



Aquatic Consulting Services

P.O. Box 530, Sanford, MI 48657
www.aquaticremedies.com

989-689-0223

December 22, 2021

**Cannon Township Board
Cannon Township
6878 Belding Rd. NE
Rockford, MI 49341**

Dear Ladies and Gentlemen,

We have completed the gypsy moth surveys, maps, and report for the 2022 season in Cannon Township. I have included JPG and PDF map files of the results for you to review and to post on the township website as needed. Both JPG and PDF files are printable for your purposes although the .PDF file will likely be more user friendly on a website. I will provide your GIS personnel with .SHP files for use in a GIS mapping system. I have also included a short report on the conditions in each recommended spray block. An 18 x 24-inch map may be sent in a separate package for display purposes.

During my survey, I was able to confirm that the areas of concern referenced by Cannon Twp officials and residents are in fact infested with gypsy moths. There are three major environmental controls that limit gypsy moth population buildups; a fungus called *E. maiamiga*, a gypsy moth virus called NPV, and a class of egg parasitoid wasps. For some reason, these environmental controls have not been as effective as they have been in past years. Gypsy moth scientists suspect that successive years of untimely dry conditions in mid-late June have depressed the critical buildup of *E. maiamiga* in the environment. Regardless, we are dealing with a fairly high pressure and volatile gypsy moth population cycle across the state, but we are optimistic that our methods will provide some relief. Thankfully, we were able to catch the populations on the rise, and using our survey, spray, monitor protocol, I anticipate we will be able to limit further population growth and damage. I must emphasize though, when in a growth phase, gypsy moth populations can be quite resilient and several years of treatment and monitoring are often needed. Established populations in preferable habitat such as in spray blocks Cannon03, Cannon10, Cannon13, and Cannon14 can be especially hardy and often require 2-3 years of spray just to suppress population growth. The total acreage recommended for spray in spring 2022 is 4,029 acres. This total may be higher or lower than you anticipated, but I must assure you, only the areas with significant, potentially damaging population densities were recommended for spray. There are a few areas with less severe infestations that were not recommended but should definitely be monitored. A proactive approach toward monitoring can usually prevent this type of situation and is much more economical relative to several years of costly reactionary spraying. Overall, I anticipate good results for next season, but strongly encourage Ada Township to continue with some sort of monitoring program.

I will hold off on digitizing the spray blocks for the pilot's use until you have had a chance to review the maps. Once we get closer to spray time and you have selected an aerial applicator, I will provide the pilot with spray maps and digitized files.

Thank you for the opportunity to work for Cannon Township this season. Please let me know if I can help you with anything further at this time. 989-689-0223 or gypsymoth@aquaticremedies.com.

Sincerely,

Neal Swanson
Owner/Biologist

Cannon Township, Kent County Recommended Gypsy Moth Spray Areas 2022

Aquatic Consulting Services II, LLC
December 2021

Block #	Acres	Reason for Spray
Cannon01	63	A rising population in good habitat. Nuisance is likely slightly elevated in the area, although residential population density is not high, so nuisance should be intermittent. Tree damage is a secondary concern as egg mass densities are still increasing, so defoliation is likely to be moderate in 2022. Spray to mitigate potential nuisance, limit future defoliation, and suppress population growth.
Cannon02	166	A rising population in good habitat. Nuisance is the primary concern as residential population density is high. A few trees in the area show successive years of egg mass accumulation, so tree damage is also a concern in coming seasons. Population is continuous with the untreated Courtland Township, so risk of reinfestation post-treatment and post-suppression is higher. Spray to reduce nuisance, limit tree damage, and inhibit reinfestation.
Cannon03	865	A rising population in prime habitat. Nuisance is the primary concern in this area, as confirmed by homeowner interaction. Historical tree damage was evident in a few trees in the area, and egg mass densities imply further defoliation. Population is continuous with untreated Courtland Township, so reinfestation is also a concern. Spray to reduce nuisance, limit further defoliation, and inhibit reinfestation.
Cannon04	175	An established population in very good habitat. Nuisance is elevated in the area, as confirmed by homeowner interaction. Tree damage is also a concern, as several trees show evidence of successive years of accumulation. Spray to reduce nuisance and limit further tree damage.
Cannon05	364	A rising population in very good habitat. Tree damage is the primary concern, particularly in the Egypt Ridge and N. Myers Lake Ave areas, as several trees show evidence of historical tree damage. Nuisance is also a concern in residential subdivisions. Spray to limit further tree damage and mitigate potential nuisance.
Cannon06	190	A rising population in prime habitat. Nuisance level is elevated in the area, as confirmed by homeowner interaction. Evidence of historical tree damage was noted in a several trees along Kreuter Rd and Myers Lake Ave. Tree mortality is possible within the next 2 seasons in a few more heavily infested trees. Spray to limit further tree damage and reduce nuisance.
Cannon07	340	A rising population in prime habitat. Habitat conditions are very similar to block Cannon06, although residential population is slightly higher, so associated nuisance is likely higher as well. Historical tree damage is evident in several trees in the area, particularly along Sunfish Lake Ave. A few trees within a cemetery in the area have potential for tree mortality within the next 1-2 seasons if treatment is delayed another cycle. Nuisance and tree damage are both primary concerns in the area. Spray to reduce nuisance and limit further tree damage.

Cannon08	493	A rising population in prime habitat. Habitat conditions and residential population density are both ideal for prolonged infestation. Evidence of historical tree damage is notable along Ramsdell Dr and with the expansive Camp Roger. Nuisance is very high in the area, as confirmed by homeowner interactions. Spray to reduce nuisance, limit further tree damage, and suppress population buildup.
Cannon09	90	A rising population in very good habitat. Tree damage is the primary concern in this area, as residential population density is lower than in some other areas. However, nuisance is also a concern as a portion of the block includes a popular public park. Spray to limit tree damage and mitigate potential nuisance.
Cannon10	124	An established population in very good habitat. Nuisance level is fairly high as confirmed by homeowner interaction. Several trees along Kreuter Rd show successive years of accumulation and historical tree damage. Spray to reduce nuisance and limit further tree damage.
Cannon11	15	An established population in good habitat. Population is continuous with block Cannon10, but habitat should support a less robust infestation. Nuisance is likely elevated in the area. Tree damage is a secondary concern, primarily due to tree community type. Spray to mitigate potential nuisance and future tree damage and suppress population.
Cannon12	42	An established population in very good habitat. Population is continuous with more heavily infested areas of Townsend Park. Historical tree damage was noted in a few trees along 6 Mile Rd. Nuisance is likely elevated as egg mass residues show successive years of accumulation. Spray to limit further tree damage and reduce nuisance.
Cannon13	147	An established population in prime habitat. Egg mass densities are very high in a few areas of the popular Townsend Park. Other areas within the park are not as bad, but potential for a prolonged infestation is high. Nuisance may not be as high due to no residential population but will be intermittent. Tree damage is the primary concern due to prolonged infestation. Spray to limit further tree damage and mitigate potential nuisance.
Cannon14	297	An established population in prime habitat. Historical tree damage was noted in several trees along Honey Creek Ave. A few trees in the area may experience tree mortality within the next 1-2 seasons if treatment is delayed another cycle. Nuisance is also elevated in the area, as confirmed by homeowner interaction. Spray to limit further tree damage, reduce nuisance, and suppress population.
Cannon15	24	A rising population in very good habitat. Population is continuous with a known population in adjacent Ada Township. A few trees in the area have very high egg mass densities, so future tree damage is the primary concern. Nuisance should be lower due to low residential population. Spray to limit future tree damage and inhibit reinfestation.
Cannon16	17	A rising population in very good habitat. Habitat conditions are identical to block Cannon15. Residential population is even lower relative to Cannon15. Forest is continuous with a large untreated state game area, so potential for prolonged infestation is much higher. Spray to suppress population and inhibit potential reinfestation.

Cannon17	39	A rising population in very good habitat. Considerations are identical to block Cannon16 although area is surrounded by state game area, so potential for prolonged infestation is even higher. Spray to suppress population growth and inhibit potential reinfestation.
Cannon18	37	See block Cannon17
Cannon19	13	See block Cannon17
Cannon20	10	See block Cannon17
Cannon21	387	An established population in prime habitat. Several trees in the area show evidence of historical tree damage and very high egg mass densities. Tree mortality is possible within 1-2 seasons if treatment is delayed another cycle. Nuisance is also very high, as confirmed by homeowner interaction. Spray to reduce nuisance limit further tree damage and suppress population buildup.
Cannon22	131	A rising population in good habitat. Nuisance is elevated in the area, as confirmed by homeowner interactions. Tree damage is a secondary concern, as few trees show evidence of successive years of infestation. Area is adjacent to a large untreated state game area, so potential for reinfestation is high. Spray to reduce nuisance, mitigate future tree damage, and inhibit reinfestation.

Total Acreage = **4,029 acres**

The term “nuisance” is subjective and relates to the likelihood that the feeding behavior and number of caterpillars in the area will impact a property owner’s quality of life. Some property owners may experience heavy infestation yet go unbothered. Other property owners may view 5-10 caterpillars visible on a barn door as a nuisance. Field experience during gypsy moth infestation suggests that the number of egg masses found in an area may yield a widespread nuisance situation. The term “tree damage” is more literal, but relative to environmental and historical factors as well. Any level of defoliation should be considered damaging, but otherwise healthy trees are generally much more resilient, even after consecutive years of defoliation. Other environmental stressors such as drought or disease are additive factors that will contribute to greater risk of tree degradation and/or mortality. Defoliation levels of >60% are also very stressful to trees, although most trees can survive 3+ years of >60% defoliation if few other stressors are present. Habitat quality relates to tree species composition, density, distribution, understory, and topography of an area. Mixed forest type consisting primarily of oaks, neatly groomed understory, mixed age-class, and low topographic variability are the ideal conditions for persistent infestation, and so this habitat is designated as “prime” with very good, good, and marginal habitat in decreasing suitability. Trends in populations are designated by the egg mass residues in the area. Rising populations show a high new/old egg mass ratio, with established, sustained, and remnant populations proceeding toward a high old/new egg mass ratio.

Overall, all areas initially designated as problem areas by township officials did in-fact support infestations of gypsy moths. The level of damage and/or nuisance can be difficult to predict given the interaction of unpredictable environmental factors. All recommended areas contain potentially damaging gypsy moth egg mass numbers. Accordingly, all spray areas are highly recommended for *Bacillus thuringiensis var. kurstaki* (B.t.k.) treatment in spring 2022. There is significant risk

of potential tree damage and high nuisance levels if recommended areas are left untreated for another cycle. Some areas showed evidence of successive years of infestation (particularly the areas of Honey Creek Ave, 5 Mile Rd, Kreuter Rd and Myers Lake Dr intersection, and much of Ramsdell Dr), which often prove much more challenging to suppress. Under these circumstances, several years of treatment are often necessary. It is not possible to completely eliminate gypsy moth populations, so this should never be the expectation. With 2-3 years of treatment and monitoring, an acceptable level of control is attainable.

Spray areas are recommended based on historical data, habitat suitability, population dynamics, and field experience in gypsy moth management. The Michigan State University Extension is a primary environmental information resource available to the public in Michigan and offers management advice on a variety of invasive species [Gypsy Moth - Integrated Pest Management \(msu.edu\)](https://www.maes.msu.edu/gypsy-moth-integrated-pest-management). While we hold the survey methodology we employ as proprietary, the MSU Extension published a 1/40-acre survey protocol that designates 200-250 egg masses/acre as having potential for high defoliation and nuisance. At the high end of this range $250/40 = 6.25$ egg masses in a 1/40-acre survey plot. A 1/40-acre survey plot is a circle with a radius of 18' 7" where all visible egg masses are counted. In many areas we observed at least 10 egg masses on a single tree with several areas showing several hundred egg masses/tree (See attached Photos 1-4). Accordingly, by these standards we should recommend large continuous areas of the township, but this would not be cost effective given that some of the area is only sparsely populated and would not provide high visibility of return on expense.

Gypsy moth suppression managers are often tasked with balancing high potential for damaging gypsy moth numbers with high community benefit. Areas where these considerations overlap are generally the areas that are treated first with available funds and areas of diminishing return are treated as funds are depleted. Our treatment recommendations take this into account, and we try to limit recommended spray areas to these top-tier areas. Occasionally, this approach causes situations where property owners are not included in treatment areas yet they are adamant that they should be. A common example is; the disgruntled property owner lives ¼ mile off the road on 40 forested acres. It might cost the township \$3,000 to treat this individual's property while 40 one-acre parcels could be treated for the same cost. This is an unfortunate reality of the cost/benefit tradeoffs that every community must deal with. We are willing to advise in how to deal with complaints of this nature, but we encourage our clients to attempt to diffuse conflicts internally.

Gypsy moth suppression programs in Michigan generally follow an Integrated Pest Management (IPM) strategy which is focused on low environmental impact and economic awareness. Further, an IPM strategy intends to mitigate exponential population growth with treatment only until latent environmental controls begin to limit populations sufficiently. In order to efficiently determine when treatment is no longer advisable, monitoring is imperative. Accordingly, we strongly advise Cannon Township maintains a monitoring program for the next 2-3 years at least.



Photo 1: Cluster of several egg masses on underside of single branch of red oak tree, block: Cannon02



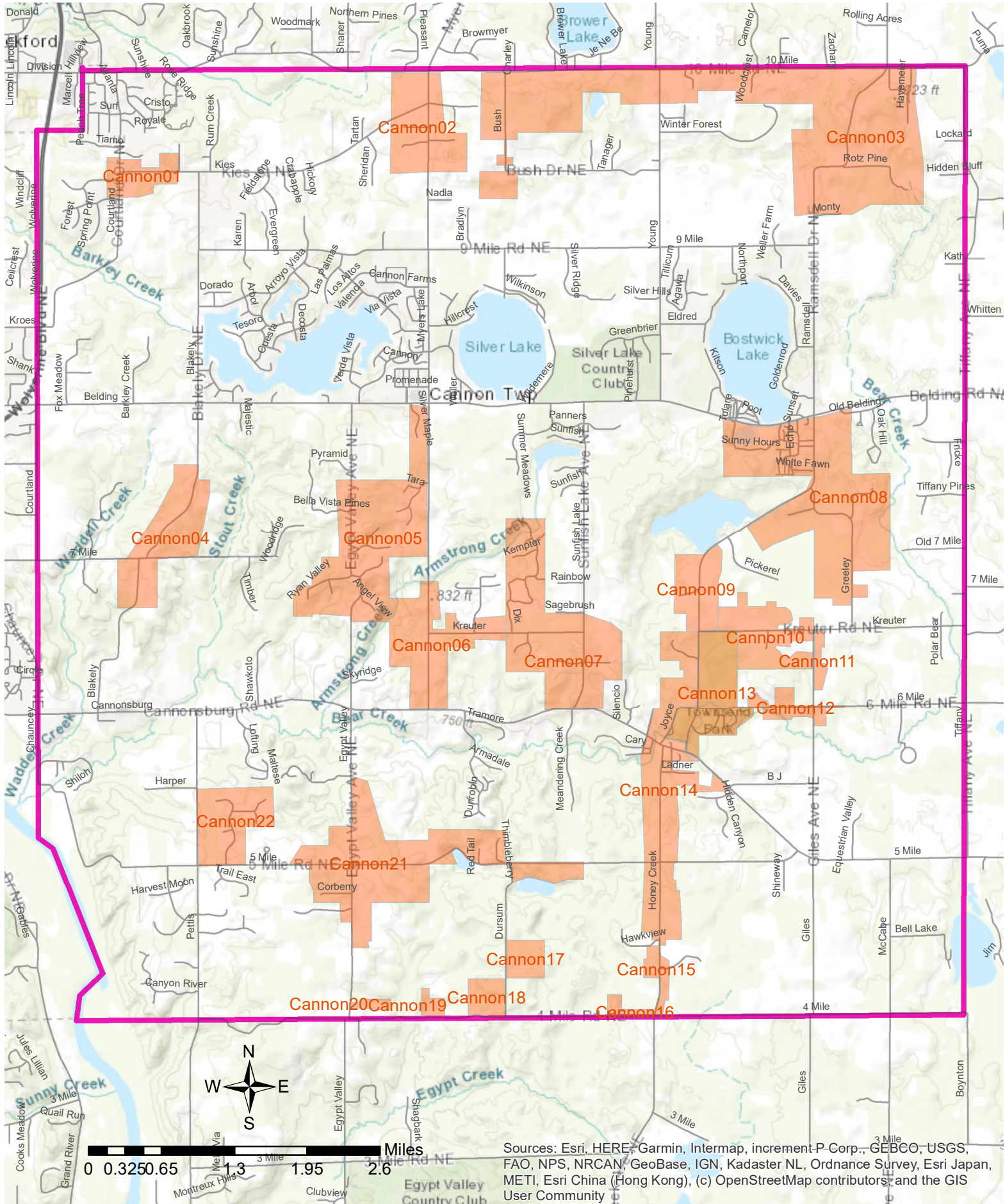
Photo 2: Several egg masses on trunk of red pine tree, block: Cannon04



Photo 3: Several egg masses and pupal cases on mailbox, block: Cannon12



Cannon Township Gypsy Moth Survey Report 2022 Season



**Shaded areas are recommended for
aerial B.t.k. spray in Spring 2022**

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