

Implementation of Aerial Spray Program for Control of European Gypsy Moth Outbreak in Ward 2

Date: February 18, 2020

To: Infrastructure and Environment Committee

From: General Manager, Parks, Forestry and Recreation

Ward: Ward 2-Etobicoke Centre

SUMMARY

In an effort to protect the City's tree canopy against invasive pests, it is necessary for the City to implement a European Gypsy Moth control program in Spring of 2020, which would include an aerial spray in a portion of the Princess-Rosethorn neighbourhood, located in Ward 2 (Etobicoke Centre). The area to be treated is referred to in this report as the Princess Margaret Spray Block.

The report requests that City Council grant authority to Urban Forestry to implement an aerial spray program in the affected area as well as authorize the City Solicitor to introduce a bill to allow Urban Forestry to execute an aerial spray program in the affected area of Ward 2.

European Gypsy Moth (*Lymantria dispar*) (EGM) is an invasive alien pest that was first found in Ontario in 1969. This pest cannot be eradicated. If left unchecked, populations can grow to outbreak levels, which can lead to tree defoliation and ultimately affect the health of the urban forest canopy. The EGM population fluctuates in relation to environmental and biological controls. In 2007, 2008, 2013, 2017 and 2019 Toronto implemented aerial spray control programs when EGM populations attained outbreak levels. Those measures were successful in reducing the population to acceptable levels.

Survey data collected in the fall of 2019 indicate that the EGM population is at a high level in the area defined as the Princess Margaret Spray Block and requires intervention in order to mitigate the impact to forest health and to alleviate the nuisance caused by this pest. This report presents the results of the survey along with recommended control measures, which include an aerial application of *Bacillus thuringiensis* subspecies *kurstaki* (Btk) to manage the infestation.

At present, aerial spraying is proposed to treat a total of twenty-six (26) hectares of land in Ward 2. Ground-based spraying, systemic tree injection and mechanical egg mass removal is also proposed for various locations within multiple other wards to treat approximately 900 additional individual trees. This control strategy is expected to reduce the EGM populations as well as mitigate potentially severe canopy defoliation from occurring in the targeted areas. The control strategy would result in the significant decline in the health of the trees and/or the prevention of tree loss in the area to be treated.

RECOMMENDATIONS

The General Manager, Parks, Forestry and Recreation recommends that:

1. City Council authorize the General Manager, Parks, Forestry and Recreation to implement an aerial spray using a biological control agent, *Bacillus thuringiensis* subspecies *kurstaki* (Btk), where necessary in Ward 2.
2. City Council direct the General Manager, Parks, Forestry and Recreation to consult with Toronto Public Health, Transportation Services and Toronto Police Service to coordinate implementation of the proposed aerial spraying of the biological control agent Btk.
3. City Council authorize the City Solicitor to introduce a bill to implement a control strategy for EGM infestation through aerial spraying of the biological control agent, *Bacillus thuringiensis* subspecies *kurstaki* (Btk) in Ward 2.

FINANCIAL IMPACT

The control measures outlined in this report are estimated to cost \$30,160 net of HST (\$30,690.82 net of HST recoveries).

The proposed 2020 Operating Budget for Parks, Forestry and Recreation included funding for Urban Forest Health as part of the current service levels within the ongoing base budget provision. Although there is no specific provision for delivery of EGM spraying, it is anticipated that provisions for tree maintenance and forest management can accommodate this expenditure within the 2020 Operating Budget.

The Chief Financial Officer and Treasurer has reviewed this report and has been provided the financial impacts associated with forest management as part of the 2020 budget process.

DECISION HISTORY

In 2007, 2008, 2013, 2017 and 2019 there were elevated levels of infestation of EGM in the City of Toronto, requiring implementation of various control methods. Approval by City Council was required in order to apply the aerial spray.

At its meeting held on January 30, 31, 2019. City Council adopted item IE1.3, titled Non-Competitive Contract with Zimmer Air Service Inc. for Control of EGM Outbreak in 2019.

[City Council Decision Document](#)

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.IE1.3>

At its meeting held on April 26 2017, City Council adopted item PE18.6, titled Control of European Gypsy Moth Outbreak in the City of Toronto authorizing the aerial spray by Zimmer Air Service Inc. in 2017.

[City Council Decision Document](#)

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.PE18.6>

At its meeting held on November 27, 2012, City Council adopted item PE17.2, titled Control of European Gypsy Moth Outbreak in the City of Toronto, authorizing the aerial spray by Zimmer Air Service Inc. in 2013.

[City Council Decision Document](#)

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.PE17.2>

At its meeting held on January 29, 2008, City Council adopted item PE12.4, titled Forest Health Care – Invasive Exotic Pests authorizing the aerial spray by Zimmer Air Service Inc. in 2008.

[City Council Decision Document](#)

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.PE12.4>

At its meeting held on February 5, 2007, City Council adopted item PE18.6, titled Control of European Gypsy Moth Outbreak in some Areas of the City of Toronto authorizing the aerial spray by Zimmer Air Service Inc. in 2007.

[City Council Decision Document](#)

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2007.PE1.4>

COMMENTS

European Gypsy Moth (EGM) has been present in North America since the late 19th century when it was inadvertently released into the environment in the state of Massachusetts, USA. This leaf-eating pest steadily advanced westward throughout New Brunswick, Nova Scotia, Quebec and Ontario, in addition to the northeast and mid-west USA. The first population of EGM in Ontario was detected on Wolfe Island in Lake Ontario in 1969. Outbreak conditions causing visible damage over large geographic areas occurred in southeastern Ontario during the mid-1980s, the early-1990s and the mid-2000s. In the GTA, outbreak conditions have required control in 2007, 2008, 2013, 2017 and 2019.

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EGM's preferred hosts are all species of oak trees (genus *Quercus*). However, it will also attack maple (genus *Acer*), spruce (genus *Picea*), birch (genus *Betula*), aspen (genus *Populus*) and many other deciduous and coniferous trees. EGM populations are known to fluctuate over time, with long periods of low population levels climbing rapidly to outbreak conditions, then collapsing to pre-outbreak levels. The cyclical nature of outbreaks makes control difficult, as the pattern is not predictable.

EGM has four life stages: egg, larva (caterpillar), pupa and adult. The caterpillar stage is the destructive form, feeding on tree leaves for a period of about seven (7) weeks. With potentially thousands of caterpillars feeding on an individual tree, it can be quickly defoliated. Low levels of leaf feeding are noticeable, causing injury to 30 to 40 per cent of the leaf area of an individual tree. Medium and high degrees of leaf feeding can occur during outbreak conditions, causing significant defoliation of individual trees. Repeated tree defoliation will result in twig, branch death and/or whole tree mortality.

Normally, EGM is present in low numbers. Naturally occurring fungal pathogens and insect viruses cause disease in caterpillars and eggs, providing effective biological control of populations. Two natural biological controls that kill EGM caterpillars are a fungal pathogen referred to as *Entomophaga maimaiga*, and a virus referred to as *Nucleopolyhedrosis* (NPV). Naturally occurring parasitic wasps also kill EGM eggs, and predators such as birds and mice feed on the caterpillars. These naturally occurring biological controls aid in keeping the population levels low.

When EGM population levels climb rapidly, the biological controls that naturally suppress population outbreaks are not effective. It is important that treatment programs be applied strategically to areas with high EGM population density so that susceptible trees are protected from lethal damage. At the same time, populations of fungi, virus and parasitic wasps that depend on EGM insects for their reproduction are also sustained and allowed to build up. Treatment programs must balance the health of trees against the health of natural biological control populations.

EGM outbreaks may last from two to four years before natural biological controls or cold weather cause populations to crash. At low population levels, individual trees respond to early defoliation by producing a second flush of leaves, mitigating the stress to the tree. However, in combination with other stresses, repeated defoliation can cause tree mortality.

Outbreaks in Toronto

EGM has been present in the city of Toronto for many years, but prior to 2004, populations were low and defoliation was not very significant. In 2004, 2005, 2006, 2012, 2016 and 2018 population levels were detected to be increasing and Urban Forestry received an increasing number of calls of concern from the public. As a result of the increasing population levels observed, Urban Forestry implemented control programs in 2006, 2007, 2008, 2013, 2017 and 2019 that were successful in reducing population levels that were tolerable in relation to the nuisance caused by this pest as well as forest health.

In the years 2004-2006 and again in 2012, 2014, 2018 and 2019 many concerned residents and Urban Forestry staff used Integrated Pest Management (IPM) techniques to control caterpillars. The methods used included:

- burlap wraps around tree trunks, collection and daily removal and destruction of the caterpillars that hide under the burlap;
- pheromone traps or lures to catch or confuse male moths;
- removal and destruction of egg masses;
- insecticide spray of selected trees; and
- insecticide injection of selected trees.

These methods have worked with limited success. Burlap bands only work while caterpillars move up and down the tree when they are small. Pheromone traps provide little control in high populations and are used primarily for monitoring low level populations. When high numbers of egg masses are located in the upper canopy of the tree, and where the tree bark is very rough, mechanical scraping operations to destroy egg masses are relatively ineffective. The spraying and injecting of selected trees is effective in destroying caterpillars that feed on individual trees, but has little impact on the overall EGM population at the landscape level.

In 2007, 2008, 2013, 2017 and 2019 Urban Forestry conducted aerial spray operations using the biological control agent Btk. The sprays were successful and populations of EGM were reduced to tolerable levels.

Survey Results and Control Measures Proposed for 2020

Commencing in October of 2019, after the EGM egg laying was completed, Urban Forestry initiated surveys to count egg masses in areas of potential EGM outbreak. Surveys were completed in late November with results clearly demonstrating that the 2019 aerial spray for control of EGM was successful for the majority of the 1350 hectares that were treated. However, a small lingering pocket within the Princess-Rosethorn neighbourhood located in Ward 2 still contained higher levels of egg masses that if left untreated could result in significant canopy damage. The proposed area, referred to as the Princess Margaret Spray Block, is twenty-six (26) hectares and is contained within a single spray block located entirely within Ward 2.

In addition to the area noted above, Urban Forestry identified approximately 900 individual trees outside the proposed area that will require treatment in order to prevent severe canopy damage from occurring. Approximately 400 trees have been selected to undergo treatment by either ground spray with a Btk-based product or systemic tree injection with the product TreeAzin®. In addition to this, approximately 500 trees are currently scheduled for mechanical egg mass removal on public lands within Wards 1,2,5,6,15,16,17,20,21,22,23,24, and 25.

Communications Plan

Prior to implementation of an aerial spray program, Urban Forestry will work with staff in Strategic Communications to develop and execute a robust communications plan. Public notification as referenced in the communications plan must first be approved by

the Ministry of the Environment, Conservation and Parks. This plan may include meetings with Councillors and residents as well as updates to the City and Urban Forestry websites, media releases, notices to residents in the affected areas, a social media strategy, and signage posted along streets and in public areas such as libraries.

Engagement of Contracted Services Required to Implement a Control Program

In 2007, the City of Toronto partnered with the City of Mississauga to implement EGM control using BioForest Technologies to plan the spray timing and application rates and Zimmer Air to obtain provincial permits and implement the spray program. This co-operative approach was repeated in 2008 when the City of Toronto partnered with the Town of Oakville, Halton Region Conservation Authority, the City of Burlington, the Royal Botanical Gardens and the City of Hamilton to utilize these same private companies to plan and implement the spraying program.

In the spring of 2018, the City of Mississauga treated 1,940 ha; the City of Hamilton treated more than 2,000 ha; and the Town of Oakville treated 100 ha to control Fall Cankerworm and EGM. Zimmer Air Services provided aerial spray services for these municipalities as well.

City of Toronto staff continue to communicate and participate in an exchange of information with these municipalities about their control programs. At this point it is not known if they will implement another aerial spray program for EGM in the spring of 2020.

The aerial spray requires federal and provincial permits to fly the double-engine helicopter used to apply the spray at a low elevation over residential areas. Only one contractor (Zimmer Air Service Inc.) has the capacity to provide this specialized service and as a result, staff anticipate that it will be necessary to enter into a non-competitive procurement contract with Zimmer Air as was done in previous years of the aerial spray program.

Zimmer Air Service Inc. quoted \$1,160.00/ha, net of HST. This is a fair price for the prescribed rate for a 2-application program based on the proposed 26 hectares.

Urban Forestry Natural Area Management

Forest Health Care programs are managed as part of Urban Forestry's Natural Area Management unit. Urban Forestry regularly surveys for potential forest pest outbreaks and implements control programs when the pest populations reach outbreak levels. In the past, the expenditures for the pest management programs have been absorbed within the overall Urban Forestry Annual Operating Budget with little impact to other operations. Based on the preliminary estimates of total area and numbers of trees requiring treatment, the cost of the proposed aerial spray program in 2020 is \$30,160.00 (based on the quoted cost of \$1,160.00/ha).

***Bacillus thuringiensis* Subspecies *kurstaki* (Btk)**

Bacillus thuringiensis subspecies *kurstaki* is a biological control agent which, when applied under proper conditions to the foliage of preferred host plants, results in the

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death of butterfly and moth caterpillars feeding on leaves. The active ingredients in Btk work only in the gut of moth and butterfly caterpillars and are not harmful to humans, mammals, birds or other animals. The timing of the application is critical as there is normally a period of approximately fourteen (14) days in the early development of the EGM caterpillars when Btk is most effective. Once Btk-treated leaf material is ingested, the normal operation of the gut is disrupted resulting in a cessation of feeding. This causes death by starvation or lethal blood poisoning from the bacterium entering the host caterpillar.

The commercial formulation that was used has the registered trade name of Foray 48B produced by Valent BioSciences Limited. Foray 48B is registered and approved for use by the Pest Management Regulatory Agency of Health Canada (PMRA) against EGM in Canada, applied aerially or from the ground for forestry and residential use. Btk is a Class 11 bio-pesticide and is considered to be of low risk under the *Ontario Pesticides Act*.

TreeAzin®

TreeAzin® is a pesticide product that has been approved for injection of trees in the control of EGM. The active ingredient in TreeAzin®, Azadirachtin, is also a Class 11 pesticide under the *Ontario Pesticides Act* (PCP# 30559). It is considered to pose minimal risk due to its application method to humans, mammals, birds, bees and other animals as well as soil and aquatic ecosystems.

Why Spray Privately Owned Trees?

At outbreak levels, many trees are defoliated and may die, representing significant environmental and financial costs to the City and Toronto residents. The environmental and health benefits of trees in an urban environment are well known to be associated with improved air and water quality, mitigation of heat island effects, provision of shade, protection against sun and associated skin cancer risks, as well as carbon sequestration.

According to the 2018 Tree Canopy Study, approximately fifty-five (55) per cent of Toronto's urban forest is located on private property; therefore, the protection of private trees is important to the goal of maintaining canopy cover. Moreover, if only City-owned trees are subjected to control measures, the likelihood that EGM populations would still persist in the treated area is high, potentially leading to severe canopy damage as well as increased spread to the surrounding areas during the 2021 season.

EGM is a serious nuisance to the residents living in outbreak areas. The crawling caterpillars and their droppings on private property become intolerable for many residents. Urban Forestry is inundated with public complaints related to the nuisance that results from the caterpillar stage of the EGM, which causes substantial interference with their use or enjoyment of lands.

The proposed area for aerial spray treatment contains both City-owned and privately-owned trees. Due to the extent and scope of the infestation in this area and the unavailability of a landscape level control option for this pest, a program of aerial spraying of Btk is being recommended. Because aerial spray operations specifically

target defined geographical areas and not individual trees, the treatment of privately-owned properties is not only required, but is unavoidable.

Authority for Spraying Private Properties and Trees

Under the *City of Toronto Act*, the City has authority to provide any service or thing that the City considers necessary or desirable for the public and to pass by-laws respecting the economic, social and environmental well-being of the city as well as the health, safety and well-being of persons.

In an effort to protect the City's tree canopy against invasive pests, it is necessary for the City to implement a EGM control program in 2020, including an aerial spray.

This program will aid in the suppression of the EGM population in the affected area and prevent severe defoliation of trees. In addition it would keep EGM populations at tolerable levels until the next cyclical outbreak occurs. Urban Forestry will continue to monitor for the presence of EGM across the city and address future outbreaks as required. Urban Forestry is also in communication with authorities regarding the potential future approval for the use of drones to apply aerial applications of pesticides as a potentially less expensive treatment option.

The Fair Wage Office has reported that Zimmer Air Service Inc. has indicated that it has reviewed and understands the Fair Wage Policy and Labour Trades requirements and has agreed to comply fully.

CONTACT

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SIGNATURE

Janie Romoff
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ATTACHMENT

Attachment 1 – Figure 1: Map of Proposed Aerial Spray Block in Toronto

2020 Gypsy Moth Control Program: Princess Margaret Spray Block (Proposed)



0 50 100 200 Metres
Total Treatment Area: 26 Ha.

Legend

Spray Block Boundary

Urban Forestry:
Forest Health Care
18 Dyas Rd, 1st Floor
Toronto, ON M3B 1V5
Tel (416) 392-1436
Fax (416) 392-1915

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