Control Plants [WPCPs], and stagnant water) to reduce larvae of mosquitoes with potential for large numbers in the Rockaways.

Source reduction of potential mosquito breeding sites would also be included as part of the No Action Alternative. This would include the removal or covering of tires, and the removal or elimination of open containers of stagnant water on public properties; and regular inspection of non-compliance and removal of objects preventing the natural flow of natural waterbodies. Non-compliance with these control measures would possibly result in violations and/or fines.

BIOLOGICAL ALTERNATIVES

These alternatives would involve the reduction of mosquito larvae and adult mosquitoes using biological control organisms such as larvivorous fish, bats, dragonflies, and birds. Under this alternative, natural predators of mosquito larvae and adult mosquitoes would possibly be introduced to control mosquito populations. In such cases, there would be concerns over availability of resources (e.g., habitat, food), as described in Chapter 3.U, "Alternatives," for these newly introduced (potentially non-native) species and their potential to outcompete indigenous species and create an ecological imbalance in the environment.

Fish and other aquatic biocontrol organisms would be able to control a certain amount of mosquito larvae. Insectivorous birds, however, forage on insects other than mosquitoes; insect-eating bats behave similarly. NYCDOH's concern for human exposure to rabies is also a factor limiting the consideration to introduce bats or increase the existing bat population in the Rockaways. NYCDOH takes a conservative approach to handling cases of humans exposed to rabies, which would be inconsistent with a plan to promote bat population growth in the Rockaways.

ALTERNATIVE TECHNOLOGIES

Alternative technologies are considered when potential significant adverse impacts could be reduced by adopting an alternative technology, and/or the alternative technology would be less costly and adequately efficient in meeting the objectives of the project. Alternative Technologies that were identified for adult mosquito control include Mosquito Magnets? and bug zappers.

Mosquito Magnets?

In 2000, there were 11 Mosquito Magnets? installed in the Rockaways. NYCDOH plans to install six more units in 2001, for a total of 17. In addition, NYCDOH plans enclose these units in cages to make them mobile. They have been installed in isolated, mosquito breeding areas of the Rockaways where they assist in the elimination and reduction of adult mosquitoes.

Bug Zappers

Bug zappers also help eliminate mosquitoes; however, based on research studies, they also kill beneficial insects and would not be expected to singly reduce a significant number of mosquitoes, which would be required under the *Mosquito Population Control Program in the Rockaways*.

UNAUTHORIZED PROGRAMS**Additional Larviciding Actions**

This alternative would include not only the larviciding efforts under the *Routine Program*, but also potentially undertaking larviciding actions on every property within the Rockaways, including residential backyards and any observed stagnant pool of water. Such actions would likely require residents to report on the condition of their landlord's or adjacent properties for NYCDOH to be fully aware of the intermittent pools of water. This approach might reduce the number of mosquito larvae as compared to the *Routine Program* (No Action Alternative); however, mosquito generation rates are very high, and it would be difficult to gain access to these locations to treat all such sites in time to significantly reduce breeding populations and emerging adult mosquitoes.

PROGRAM ALTERNATIVES

Options under this alternative would include operational decisions, eliminating buffer zones, use of additional carriers in products, potential use of newly registered adulticide products in the future, and changing the timing of application. Refer to Chapter 3.U, "Alternatives."

OPEN MARSH WATER MANAGEMENT (OMWM) ALTERNATIVE

Source reduction would be the approach of this alternative. Three types of OMWM modifications can be made for marsh areas—tidal ditches, ponds, and pond radials (short ditches)—which are either slightly above or slightly below the spring tide line. All of these are variations of ditch digging to provide tidal flow and circulation to reduce salt marsh mosquito breeding sites. This method of reducing populations of larval mosquitoes is being actively pursued by NYCDOH. It would, however, take a considerable amount of time before the benefits of this alternative are evident.

C. PROBABLE IMPACTS OF ALTERNATIVES**NO ACTION**

Under this alternative, larvicide application would continue under the *Routine Program*. This action, however, would only control larval populations of mosquitoes. Persistent biting of adult mosquitoes would continue to occur in the Rockaways.

BIOLOGICAL ALTERNATIVES

In some locales, these methods have had limited success. In the absence of pesticide use, implementation of these methods may not be adequate to successfully reduce dense populations of mosquitoes, as is needed in the Rockaways.

Fish and Amphibians

Under the *Routine Program*, NYCDOH in concert with NYCDEP stocks *Gambusia* (mosquito fish) in all of NYCDEP WPCPs; this includes NYCDEP WPCP in the Rockaways. Under this alternative, additional fish would have to be stocked in numerous freshwater environments throughout the Rockaways. This may not be feasible due to limitations on property access, plus the public resistance

and legal impediments to introducing additional populations of native and non-native species into the environment.

Amphibians, such as tadpoles, would not be able to be introduced into the numerous and varied locations where mosquitoes breed. They also could not be introduced en masse to various locations throughout the Rockaways in a short time period, and the effect of introducing large quantities of frogs into non-natural environments could have significant effects on the localized ecosystems.

Mosquito breeding sites that are too small to maintain fish populations (e.g., temporary pools or isolated containers) would not be stocked with mosquito-eating fish. In this case, fish would not be used as a supplemental control measure.

Introducing fish or amphibians to any waterbodies—enclosed or open—in the Rockaways would only control a small portion of mosquito larvae populations. Mosquitoes would continue to proliferate and adult mosquito populations would continue to exist. The freshwater pockets that can appear in the form of puddles and water in containers cannot be stocked with fish or amphibians to control the breeding of mosquitoes. The unknown ecological effects of introducing fish into an environment with other living organisms could also disrupt predator-prey relationships. Thus, this alternative (as a stand-alone measure) would likely fail to reduce adult biting mosquitoes in the Rockaways.

Other Insectivorous Organisms

Introduction of dragonflies in other regions have shown that these predators do not kill a sufficient number of adult mosquitoes. As stated in Chapter 3.U, “Alternatives,” some dragonfly species take one or more years to mature into adults, and long-term research and field studies are needed to evaluate how these organisms could fit into a mosquito-control program.

Introducing other insectivorous organisms is extraordinarily difficult to employ on a short-term notice, and would only control a small portion of mosquito larvae and adult populations. The unknown ecological effects of introducing these organisms into an environment with other living organisms could also disrupt predator-prey relationships. Thus, this alternative (as a stand-alone measure) would likely fail to reduce the density of adult mosquitoes and likely create greater ecological impacts relative to the introduction and additional populations of organisms in the environment.

Insectivorous Birds

As stated in Section 3.U, “Alternatives,” the United States Fish and Wildlife Service prohibits capturing and breeding birds. Therefore, the *Mosquito Population Control Program in the Rockaways* would be dependent upon the existing insect-eating bird populations that reside in the Rockaways to forage on mosquitoes. Given the existing conditions in the Rockaways, it is assumed that the existing bird populations would not significantly reduce adult mosquito populations.

Increasing bird populations would not achieve the goal in reducing adult mosquito populations. Thus, this alternative (as a stand-alone measure) would likely fail to reduce the high density of adult biting mosquitoes as effectively as the use of adulticides.

Insectivorous Mammals

The diet of insectivorous bats consists of insects other than mosquitoes. Bats also have the potential to transmit rabies, a virus for which NYCDOH takes a very conservative approach when dealing with human exposure. Therefore, it is unlikely that the proposed program would include supplementing the existing Rockaways bat population.

ALTERNATIVE TECHNOLOGIES

Alternative technologies include devices such as Mosquito Magnets? and Bug Zappers which are used to attract insect pests.

Mosquito Magnet?

These devices are difficult to install in densely urban areas. They are currently being used in the Rockaways in isolated, primarily unused areas where mosquitoes occur in high densities. If large numbers of them were installed, there would be considerable concern with issues related to safety, disposal, and air quality due to their dependence on propane tanks. This alternative would have limited use in crowded urban areas where this is already a plethora of carbon dioxide sources.

The reliance on Mosquito Magnets? for mosquito control throughout the Rockaways would be infeasible because the units rely upon carbon dioxide as the means for attracting mosquitoes, and there are a plethora of such sources throughout the Rockaways. Deploying such units on a short-term notice at numerous potential locations throughout the Rockaways would also be impractical, and would only control a small portion of adult mosquito populations. Thus, this alternative (as a stand-alone measure) would likely fail to reduce the high density of adult mosquitoes in the Rockaways as effectively as the use of adulticides.

Bug Zappers

As the primary method of control, bug zappers (and Alternative Technologies in general) are not efficient enough to meet the goals and objectives of the *Mosquito Population Control Program in the Rockaways*. These units require power sources and studies have shown that mosquitoes are only a small percentage of the creatures killed by such devices. Deploying such units on a short-term notice at numerous potential locations throughout the Rockaways would also be impractical, and would only control a small portion of adult mosquito populations. Thus, this alternative (as a stand-alone measure) would likely fail to reduce the population of persistent biting adult mosquitoes and settling the health and well being of citizens in the Rockaways.

Unauthorized Programs

The limitations of implementing only an increased larviciding program would be the failure to control adult mosquito populations and the necessity of trespassing on private properties. Although this alternative would be impractical to employ, the residents and workers of the Rockaways would likely be exposed to fewer adult mosquitoes under this alternative than under the No Action Alternative. However, even with additional larviciding, adult mosquitoes would continue to emerge in large numbers, maintaining the need to control adult mosquito populations in the Rockaways.

Household Prevention Measures

If all Rockaways residents were required to install window screens, the number of total mosquito bites would be expected to be fewer than under the No Action Alternative. However, this alternative would only lessen potential mosquito bites indoors. Residents would still spend time outdoors during the summer when mosquitoes are at the height of their biting activities.

It would be nearly impossible to force installation of window screens in all Rockaways (publicly and privately owned) homes and apartments. Legislation would have to be adopted to direct and enforce this alternative. This alternative would also not protect people who were outside during the hours that biting mosquitoes are most active. Thus, this alternative (as a stand-alone measure) would likely fail to reduce the potential for humans to be exposed to high densities of biting mosquitoes.

Access Approvals

NYCDOH is continuing to pursue approvals for larviciding of areas in Gateway National Park to reduce mosquito generation and the persistent biting of adult mosquitoes, but has not been successful to date. Under this alternative, NYCDOH would apply adulticides in Gateway National Park. If such approvals were gained in the future, NYCDOH would work with the National Parks Service to minimize the potential impacts to non-target species from these actions.

PROGRAM ALTERNATIVES

Timing of Application Change

NYCDOH plans to limit the use of adulticides to the period from near sunset through sunrise, because adulticides can break down quickly in the presence of sunlight. Also, the bulk of mosquitoes that are persistent biters are more active during dusk and nighttime hours. If NYCDOH should elect to spray in the daylight hours (i.e., daylight hours well before sunset or well after sunrise), potentially more humans and non-target wildlife would be directly exposed to the adulticides.

Under this alternative, NYCDOH would monitor the primary species that present in the Rockaways area. If at some time in the future NYCDOH would consider that spraying of adulticides would be required for daylight hours, such actions would be subject to environmental review and assessment pursuant to New York City Environmental Quality Review (CEQR) and New York State Environmental Quality Review Act (SEQRA).

Elimination of Buffer Zones

Not adhering to buffer zones may have potentially greater impacts on natural resources (i.e., aquatic organisms) than those expected with the limits in the proposed *Mosquito Population Control Program in the Rockaways*. NYCDOH would monitor the effectiveness of its future programs, and may at some time in the future decide whether the buffer zones are having a significant effect on the efficacy of the program. If the elimination of the buffer zones are recommended in the future, such actions would be subject to environmental review and assessment pursuant to CEQR and SEQRA.

Use of Additional Carriers

The use of additional carriers in products may result in greater amounts of inert ingredients in the environment. Therefore, this alternative may have potential greater impacts on public health, natural resources and water supply, compared to those expected from the voluntary limitations under the proposed *Mosquito Population Control Program in the Rockaways*. If NYCDOH modifies the program at some time in the future to include the use of additives beyond those required as a minimum by the product label, it would be subject to environmental review and assessment pursuant to CEQR and SEQRA.

OPEN MARSH WATER MANAGEMENT (OMWM) ALTERNATIVE

NYCDOH is actively pursuing the implementation of this alternative. It would take several years to accomplish the goals of OMWM and benefit from the execution of this alternative. This alternative would have to be examined on a site-by-site basis to ensure that there are no adverse impacts to ecosystems from the changes to tidal flow patterns and wetland vegetation. Permits would be required from NYSDEC and the U.S. Army Corps of Engineers (ACOE) to perform such activities.

These types of source reduction and enhancement measures would reduce potential sites for mosquito breeding. However, these activities would potentially only reduce mosquito larvae populations, and would not have an effect on identified adult mosquito populations. Although these measures are being

actively being pursued by City, State and Federal agencies, this alternative (as a stand-alone measure) would likely fail to reduce the potential for adult mosquitoes that persistently bite humans. Therefore, it is likely that applications of adulticides would need to continue in congruence with this alternative if adult mosquito populations in the Rockaways are not significantly reduced. 

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