Meeting Date: **April 14, 2021**

Submitted by: **Scott Mairs – Director, Community Services**

Report No: **CMS-05-2021**

Subject: **Gypsy Moth Management Plan & Survey Results**

Recommendation:

THAT Report CMS-05-2021 re: Gypsy Moth Data Analysis and Results be received;

AND THAT the Gypsy Moth Survey and Data Analysis prepared by Stantec Consulting Ltd. Appended to Report CMS-05-2021 be received;

AND FURTHER THAT Council approve the use of Zimmer Air Services to conduct aerial spraying in areas identified in the attached Appendix B appended to Report CMS-05-2021.

Purpose:

To seek Council's approval to perform aerial spraying in the locations identified in the attached Appendix appended to this report.

Background:

Gypsy moth (Lymantria Dispar) is an invasive species that is severely weakening trees across North America. Unfortunately, parts of Middlesex Centre are experiencing an infestation of gypsy moth.

Gypsy moth outbreaks occur every 7 to 10 years. Gypsy moth caterpillars ("larvae") will chew holes in leaves, and may partially or totally strip a host tree of its leaves.

During outbreak years, nearly all broadleaf (hardwood) trees may be completely defoliated. This can harm and even kill otherwise healthy trees. Caterpillars appear everywhere and their droppings ("frass") will fall from the trees. This species is known to infest trees in woodland or suburban areas. They prefer to infest hardwood species, such as oak, birch, poplar, willow, maple and others.

The primary concern of gypsy moth outbreaks is the impacts caused by defoliation to trees and shrubs. This defoliation and the adverse health impacts on host trees can

have impacts on environmental, health, and economic interests beyond the scope of this report. In general, healthy trees are able to withstand very significant defoliation events without mortality. However, multiple successive years of defoliation deplete energy stores within trees and can cause branch or entire tree mortality. The presence of additional environmental and physical stressors such as root zone compaction or drought can exacerbate the impacts of defoliation and hasten tree decline.

The Ministry of Natural Resources and Forestry (MNRF) conducted aerial surveys in July 2020 to monitor gypsy moth outbreaks. Defoliation reports were verified with filed surveys and laboratory analysis. Defoliation was observed to significantly increase in 2020 (586,325 ha) over 2019 (47,203). This increase appears to have been widespread with all MNRF regions reporting increases. Middlesex Centre is located within the Aylmer MNRF district which reported an increase from 37,551 ha of defoliation in 2019 to 99,387 ha in 2020.

While they can be found anywhere in Middlesex Centre, recently there has been a particularly heavy infestation in the Westbrook Park area in Kilworth and the Ilderton area as noted in the Gypsy Moth Management Plan, Survey Results & Defoliation Projection Report prepared by Stantec.

In 2020, staff worked with a local arborist to treat the municipal portion of the tree lot at Westbrook Park in Kilworth. As this involved bringing in specialized equipment from out of the area, staff arranged with the arborist to provide a flat rate per household for homeowners wishing to treat their individual properties. The municipal cost of this manual application at Westbrook Park was $21,807.85. Further, staff also posted information on the municipal website about the invasive species at https://www.middlesexcentre.on.ca/articles/dealing-gypsy-moths.

In 2021, Middlesex Centre contracted Stantec Consulting to undertake a Gypsy Moth Field Survey beginning in February.

The field survey saw research observers conduct a walkthrough of the identified study areas. The observers counted all the gypsy moth egg masses and capture data on the size and location (type of tree) of the masses, as well as information on the health of the trees.

The study areas are Westbrook Park (Site 1A), the Jefferies Rd. Pump Station (Site1B), a private woodlot in Komoka (Site 2) and the area from the Ilderton Rail Trail to the Fire station (Site 3).

Analysis:

Site 1A - Westbrook Park

Three (3) Modified Kaladar Plots (MKPs), that are a series of Gypsy Moth monitoring plots, were created for this site. The MKPs were dominated by cherry *(Prunus)* and oak

(Quercus) trees as hosts. Plot 3 recorded the highest number of egg masses (160) and plot 1 recorded the lowest (15). The majority of egg masses in all plots appeared old, as they were bleached and frail to the touch, indicating they were likely from previous years. However, majority of the egg masses were large in size (greater than 30mm on the longest axis). Six (6) egg masses that appeared new based on color and texture were observed in plot 3 and one (1) such egg mass was observed in plot 2.

Site 1B - Jefferies Road

Two (2) MKPs were created for this site. After the initial walkthrough, a maple *(Acer)* and aspen *(Populus)* dominant stand was selected for plot analysis. The majority of the egg masses observed were less than 15 mm. This site recorded the lowest number of egg masses for both plots at all sites. Based on the colour and texture, the three (3) egg masses observed on both plots appeared to be old.

Site 2 - Private Woodlot

This site had pheromone traps set in summer 2020. The traps attract the moths, which impacted egg mass survey results, as most insects prefer the tree with the trap. However, the woodlot is large and dominated by oak trees, therefore four (4) MKPs were created on site. Oak *(Quercus)* was the dominant host for plot 1, 2 and 3, while plot 4 was dominated by pines *(Pinus)*. The majority of the accessible egg masses on site were greater than 30 mm on the longest axis. The highest number of egg masses (180) of any plot of all sites were observed on plot 3 of this site. The site also showed most evidence of new egg masses. Eleven (11) of the total egg masses observed on this plot showed evidence of new eggs. All of these egg masses were inaccessible due to their location on the host. Plot 2 also recorded a large egg mass count (128). However, only two (2) egg masses observed appeared new. Plot 1 and plot 4 recorded 48 and 35 egg masses, respectively. One (1) probably new egg mass was observed on plot 1 and none were observed on plot 4.

Site 3 - Ilderton Rail Trail

Two (2) MKPs were created for this site. The MKPs were dominated by cherry *(Prunus)* and maple *(Acer)* trees as hosts. Plot 2 recorded the highest number of new and old egg masses for the entire study area. Egg masses in plot 1 were between 10-25 mm whereas egg masses in plot 2 were larger (greater than 30mm on the longest axis). Fourteen (14) egg masses that appeared new based on color and texture were observed on plot 2 and six (6) such egg mass was observed on plot 1.

Defoliation Prediction

The data from the two best predicting factors – the proportion of new to old egg masses, and the size of egg masses – collected in this study are somewhat contradictory. The observation of a significant decline in egg masses year-over-year is a strong indicator of population decline. However, the presence of large egg masses is an indicator of population strength. The proportion of egg masses year-over-year has been preferred in

the defoliation predictions because it is more robust given the inability to measure many of the older egg masses to a statistically significant degree. There is the possibility that a decline in egg mass sizes would be observed if the 2020 egg masses were accessible for measurement.

This interpretation is in-line with MNRF projections which show an overall reduction in projected defoliation in the Aylmer district. It should be noted though that pockets of significant defoliation can and likely will occur even in overall population decline as very localized populations can fluctuate on varying timelines. Plot 2 of site 3 and plot 3 of site 2 showed the highest number of new egg mass sightings and are projected to have light to moderate defoliation according to the USDA defoliation prediction model.

Limitations

The intent of this study was to investigate the areas of issue from 2020 and provide guidance on the issue for 2021. To fulfill this objective, Stantec elected to investigate additional areas in order to contextualize the impacts of controls used in the problem areas. In terms of statistical representation, the areas investigated are not powerful enough to accurately model the entire municipality. The results of the Stantec survey have been interpreted within a general understanding of gypsy moth infestation cycles and MNRF projection to apply the study results to the areas of the municipality that were not studied.

Gypsy moth adults are mobile but are not considered likely to travel significant distances. The caterpillar stage of the moth is generally restricted to an immediate area though they are known to travel up and down trunks of trees to avoid direct sun exposure. This means that population levels can be very localized, and these very localized populations can vary somewhat separately from the overall population. Therefore, it is likely that there will be pockets of more significant outbreaks despite the projection that the overall population is declining.

Based on the survey findings, there are two management options for the Municipality of Middlesex Centre to consider.

Option 1 – Passive Management

Passive management is the most common response to pest outbreaks and involves only the actions necessary to ensure public safety in-line with the general tolerances of the municipality. This would typically involve felling of dead trees on public lands that are deemed hazards to persons or property. This action would typically follow a complaint from the public or due diligence of municipal employees that notice the hazard. Under a passive management regime, no proactive or reactive controls are utilized to modify the outcomes of an infestation – the focus is solely on the reduction of hazard.

Passive management is recommended for public woodlots that are not intensively used for recreation by the public to the point where significant ecological impacts are likely

with no intervention. Significant ecological damage is considered to occur at 66% to 90% tree defoliation (USDA). Therefore, if a woodlot is noticed to be experiencing a significant outbreak of gypsy moth approaching these levels, it would be recommended to monitor the situation to develop a forecast for the following season or rely on MNRF projections. If significant defoliation is projected to occur again, a switch in management response to active management is recommended.

Option 2 – Active Management

In instances where the tolerance level for an outbreak is lower than the present or projected levels, active management is recommended. Several options are available for effective active management and it is likely that a combination of methods is the best option.

Control methods for small outbreaks include:

Manual Egg Removal:

Egg masses are deposited in mid-to-late summer on tree trunks, branches, logs, fences, and almost anything stationary. These egg masses will remain in-situ until emergence the following spring. Through this period egg masses may be scraped off whatever surface they are attached to and destroyed. Simply scraping the masses off and leaving them where they fall is typically not sufficient as the eggs may remain viable. Water mixed with detergent, vinegar, and bleach are common ways for destroying the eggs.

This method of control is time consuming and limited to egg masses that are accessible by hand. As such this method is most appropriate for residents to care for single trees or relatively few trees on a lot. It may have some application for select landscape or street trees. Manual removal of egg masses does not require specialized equipment, permits, or leave anything behind on trees.

Adhesive Barriers:

The objective of adhesive barriers is to intercept larvae (caterpillars) as they traverse the trunk of an infested tree. During the development stage where the larvae are nocturnal feeders, they will sometimes crawl into the leaf litter at the base of a tree to avoid direct sunlight. An adhesive barrier is created by wrapping duct tape tightly to a tree – so that caterpillars cannot crawl between the tape and the trunk – and covering the non-tacky side of the tape with a tacky substance. It is done this way to avoid having the tacky substance applied directly to the bark of the tree.

This control method is less time consuming than manual removal and may allow for greater capture if too many of the egg masses are inaccessible. However, the downsides are that the window of effectiveness is much shorter, and the barrier must be left on the tree and changed periodically to ensure it remains tacky. As such this method

is most appropriate for residents to care for single trees or relatively few trees on a lot. It may have some application for select landscape or street trees.

Non-Adhesive Barriers:

The objective of this control method is the same as that of the adhesive barriers, however the caterpillars take refuge under the barrier rather than becoming stuck to it. A folded over 30 – 60 cm burlap strip is wound around a tree at breast height. In midday the burlap is removed and the caterpillars using it as refuge are destroyed.

For this control method to be effective the burlap must be monitored daily, and this can be time consuming to complete with many trees. However, non-adhesive barriers are easier to set up than adhesive barriers and will not leave any residue behind. As such this method is most appropriate for residents to care for single trees or relatively few trees on a lot. It may have some application for select landscape or street trees.

Control methods for moderate to large scale outbreaks include:

Targeted Insecticide:

Targeted insecticide application is possible to the foliage of individual plants. Several insecticides are registered in Canada for the control of gypsy moths. All manufacturer recommendations, procedures, and regulations should be followed when applying insecticides. It is recommended that licensed applicators perform the application. Targeted insecticide is possible for smaller landscape trees and shrubs but impractical for large canopy trees without specialized equipment. Targeted insecticide can be partnered with adhesive and non-adhesive barrier controls.

Aerial Insecticide:

Aerial insecticide control is the only control that is appropriate for significant outbreaks over significant area. *Bacillus thuringiensis var. kurstaki* (BTK) is the most common aerial application insecticide for gypsy moth in Canada. BTK is popular because of its effectiveness and highly targeted nature as it is non-toxic most other insects. As an environmental bacterium rather than a chemical it has been considered safe for use in Canada. The application window is critical, and application must occur while larvae are actively feeding on foliage. This is typically in mid-to-late May. See Appendix C for Health Canada's Fact Sheet on BTK.

Staff Recommendation

Based on the options highlighted, staff are recommending that the municipality conduct aerial spraying of BTK in the areas noted in Appendix B, which total 84.17 acres.

As noted in the Financial Implication, the cost to undertake the aerial spraying is slightly over budget for 2021. Should Council wish to proceed, but remain in budget, an

alternative proactive option could be to proceed with the aerial spraying but on fewer areas, which means that approximately 13 acres overall would not be included.

If approved, and as noted by Zimmer Air Services, the program would consist of 2 applications of Foray 488 PCP # 24977 at 1.6 L/acres the maximum label rate applied a few days apart. Due to the requirement to overfly people and residential property in the execution of the program, a Transport Canada Ministerial Authorization application will need to be submitted and approved by Transport Canada. The purpose is to ensure public safety, and to assess any hazards associated with flying below height restrictions in what is deemed a "Built Up Area" under the Canadian Aviation Regulations. Only a Twin-Engine Helicopter will be approved by Transport Canada to carry out this application. Zimmer Air Services will apply for the Ministerial Authorization which takes a minimum of two weeks to obtain, at which time Middlesex Centre would need to provide a letter supporting the spray operation. Some traffic control or means to prevent access to the areas being sprayed during the operation will be required however based on the areas identified, any traffic control will be minimal. Public notification and or posting under the Pesticide Act will be completed by the municipality.

Based on the BioSIM model noted in Appendix E, 90% hatch out will occur around May 20th. Spraying would be conducted sometime around this date.

Financial Implications:

The cost for Zimmer Air Services to complete the aerial spraying in the identified locations is $30,885.37 ($361/acre) which includes the $500 Transport Canada Application Fee.

A total of $40,000 was budgeted in the 2021 Operating Budget to deal with the Gypsy Moth issue that was to include the egg mass field analysis and detailed management report and treatment of the identified areas. If all areas are approved, the project will be over budget by $4,935.37. With savings from other operational projects, the budget shortfall will be absorbed.

Strategic Plan:

This matter aligns with following strategic priorities:

- Sustainable Infrastructure and Services
- Responsive Municipal Government

Attachments:

Appendix A – Stantec Gypsy Moth Survey Data Analysis and Results Report

Appendix B – Aerial Spray Map Locations

Appendix C – Health Canada - BTK Fact Sheet

Appendix D – Agriculture and Agri-Food Canada – BTK Environmental Impact Bulletin

Appendix E – BioSIM Map