

Detailed/Technical Q&A including questions from Council on December 15, 2021

Q1: Does the program have a localized effect, or a broad effect on the entire city? Does it have an impact on mosquito populations city wide?

The aerial program itself involves targeted, localized treatment of temporary water bodies in open fields within and especially in the agricultural lands surrounding the city. This reduces the number of developing aquatic mosquito larvae, and has a broad impact on the whole city by proactively reducing the numbers of mosquitoes that will migrate into the city.

The aerial program is complemented by roadside ditch and ground programs that target similar temporary aquatic habitats along roads, in parks, and in ravines within the city.

Together these programs significantly reduce the numbers of mosquitoes city-wide.

Q2: What is the amount that was discussed at the spring session? What was the amount for past seasons?

The amount was \$507,000, which covers the contract for hiring the helicopters for application, the fuel for the helicopters, and the pesticides used for treatment. This amount has been the same for approximately a decade. Additional financial information is available in Attachment 3.

Q3: What kinds of recommendations are there on the product we're using? Is it safe, or are there carcinogens? Label conditions such as wind, rain, protections you need to wear, etc.

The products we are using, Vectobac 200G Biological Larvicide and Aquabac 200G Biological Larvicide Granules use proteins generated by naturally occurring soil bacteria (*Bacillus thuringiensis israelensis* or Bti) that act as toxins when consumed by the feeding aquatic larvae of mosquitoes. The proteins are considered non-toxic to almost all

other taxonomic groups, other than some related groups of aquatic flies. They are the most widely used mosquito larvicides worldwide, approved by Health Canada and recommended by WHO.

The granular products prior to application have a warning as a potential eye irritant.

Label directions prohibit application directly into treated, finished drinking water reservoirs or drinking water receptacles when the water is intended for human consumption. This is because of the possibility of live bacteria still present in the product, and the desire to avoid bacterial growth of any kind in drinking water. Another formulation of the product is available which has been treated with UV radiation to kill the bacteria, and can be applied to drinking water.

When handling, loading or mixing the products the label recommends avoiding contact with skin, eyes and clothing, and avoiding breathing any dust generated. Handlers should wear a long-sleeved shirt, long pants, waterproof gloves, shoes, socks, eye goggles and an N-95, R-95 or P-95 respirator. Applicators may remove the gloves, eye goggles, and respirators if the application apparatus reduces exposure to the dust to negligible levels (such as the use of backpack sprayers, whips, or application wands as in our ditch and ground programs).

The proteins are carried on granular, ground corn cob material, and this is the source of the dust that may cause eye or respiratory irritation.

The label states that application should only occur when meteorological conditions allow for complete and even coverage, and are in compliance with local and/or provincial authorities. In conjunction with Alberta Environment & Parks, the City of Edmonton have set a threshold of wind speed below 16 kph to reduce crosswind application drift.

There is no evidence for toxicity or carcinogenic effects with this product.

Q4: If we didn't have this program, what alternatives would there be?

There is no other way to effectively treat the habitat covered by this program in the time span required.

Without this program, numbers of mosquitoes within the city would likely increase, possibly leading to larger quantities of mosquito repellent used by residents and more backyard treatments with fogs, adulticides and other remedies to reduce biting.

Q5: Do we have an environmental impact assessment for the program?

The effect of the program on mosquito populations is evaluated on an ongoing basis, prior to, during and after any applications. Both larval mosquitoes and adult mosquito population and distribution are monitored.

The impact in aquatic environments on non-target organisms, in particular aquatic invertebrates, are also monitored for taxonomic presence, diversity and distribution. This monitoring extends to areas not directly treated by the program, including permanent water bodies, and habitat outside the program area entirely.

This monitoring showed that prior to 2015, when the city still used broad-spectrum products as larvicides, there was a significant impact on aquatic invertebrate diversity and numbers in temporary and semi-permanent ponds in the region. Since the move to only biorational products, aquatic invertebrate diversity has rebounded, and there is no significant difference between treated and untreated areas.

Q6: Of the products available on the market, why do we use the product that we do?

There are very few other products currently available in Canada for controlling mosquitoes.

There are some products available for treatment of adult mosquitoes. These generally use ULV (Ultra-Low Volume) sprayers or “foggers” to disperse pesticides over a wide area intended to reduce the numbers of adult mosquitoes. These products generally have a fairly wide toxicological range, affecting large numbers of other insects including native pollinators, predators, and even birds and mammals. Because the adults disperse long distances from their source, they can be hiding in almost any stand of trees, bushes or long grass, requiring large areas of residential neighborhoods to be treated to be effective. These products are usually applied at night to reduce human exposure, however Edmonton’s overnight temperatures, even in summer, are usually too low for them to be very effective against mosquitoes. Wide-scale adulticiding such as this is not an effective method for Edmonton.

Other products include artificial insect growth regulating hormones applied to aquatic environments that disrupt the development of the mosquito larvae. These products also affect all other organisms in those habitats that use the same hormones, including all insects and most crustaceans. Because they do not kill the larvae, but only disrupt their development, it can be difficult to tell if a habitat has been treated or not prior to adult emergence. There has been limited evidence gathered to date on the downstream effects of the hormones at very low concentrations. In addition, the products tend to be very expensive. For these reasons, these products are only used in specific circumstances in Edmonton's program.

Some products are also available that utilize proteins generated by another species of bacteria (*Bacillus sphaericus*). The proteins generated by these bacteria are more effective against certain species of mosquitoes, including some important disease vectors found in the United States, but they are less effective against the floodwater mosquito species we have in Edmonton, and in the colder water temperatures we have, especially in spring. These products are used in some circumstances when those species are detected, but are not appropriate for use in our broader aerial program.

Q7: What is the practice of other surrounding municipalities? Are we really having an impact?

Edmonton's mosquito program extends into the surrounding counties, under agreement with Parkland, Leduc, Strathcona and Sturgeon Counties, as well as the Enoch Cree Nation and City of Beaumont. This regional program area reduces the number of mosquitoes that may be drawn towards Edmonton, as the floodwater mosquito species can fly up to 25 km from their development site.

Sherwood Park 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 2000s.

The products used by the City are the primary mosquito larvicides used in programs across Canada, and the world.

Evidence from the City of Edmonton's light traps, and carbon dioxide-baited traps indicate that adult mosquito activity is typically at least twice as high outside our program as within the city core, and five times higher in periods of peak mosquito activity when we are actively controlling larval numbers.

Q8: Have we considered asking our regional partners to help pay for this program?

The current program is primarily a benefit to Edmonton, and not regional partners, reducing numbers of mosquitoes in proximity to Edmonton that are then drawn into the city by lights and other attractants.

A regional program would have to expand considerably (i.e. include the entirety of neighbouring counties) in order to be of benefit to them and before it would be reasonable to request contribution. The exception would be Enoch Cree Nation, where inclusion of the whole area is feasible, but efforts there have been focused on developing relationships allowing access to Enoch territory for the mutual benefit of both Edmonton and the Enoch Cree Nation, rather than cost recovery at this time.

Q9: Is there any way for the public to receive notification when mosquito control is taking place?

The daily status of mosquito control operations are available on the City of Edmonton website (edmonton.ca/pesticidenotification).

This site also gives information on applications for management of weeds and tree pests.

Data and maps showing the precise locations of mosquito pesticide applications are available through the City's Open Data catalog. <https://data.edmonton.ca/browse>

Q10: Is Edmonton using chlorpyrifos/Dursban?

Edmonton has not used chlorpyrifos in the aerial program since 2015, and in the roadside ditch program since 2017.

Dursban 2.5G is no longer available, and no longer registered for use in Canada.

Edmonton has no stores of any chlorpyrifos products, and they are no longer being manufactured.