Aquatic Consulting Services

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January 11, 2022

Mr. Fred Lewis, Supervisor
P.O. Box 247
415 E. Main St.
Hale, MI 48739
(989) 728-2811

Dear Mr. Lewis:

We have completed the gypsy moth surveys, maps, and report for the 2022 season in Plainfield Township, Iosco County. 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 if desired.

Overall, I have some good and some not-so good news for Plainfield Township. During our survey, we were able to confirm that most of the areas of concern referenced by Plainfield Township officials and residents are in fact infested with gypsy moths. Several areas show evidence of several successive years of infestation, although this year we are seeing evidence of marked declines in new egg masses in a few areas. The northern areas of Jose Lake and Chain Lakes were hit very hard for a few seasons, but we observed egg parasitism in numerous egg masses and a relative decline in new egg masses (a remnant population). While Jose Lake showed the most notable reduction, we are seeing remnant population densities in various formerly infested areas: Bass Lake, National City area, and the M-65/Wickert Rd area. 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. It appears that these environmental controls may have begun to act. That said, we are still dealing with a fairly high pressure and volatile gypsy moth population cycle across the state, but we are optimistic that this declining trend will continue. There are a few rising populations in the Londo Lake and Indian Lakes areas that we will definitely need to monitor, as well as properties along Esmond and Ora Lake Rds. 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 is often necessary. The total acreage recommended for spray in spring 2022 is 3,025 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 further good results for next season, but strongly encourage Plainfield Township to continue with some sort of monitoring program.

Thank you for the opportunity to work for Plainfield Township again 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

Neal Swanson
Owner/Biologist

Plainfield Township, Iosco County
Report of Recommended Gypsy Moth Spray Areas 2022

Aquatic Consulting Services II, LLC
January 2022

Block #	Acres	Reason for Spray
PFT22_01	179	A remnant population in prime habitat. Nuisance level is still elevated, but not as high as in prior years, confirmed by homeowner reports. Historical tree damage is evident throughout area. Tree mortality is still possible in stressed trees in coming seasons. Population borders continuous forest to north and south, so the possibility of reinfestation is always a concern. Spray to reduce nuisance, limit further tree damage, suppress population, and inhibit reinfestation.
PFT22_02	106	A sustained population in prime habitat. Nuisance is elevated, particularly in the northern portion of the block, as confirmed by homeowner interaction. Tree damage is a secondary concern, especially in more heavily infested trees along Jose Lake. Spray to reduce nuisance and limit further tree damage.
PFT22_03	78	A remnant population in prime habitat. Nuisance has been elevated throughout the area for several successive years. Nuisance should be lower in spring 2022, although any rebound in the population will likely be intolerable. Tree damage is still a concern, particularly in trees that experienced heavy defoliation in successive years. Spray to limit further tree damage and reduce potential nuisance.
PFT22_04	233	A sustained population in very good habitat. Northern portion of the block is poorer habitat, but population is showing signs of persistence. Southern portion of block was heavily defoliated for 2 successive years, and further defoliation could push stressed trees toward mortality. Spray to suppress population persistence and limit further tree damage and potential nuisance.
PFT22_05	481	A sustained population in very good habitat. Some trees in the area experienced heavy defoliation for successive years. Tree damage in these trees is the primary concern. Nuisance is also elevated, particularly in the southern portion of the block, along Wickert Rd. Spray to limit further tree damage and mitigate potential nuisance.
PFT22_06	72	An established population in very good habitat. Population has been causing nuisance for a few years, as confirmed by homeowner reports. Tree damage is a mainly a concern in NW portion of the block and in white pine trees that often cannot survive heavy defoliation. Spray to reduce nuisance and limit tree damage.
PFT22_07	227	A sustained population in very good habitat. Nuisance level has been very high for a few years, and another year of infestation may be intolerable. A few trees, particularly in the SE portion of the block saw heavy defoliation in prior years, and another season of defoliation could cause mortality. Spray to mitigate potential nuisance and limit further tree damage.
PFT22_08	128	A sustained population in very good habitat. Population has caused some nuisance for a few years, as confirmed by homeowner interaction. Tree damage in previously defoliated trees is secondary concern. Spray to reduce nuisance and limit potential tree damage.
PFT22_09	84	A sustained population in prime habitat. Nuisance has been very high in the area for successive years but was actually somewhat lower in summer 2021. Some trees in the area were heavily defoliated in prior years, so further tree damage is

		the primary concern in 2022. Spray to limit further tree damage and mitigate potential nuisance.
PFT22_10	134	See block Plainfld11. Considerations are identical although nuisance was slightly higher in 2021.
PFT22_11	62	An established population in very good habitat. Nuisance was elevated in 2021, particularly in eastern portion of block. Tree damage is a secondary concern, although egg mass densities are high in a few trees in the western portion of the block. Spray to mitigate potential tree damage and reduce nuisance.
PFT22_12	136	An established population in good habitat. Egg mass densities in a few trees area very high, so tree damage is the primary concern in this area. Residential population is slightly lower relative to northern shore of Little Long Lake, so associated nuisance should also be lower. Spray to limit further tree damage and mitigate potential nuisance.
PFT22_13	81	An established population in very good habitat. Nuisance level is high confirmed by homeowner interaction. Heavy defoliation was localized to a few landscape trees, but adjacent hillside was also defoliated. Spray to limit further defoliation and reduce nuisance.
PFT22_14	70	A sustained population in good habitat. Nuisance level is somewhat lower than in prior years, confirmed by homeowner interactions. A few trees on the southern shore of Loon Lake do still show relatively high egg mass densities, so tree damage is a secondary concern in that area. Spray to reduce nuisance, limit further tree damage, and suppress population.
PFT22_15	144	A remnant population in prime habitat. The northern and western portions of the block were heavily defoliated in successive years, so tree damage is the primary concern in this area. Nuisance is also elevated, particularly on the southern shore of Bass Lake. Spray to reduce nuisance and limit further tree damage.
PFT22_16	147	A rising population in very good habitat. Egg mass densities are extremely high in several trees in the area, so potential for heavy tree damage is high. Residential population in the area is relatively low, so nuisance should be lower as well, but defoliation will be noticeable. Spray to limit potential tree damage and mitigate potential nuisance.
PFT22_17	175	An established population in very good habitat. Nuisance level is elevated, as confirmed by homeowner interaction. Historical tree damage is evident in several trees, particularly in the northern portion of the block. Area is surrounded by continuous forest, so potential for reinfestation is higher. Spray to reduce nuisance, limit further tree damage, and inhibit reinfestation.
PFT22_18	223	A rising population in very good habitat. Population is likely continuous into untreated Ogemaw County, so reinfestation is always a concern. Nuisance is elevated, as confirmed by resident complaints. Tree damage is a secondary concern, particularly in more heavily infested trees in the northwestern portion of the block. Spray to reduce nuisance, limit tree damage, an inhibit reinfestation.
PFT22_19	125	An established population in prime habitat. Nuisance is very high, as confirmed by homeowner interactions. Population is continuous into adjacent Grant Twp, so potential for reinfestation is high. Tree damage is also a concern, as several trees in the area have experienced high defoliation in successive years. Spray to reduce nuisance, limit further tree damage, and inhibit reinfestation.
PFT22_20	140	See block PFT22_19, Considerations are identical.

Total Acreage = **3,025 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 the 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 extending toward a high old/new egg mass ratio.

Spray areas are recommended based on historical data, habitat suitability, population dynamics, and field experience in gypsy moth management. Other areas within the township may also contain some level of gypsy moth infestation, but such areas are either show a significant downward trend or habitat conditions do not exhibit high likelihood of a vigorous infestation. 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.

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). 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 of the areas we observed at least 10 egg masses on a single tree with several areas showing well over 100 egg masses/tree (See attached Photos 1-3).

Gypsy moth suppression program 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. There is always some risk of the objection "Why did you treat them and not me?" Sometimes the situation is: the disgruntled property owner lives in an isolated plot set back on 10 forested acres. It might cost the township

$1,000 to treat this individual's property while 10 one-acre parcels could be treated for the same cost. Given this trade-off, some of our broadly infested clients decide that the best use of available funds is to treat areas of high residential population density that are also generally infested with gypsy moths. We cannot offer any advice on this consideration and take no responsibility for the concluded spray acreage.

Overall, all areas initially designated as problem areas by Township officials did in-fact support robust infestations of gypsy moths. Some areas showed evidence of several successive years of infestation (particularly Long Lake/Loon Lake, Indian Lakes, and Hwy 65/Wickert Rd areas), which often proves 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.

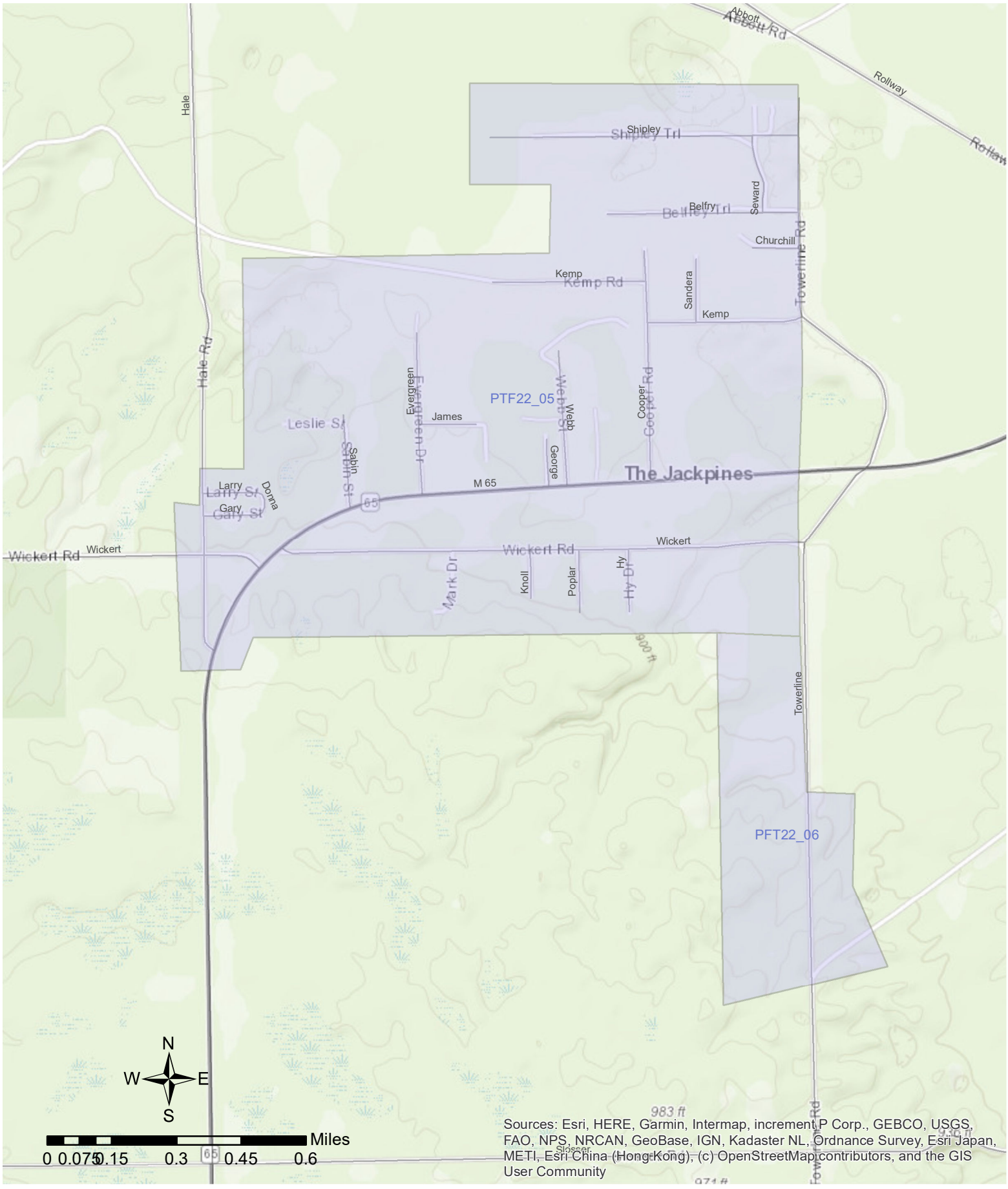
Gypsy moth suppression programs in Michigan generally follow an Integrated Pest Management (IPM) strategy which is focused on low environmental impact and economic awareness. Further, an IPM strategy intends to mitigate exponential population growth with treatment only until latent environmental controls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

Photo 1: Several egg masses on single red oak tree. Block: PFT22_07

Photo 2: Several egg masses on side on single Balsam fir. Block: PFT22_10

Photo 3: Numerous egg masses on underside of single limb of red oak tree. Block PFT22_18

Plainfield Township Gypsy Moth Survey Report
2022 Season (M-65/Wickert Rd Area)



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

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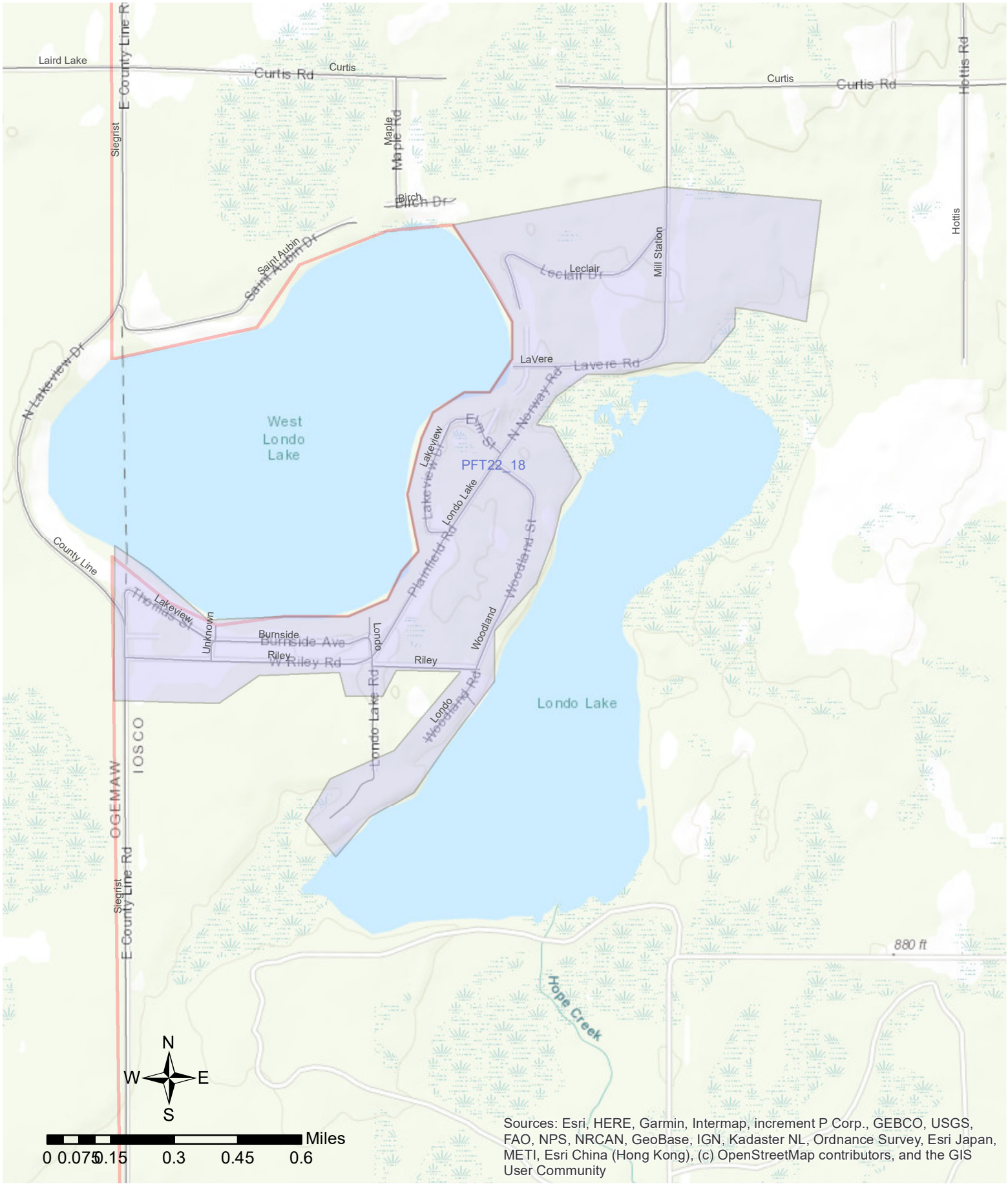
Plainfield Township Gypsy Moth Survey Report 2022 Season (Londo Lake Area)



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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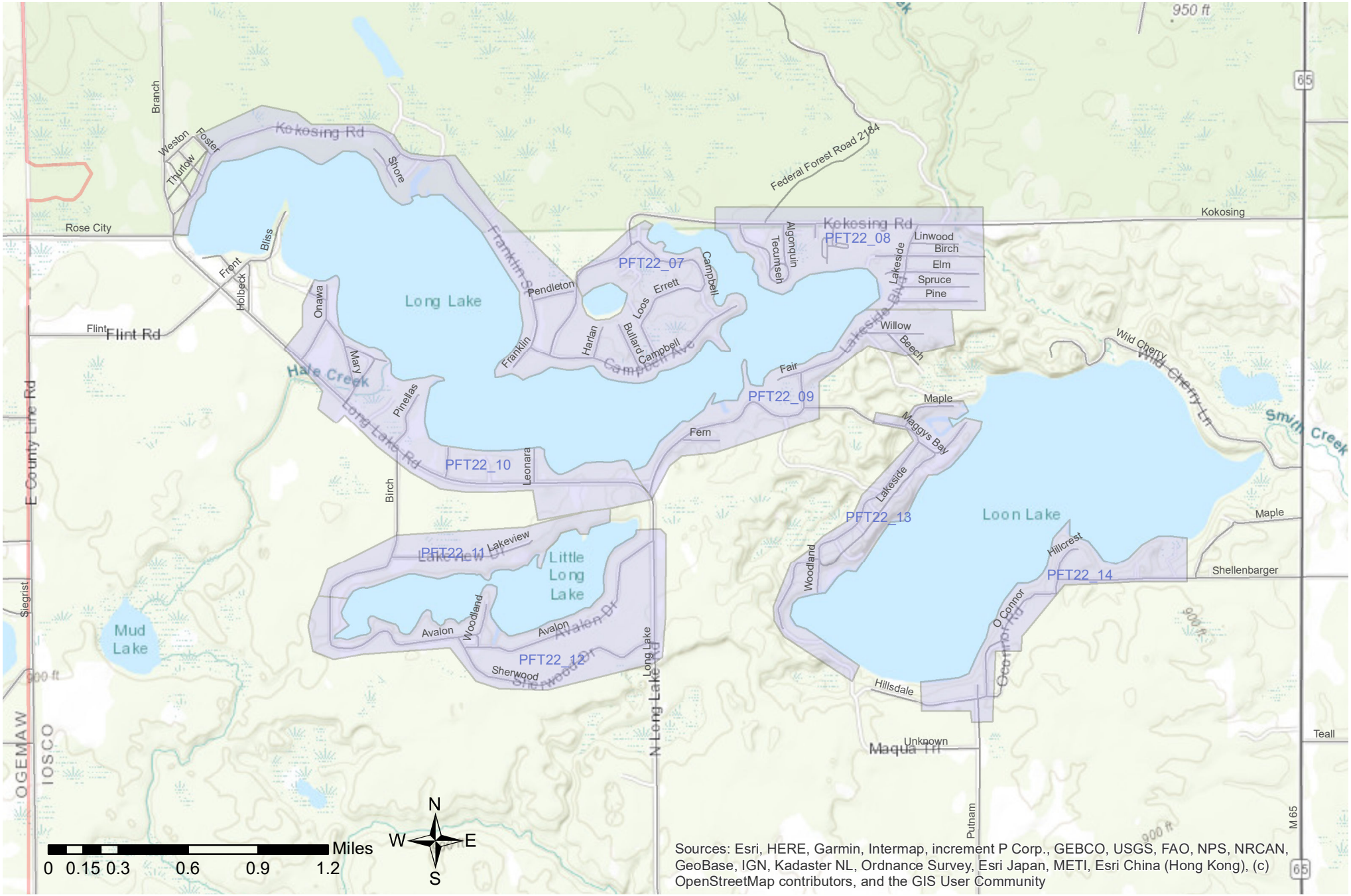
Plainfield Township Gypsy Moth Survey Report 2022 Season (Long Lake Area)



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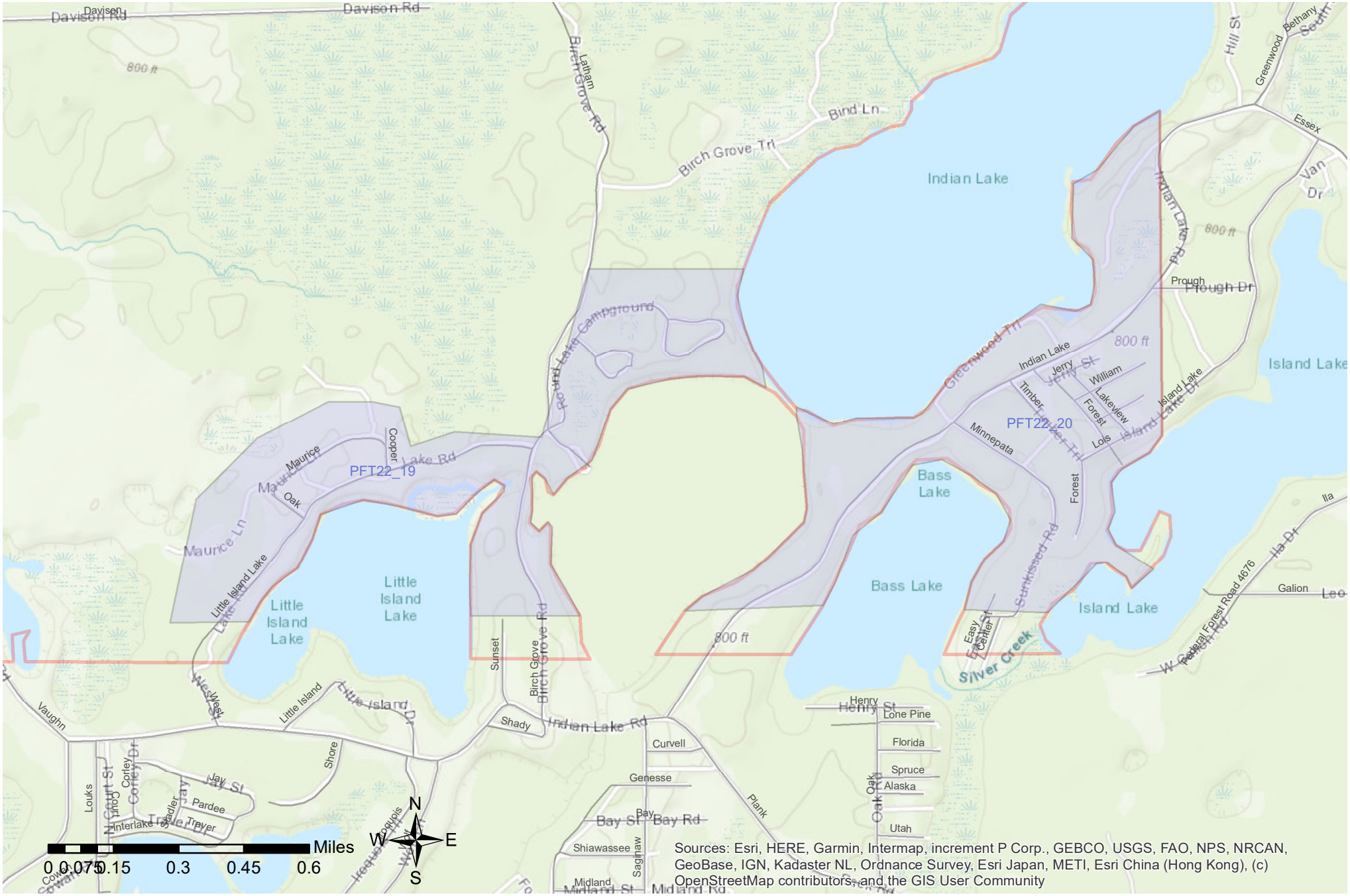
Plainfield Township Gypsy Moth Survey Report 2022 Season (Indian Lakes Area)



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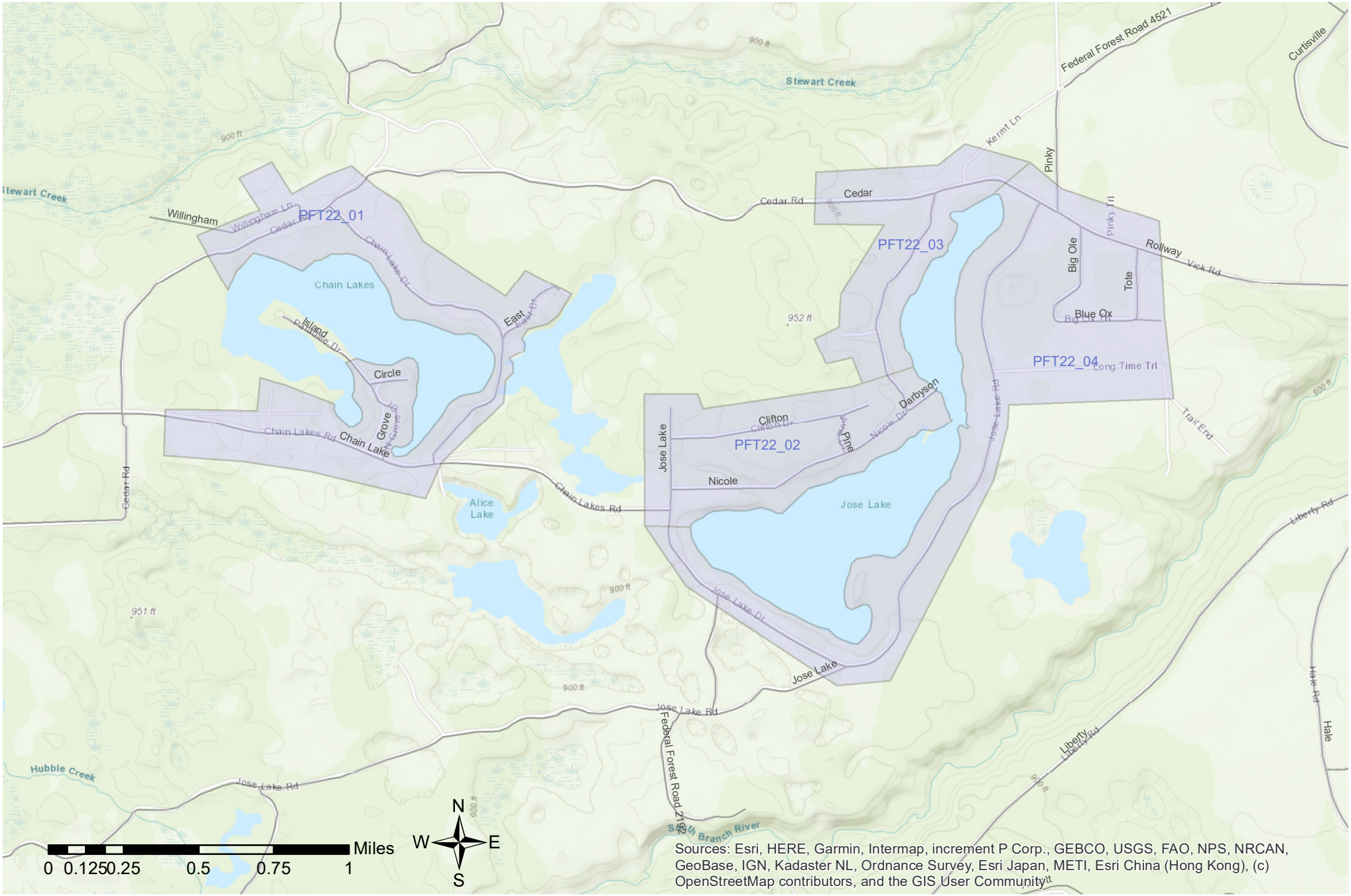
Plainfield Township Gypsy Moth Survey Report 2022 Season (Chain Lakes/Jose Lake Area)



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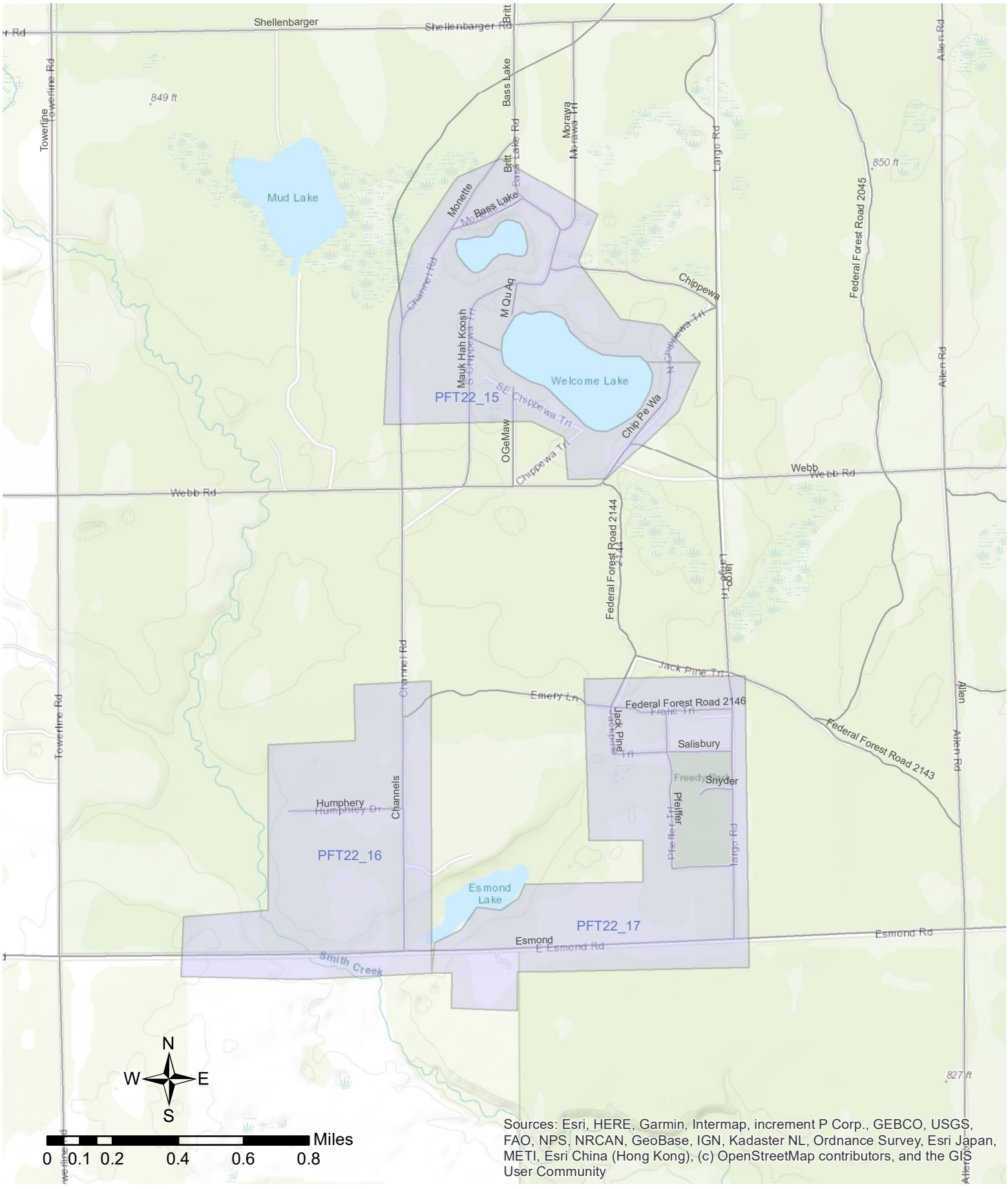
Plainfield Township Gypsy Moth Survey Report
2022 Season (Bass Lake Area)



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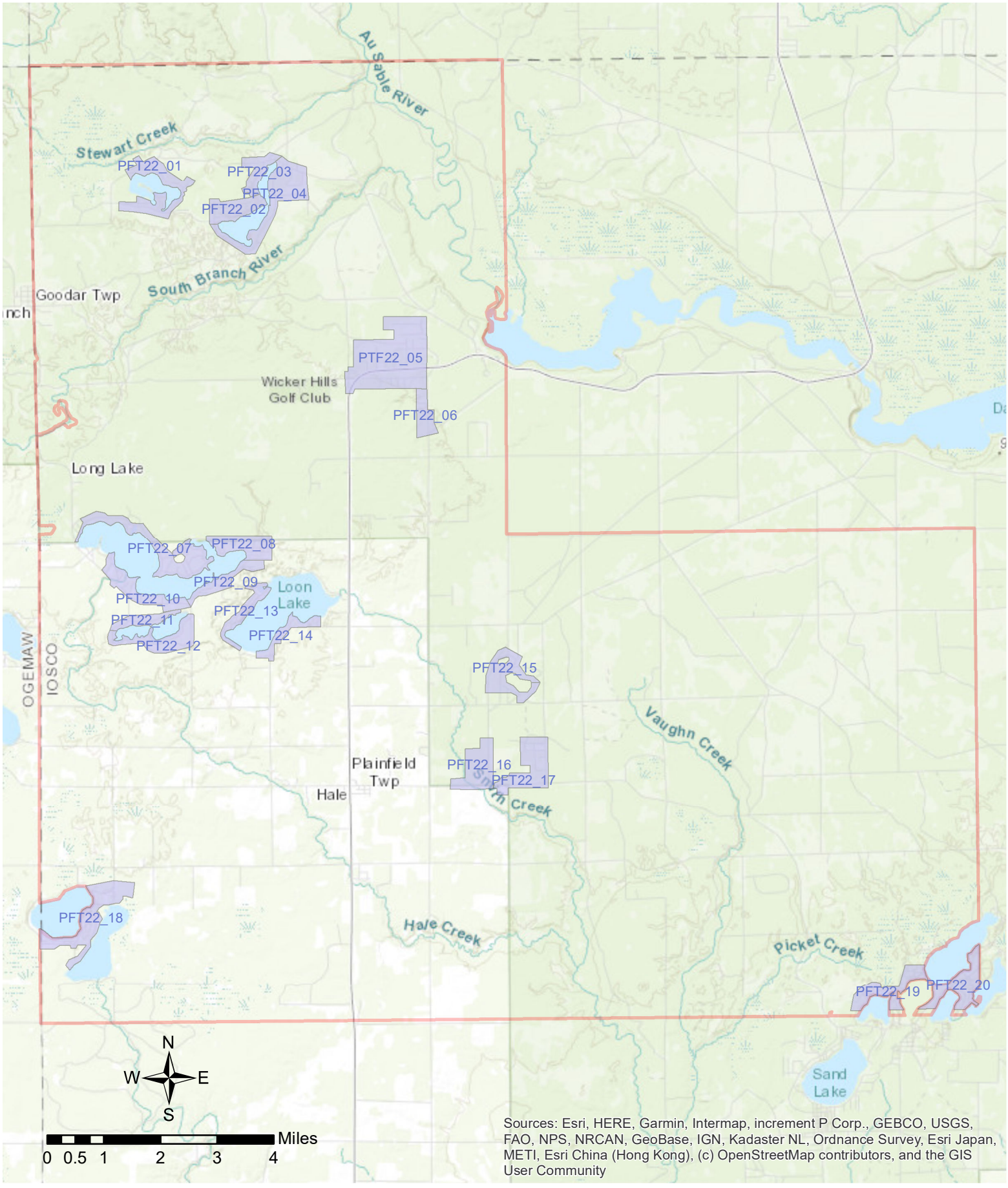
Plainfield Township
Gypsy Moth Survey Report 2022 Season



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