COUNCIL REPORT

AERIAL MOSQUITO PROGRAM - ADDITIONAL INFORMATION

RECOMMENDATION

That Community and Public Services Committee recommend to City Council:

That the $507,000 in on-going funding starting in 2022 to restore the aerial mosquito program to 2020 levels, which is currently held in abeyance within Financial Strategies, be released.

Report Purpose

City Council Decision Required.

The intent of this report is to summarize information on the Aerial Mosquito Program, its recent history and to answer questions from Council and the Committee. Council must release the approved funding from abeyance in order for Administration to deliver the program.

Previous Council/Committee Action

At the November 30/December 1/8/10/14/15/17, 2021, City Council Budget meeting, the following motion passed:

> That the 2022 operating expenditure budget for Parks and Roads Services, City Operations, be increased by $507,000 on an on-going basis, to restore the aerial mosquito program to 2020 levels, with funding from Financial Strategies held in abeyance until a report returns to Community and Public Services Committee in first quarter 2022 with additional information on the aerial mosquito program.

Executive Summary

- The City of Edmonton has had a mosquito control program since 1974.
- The aerial program is a critical part of Edmonton's approach to mosquito control. The overall program targets nuisance biting mosquitoes in order to increase livability for residents and visitors in the summer season, and improve enjoyment of the outdoors.

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- Treatments are focused on control of mosquito larvae (instead of adults) as this is the safest, most effective and environmentally friendly strategy in Edmonton's climate and with available pest control products.
- The program consists of both aerial and ground-based treatments, targeting temporary and semi-permanent water bodies only (not permanent bodies like lakes, rivers, permanent wetlands or reservoirs).
- Without the aerial program, mosquito populations would increase in the city due to migration.
- The aerial program has been funded at $507,000 per year for approximately a decade, for helicopters, fuel and pesticides.
    - $507,000 budget would provide for two aerial campaigns at current pricing levels, but three to four campaigns would be recommended.
- The City primarily uses two larvicides that are strictly regulated by Health Canada and are recommended by the World Health Organization, these products are commonly used across the globe.
    - These two products utilize proteins from a selective bacteria which are highly effective at killing mosquito larvae, are non-toxic to almost all other aquatic species and do not impact human health.
    - All pesticides used by the City of Edmonton are applied in accordance with product requirements, as well as federal and provincial regulations.
- The City of Edmonton carries out extensive monitoring of weather conditions, mosquito populations (larvae and adults), treatment effectiveness and impacts on non-target aquatic species.

REPORT

Background

More than 30 native species of mosquito live in the Edmonton area. The Mosquito Abatement (control) Program targets nuisance, biting mosquitoes in order to increase livability in the city and allow residents and visitors to take full advantage of outdoor activities during Edmonton's brief summer season. The control program historically included both ground and aerial application components. The annual aerial program funding of $507,000 was eliminated as part of the 2020 Fall Supplementary Operating Budget Adjustment, in order to achieve a zero per cent tax increase for 2021 and ease the financial impacts of the pandemic on citizens. In May 2021, $507,000 was reinstated for the aerial program on a one-time basis for treatments in the summer of 2021. The rationale was the anticipation of wet weather and the expectation that more Edmontonians would be spending time outdoors due to COVID restrictions. The motion passed at the November 30/December 1/8/10/14/15 17, 2021, City Council meeting directed Administration to reinstate the budget for aerial mosquito control on an ongoing basis with funding from financial strategies, subject to this report.

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Edmonton's Approach to Mosquito Control and Products Used

The City's mosquito control program is planned and delivered in accordance with the City of Edmonton Integrated Pest Management (IPM) Policy, C501A (available on edmonton.ca/pests). The program and supporting policy were audited by the Office of the City Auditor in 2017 and recommendations were incorporated. Initially, developed in conjunction with the University of Alberta in 1974, the program has targeted larval stages of nuisance species. Analysis has shown that targeting larvae is a more proactive, environmentally-friendly, effective and safer approach than controlling adult mosquitoes, which is generally not practiced unless the primary concern is the spread of disease.

There are a limited number of products available for mosquito control in Canada which have different levels of effectiveness and performance on target species in Edmonton's climate, as well as their impacts on non-target species.

Adult control insecticides available for use in Canada are generally dispersed over wide (and often residential) areas using Ultra Low Volume (ULV) sprayers or "foggers". They affect large numbers of other insects, and have the potential to affect birds and mammals. These products are also not effective given Edmonton's cooler overnight temperatures, as these products are typically applied at night to minimize human exposure. As a result, wide-scale adult insect control is not an effective or desirable approach for Edmonton.

There are three main categories of larvicides, which are applied directly to the aquatic environments to prevent development into adults:

- Products using Bti (*Bacillus thuringiensis israelensis*), a selective fly gut toxin derived from bacteria, are the most effective larvicides for Edmonton area mosquito species and conditions, without impacting non-target species, make up the majority of the program.
- Products using artificial insect growth regulating hormones, these are more expensive and have greater impact on other species in that they affect all other organisms in the targeted aquatic habitat that have the same hormones. Treated areas can be difficult to determine and effectiveness harder to assess, as the larval growth is interrupted rather than the larvae being killed. This type of product is only used in specific circumstances in Edmonton's program.
- Products using proteins derived from bacteria (*Bacillus sphaericus*), these are more effective against certain mosquito species, including some important disease vectors found in the United States, but they are less effective against species found in Edmonton. Additionally, these products are less effective in colder water temperatures. This type of product is then used only for targeted (ground-based) applications when certain species are detected and the effort would be deemed effective based on additional surveillance and scope. However, these products are not appropriate for use in Edmonton's broader aerial program.

Edmonton's mosquito control program has utilized biorational larvicide products containing Bti since 1980. Proteins from this naturally occurring soil bacteria are carried on granular ground corn cob material (see Attachment 1), which is then applied to temporary or semi-permanent water bodies containing larvae. Permanent water bodies, such as lakes or rivers, are not treated because they contribute little towards mosquito production and also support more complex insect communities including mosquito predators such as dragonflies. Treated drinking water

reservoirs or receptacles are also not treated in order to avoid the possibility of introduction of live bacteria into these potable water sources.

Edmonton uses two specific Bti larvicide products (Vectobac 200G Biological Larvicide and Aquabac 200G Biological Larvicide Granules), which are the most widely used products worldwide, approved by Health Canada and recommended by WHO. Like all pesticides approved for use in Canada, these products are subject to stringent health and environmental testing, regulated, and are proven effective. The products have shown no evidence of human toxicity or carcinogenic effects, and are considered non-toxic to almost all other organisms, other than some related groups of aquatic flies.

The aerial program itself involves targeted, localized treatment of temporary water bodies in open fields within the agricultural lands surrounding the city (see Attachment 1 for maps). This extends into the surrounding counties under agreements with Parkland, Leduc, Strathcona and Sturgeon Counties, as well as Enoch Cree Nation and the City of Beaumont. This approach reduces the number of developing aquatic mosquito larvae and has a broad impact on the whole city by proactively reducing the number of mosquitoes that will migrate into the city.

Following a rainfall there can be an estimated 15,000-20,000 temporary water bodies that form within the aerial program treatment area. Each water body can support hundreds of thousands of developing mosquito larvae. A single campaign of aerial treatment can result in the reduction of hundreds of millions of mosquitoes. (See Attachment 1 for maps.)The aerial program is complemented by roadside ditch and ground programs (see Attachment 1 for photos) that target similar temporary aquatic habitats along roads, in parks and in ravines within the city. Sherwood Park (Strathcona County) also has some limited ground application within their region, but most of the other municipalities no longer have programs since provincial funding was eliminated in the 2000's.

Products are applied by (or under the supervision of) certified pesticide applicators in a targeted fashion by ground and aerial methods consistent with product requirements and federal and provincial regulations. Collectively these regulations set out requirements for application rates, timing, frequency, methods, meteorological conditions, application restrictions and health and safety measures.

Monitoring

The City monitors mosquito populations, developmental stage and environmental conditions for the appropriate product use and application timing, as well as monitoring impacts of applications on mosquito populations (larvae, adult) and other aquatic non-target organisms. This monitoring has shown that aquatic biodiversity has rebounded compared to levels prior to 2015, when broad-spectrum larvicides were used.

Aerial Application and Alternatives

Aerial application of larvicides by helicopter is carried out using tanks and application booms at low altitude over the temporary water bodies (see Attachment 1 for photos). Application is targeted to those water bodies without broadly applying product to large areas, which would be unnecessary, ineffective and wasteful. Meteorological conditions are carefully monitored and

application occurs only within certain limits in order to allow for complete and even coverage. In conjunction with the Ministry of Alberta Environment and Parks, the City of Edmonton has set a maximum operating wind speed of 16 kilometers per hour for applications to reduce crosswind application drift.

Although the aerial program is complemented by ground applications, only roadside ditches and other similar temporary water bodies are reasonably accessible and small enough to be treated with ground-based methods (e.g. tank trucks with booms, manual backpack treatments, etc.). Aerial application is the best way to effectively treat the agricultural habitat surrounding the city in the time span required.

Without the aerial program, numbers of mosquitoes within the city would most likely increase (more so in years with large amounts of precipitation), leading to larger quantities of mosquitoes migrating into the city. The side effect of this is not only reduced use and enjoyment of the outdoors by Edmontonians, but an increase in the use of personal repellents and backyard treatments with fogs, adulticide sprays and other remedies to reduce biting.

Additional answers to questions from City Council members posed during fall supplemental budget deliberations are addressed in detail in Attachment 2.

Budget/Financial Implications

The amount of $507,000 includes the helicopter contract, fuel and pesticides used for treatment. This budgeted amount has been the same for approximately a decade. It is anticipated that a continued budget of $507,000 would support two aerial campaigns per season, as opposed to conducting a more ideal three or four campaigns. See Attachment 3 for a comparison of cost and treatment changes over time.

Community Insights

While there has been no public engagement regarding the use of aerial mosquito control efforts within Edmonton at this time, Edmontonians are clear that they value the enjoyment of the outdoors during the warmer months of the year. This enjoyment is affected by the presence of nuisance insects, most notably mosquitos, and effective pest management is an important service provided by the City. Additionally, the City has an Integrated Pest Management Advisory Group, made up of external members with a mandate is to provide strategic advice on integrated pest management issues; including recommendations to the Administration about integrated pest management (IPM) and facilitating public perspective on IPM issues in order to support the ongoing implementation of the Integrated Pest Management Policy C501A. This group will be engaged on the program should changes be made in the future.

The City provides general information about the mosquito control efforts to the public on edmonton.ca/mosquitocontrol. The daily status of mosquito control operations, as well as management of weeds and tree pests, can be seen at edmonton.ca/pesticidenotification. The public can access the locations of applied mosquito pesticides through the City's Open Data Catalog at https://data.edmonton.ca/browse.

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The control of nuisance mosquitoes generally benefits all Edmontonians. Treatment locations and timing are based on monitoring of environmental and weather conditions, temporary water bodies and larval populations within and surrounding the entire city, where predetermined thresholds of larvae are met for treatments to take place. This scientific approach maximizes program effectiveness and ensures equity in treatment areas by removing any bias to particular regions, neighborhoods, or demographic populations. Pest control makes outdoor spaces more accessible, welcoming and delightful for all Edmontonians.

ATTACHMENTS

1. Aerial Mosquito Program Maps and Images
2. Detailed/Technical Q&A (including questions from Council on December 15, 2021)
3. Budget/Financial Implications - Comparison Table