The QB

The North American Lily Society Quarterly Bulletin

Vol. 73, No. 2 | June 2020

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QB Editor Award

The contributors of articles and photographs for the *Quarterly Bulletin* are eligible for the *QB* Editor Award and a cash prize of $100 to be presented at the annual NALS International Lily Show and Symposium Awards Banquet. The awardee need not be present win. A review committee will pick the winner from articles published in the past four issues of the *QB* (September, December, March, June).

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The Quarterly Bulletin of the North American Lily Society

June 2020
Volume 74, Issue 2

Cover Credits

Front: 'Anastasia' by Frans Officer.

Back:

Counterclockwise from top: *Lilium canadense* by Paul Siskind; *Lilium phildadelphicum* by Katarina Durand; Seed Donor Chronicles photos by Patrick Brown.

Copy deadline

July 31 is the deadline for articles to be published in the September *QB*. Send articles to **editor@lilies.org.**

PAUL SISKIND

Lilium canadense grows in sparse populations across St. Lawrence County, N.Y.

Adventures in Stalking the Lily Leaf Beetle in the Wild

By Paul Siskind

Research Trust Fund

In spring of 2019, I received a grant from the NALS Research Trust Fund to conduct two projects studying different aspects of the ecology of the invasive lily leaf beetle in North America:

> **Project 1:** Mapping wild populations of native *Lilium canadense* across St. Lawrence County, N.Y., and tracking the levels of beetle infestation over a three- to five-year period.
>
> **Project 2:** Attempt to clarify whether the beetle is capable of producing a second generation within a single summer (as has been reported in anecdotal observations).

It will take two to five years for me to collect formal data from the projects. This article shares some informal observations from Project 1.

St. Lawrence County is at the northern edge of New York state. The St. Lawrence River forms its northern border with Ontario. It covers 2,840 square miles, making it the sixth-largest county east of the Mississippi River. The northwestern half of the county are lowlands of the St. Lawrence River watershed, whereas the southeastern half of the county rises into the Adirondack Mountains. The county has a sparse population of only 109,000, so there are extensive tracts of relatively unspoiled wetlands, forests and river corridors, along with active and abandoned farm fields (map on Page 28.)

Gardening is a challenge in this region. The northern lowlands are in USDA Zone 4b, and drop to 4a and 3b in the mountains. We have a short growing season of only 120-150 frost-free days. Springtime is rather wet, whereas late summer and fall tend to be dry. Like most places, everyone here complains about the weather, but it's actually the blackflies and ticks that make gardening unpleasant in early summer. Plus, like most of the eastern U.S., overpopulation by deer frustrates gardeners.

Lilies Native to the Area

According to historical records from the New York Flora Association's Flora Atlas, the only *Lilium* species that's native to the county is *L. canadense*. *L. lancifolium* also has naturalized around old farmsteads. *L. philadelphicum* is native to nearby counties, but it hasn't been recorded in St. Lawrence County. *L. michiganense* hasn't been historically recorded in St. Lawrence County either, but some of the populations of lilies that I found appear to be *L. michiganense* (or natural hybrids), discussed below.

Like many species of lilies around the world, *L. canadense* is found in small, sparse populations. They tend to grow intermixed among other plants. This makes it hard to spot them outside of their flowering season. Before my study, I had only seen them twice before: once in a friend's

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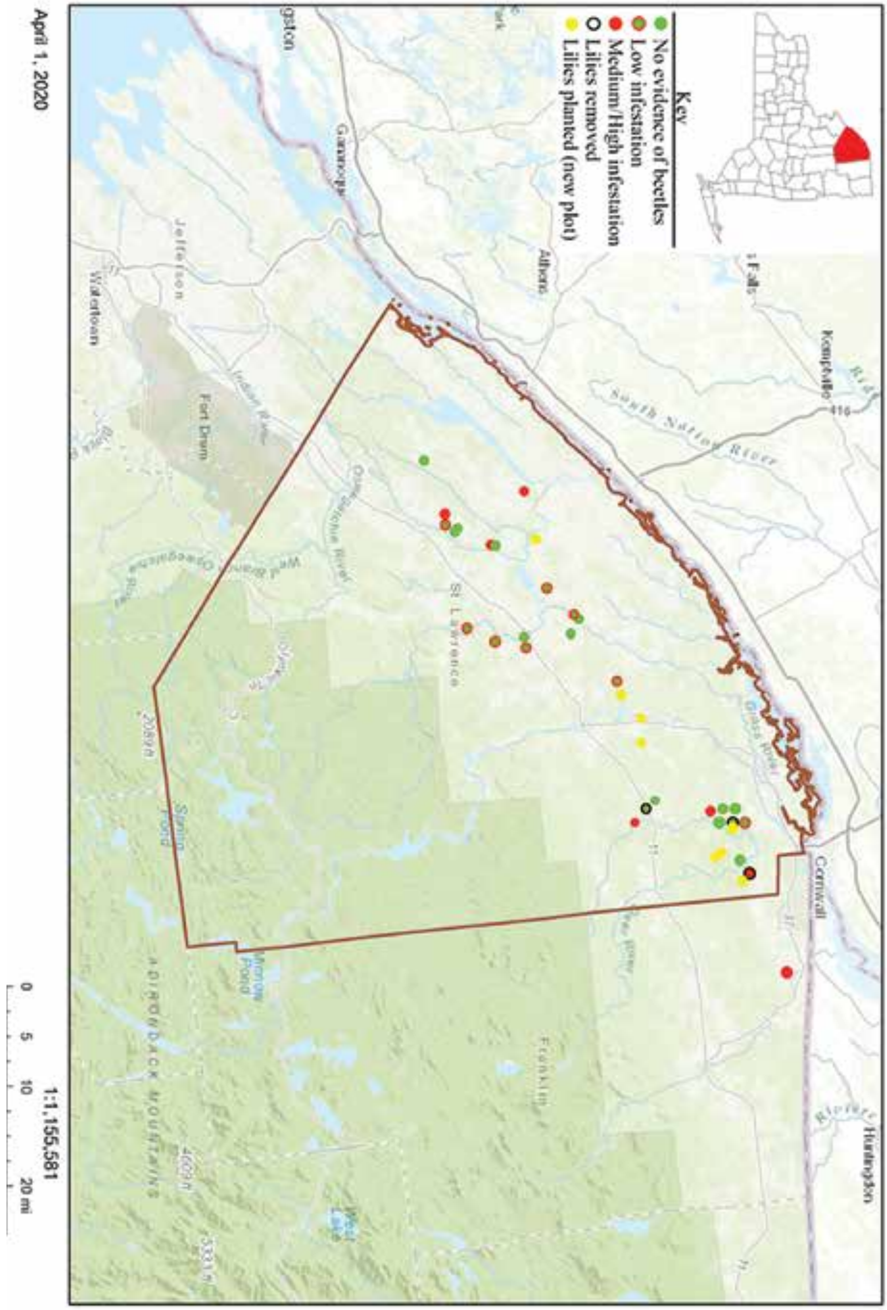
Key
No evidence of beetles
Low infestation
Medium/High infestation
Lilies removed
Lilies planted (new plot)
Cornwall
Huntingdon
South Nation River
Gananoque
Jefferson
Watertown
Fort Drum
St Lawrence
Franklin
ADIRONDACK MOUNTAINS
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April 1, 2020

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field and once in a ditch along a highway.

When I first started trying to locate wild lilies in spring 2018, I relied on two sources:

■ Eldblom and Johnson's "Plants of St. Lawrence County."

■ Word of mouth.

The book lists one spot to see a patch of *L. canadense*. I contacted Anne Johnson, and she gave me four more spots where she had seen them at some point.

Even though lilies are known to grow only sparsely, I assumed there had to be more than just six populations in 2,840 square miles. I thus sent out e-mails to people and organizations that might know where lilies could be growing, including park rangers, agricultural extension offices, science professors, gardening clubs, hiking and canoeing clubs, birdwatchers and so forth. Word seemed to spread. Sometimes I'd meet someone at a social event, and they'd say, "Oh, you're the guy whose looking for the lilies."

These inquiries yielded only about 20 locations where people reported having seen lilies at some point. I found it interesting that seeing a wild lily in bloom often left an indelible memory on people. I got quite a few responses like, "I remember seeing some about eight years ago while I was canoeing near the bridge by the old county road." Some reports turned out to be common daylilies. Two of the reports ended up being patches of *L. lancifolium*. I had expected more of those sightings, given the number of old farmsteads in the region.

After driving around back roads for two summers, I got pretty good at predicting spots where I might find an unreported patch of lilies. During my survey trips, I scoured nearby roads, and other times I would detour to an area where I hadn't yet found any. Spotting an orange dot while whizzing by a field prompted sudden U-turns, and once I got pulled over by a state trooper for driving erratically along a roadside ditch.

When I located a patch of lilies, I had to determine who owned the land and get permission to walk around, set up stakes to mark the patch, and sometimes cordon it off so that people wouldn't disturb the plants. I found a number of websites that helped in tracking down owners. Finding who actually controlled access to roadside ditches and riverbanks was tricky, dealing with county road crews, power companies, and park agencies. All of the landowners that I contacted were amenable to access on their land, and in some cases park administrators asked to help with the project in other ways.

Determining Populations for Study

I eventually settled on 27 populations to include in the study (indicated on the map on Page 28). They span almost the whole 60-mile width of the county, and I also included one site that's 5 miles beyond the eastern border. Almost all of these populations are in the lowland half of the county. Only one population is in the foothills of the mountains.

I was surprised by the variety of environments that I found the lilies growing in. Many sources say that the lilies are often found in moist fields, and I found this to be true. However, even though many sources say that they are also found at the edges of moist woodlands, I couldn't find any in that kind of location. Surprisingly, a lot of

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L. canadense growing in roadside ditch.

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the populations that I found are in roadside ditches, although this could be because they're easier to spot alongside a road.

In these ditches, I found lilies growing in soil ranging from loamy (or even gravelly) to humusy. A few of the patches are on actual riverbanks or floodplains, but I didn't find any growing in spots that would be submerged throughout the growing season. Thus, moisture early in the season seems to be more important than any particular type of soil. The lilies also seem to grow taller and more robustly in spots that get some shade rather than full sun all day.

While it's easy to spot the lilies when they're blooming, it's hard to spot them at other times in the season, even within a plot that's marked off. The easiest time to get a complete count is during the first two weeks of a season, when the lilies sprout slightly earlier than most of the surrounding grasses and forbs. With some practice, it's pretty easy to discern the color and shape of unopened lily shoots.

Once the lily opens its whorls, its unique shape is different than most other plants around them. However, once the goldenrod and other forbs leaf out, the lanceolate leaves all blend together, and it takes concentrated scouring to find them. It's even surprisingly hard to find lilies growing among stands of tall grasses.

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One of the standard ways of surveying plant populations is to use a quadrat, a square frame placed on the ground along a transect of the plot, which makes it easier to count the plants and extrapolate the total numbers. However, I found that using

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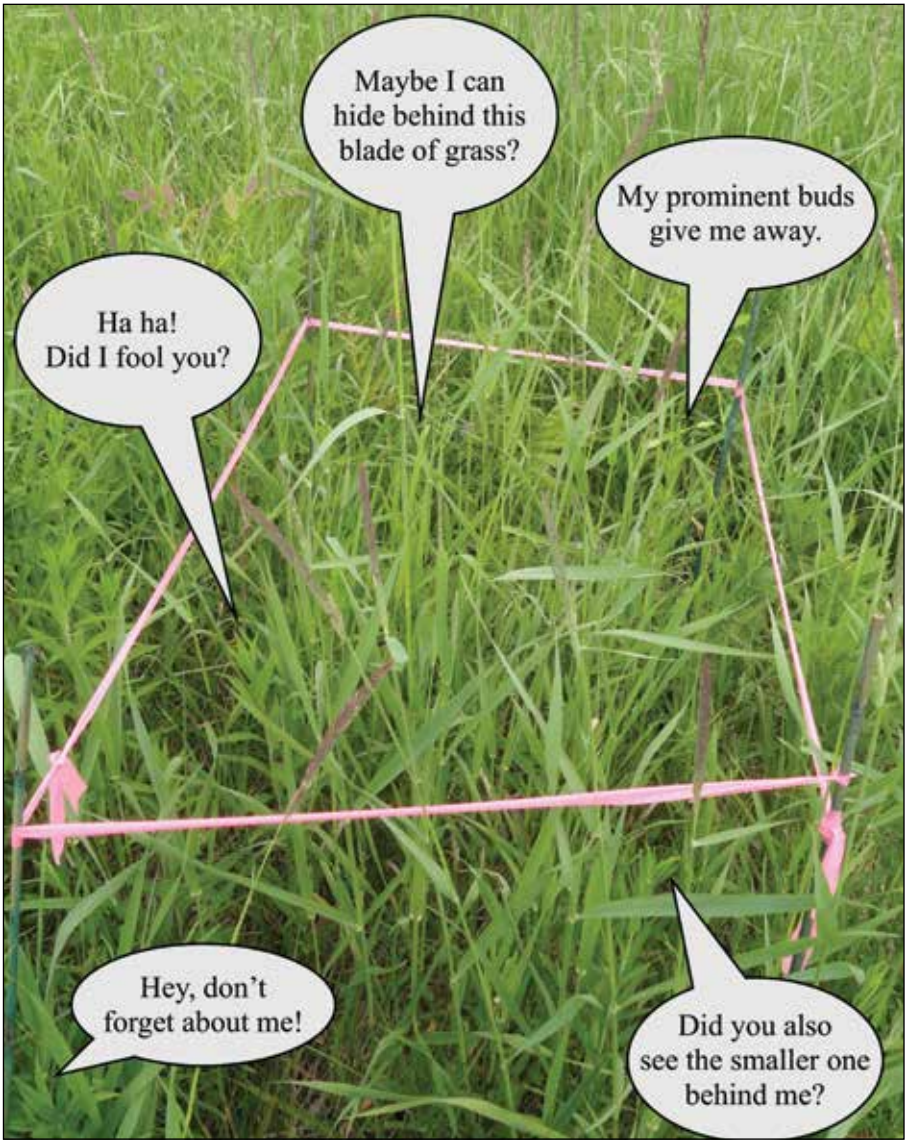

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Counting plants.

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a quadrat posed a risk of bending the surrounding plants, which could break the lily stems. Indeed, lilies in the wild are vulnerable to being crushed by tall grasses weighed down by rain, by deer walking through the grasses, by nearby tree branches blowing in the wind, and by ATVs.

However, a bigger physical threat to the populations of lilies that I found is roadside mowing. Because St. Lawrence County is a rural area with an overpopulation of deer, road crews bushwhack wide strips along roadsides so that drivers have a clearer view of deer. A number of the patches in my study get mowed down every summer. Obviously, this drastically affects the health of those patches, and it confounds the data in my survey, but the effects might not always be in ways that we presume (discussed below).

Preliminary Observations

Because my study tracks data over time, I won't have full results to report for few years. However, here are some interesting preliminary observations:

The size and density of different populations varies greatly. I found a number of very small populations of just two to eight plants in 1-2 square yards, growing far away from any other lilies. Conversely, I also found a few very large populations. One population in a wet meadow had more than 200 very healthy plants found in seven or eight distinct patches within an overall area measuring about 150 feet by 200 feet.

Another population had more than 450 plants crammed into four patches in roadside ditches near to each other. However, this appeared to be an unusual situation, because the vast majority of the plants were very small, usually with just one or two whorls of leaves. This population gets mowed down twice each summer, but even the young plants that are short enough to survive the mowing (e.g., just one whorl of three leaves) brown out and go dormant by midsummer.

I asked the highway superintendent if I could stake it off so that his crew would mow around them. He wouldn't do that, but he agreed to allow me to dig them up for replanting. I noticed that there was a dense network of stolons connecting these bulbs, more so than in other populations. My hypothesis is that the consistent mowing never allows the plants to grow long enough to form a large, healthy bulb, so instead the plants send out lots of stolons, which create dense patches of stunted plants.

There were two other patches that get mowed down (or were going to be paved over), so I also dug those up. I ended up with a couple of hundred bulbs, ranging

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Rhododendron occidentale

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A couple of hundred lily bulbs were relocated from a roadside ditch where the plants were regularly mowed.

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from single scales to large, robust bulbs. I replanted these bulbs with two strategies:

■ To increase the size of some of the small populations.

■ To try to establish some new populations in areas where I hadn't found any.

These eight new areas are marked in yellow on the map.

I won't know for a few years whether any of these new patches will become established, but it's fun to think of myself as a lily version of Johnny Appleseed.

Measuring Infestations

When I first designed this study, I planned to do a thorough quantitative analysis of the level of infestation by calculating the number of beetles and larvae per total number of lily leaves in each plot. I also started out with trying to record how extensive the leaf damage was on each plant.

After I started trying to actually collect this detailed data, however, I realized that it would be tremendously difficult for me to do this with any accuracy, for a number of reasons:

■ The number of plants within each patch varies over the course of the season: young plants brown out in midsummer; tall plants can get eaten by deer; patches get

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Damage on some lily leaves where no lily leaf beetle adults or larvae were found may have been caused by snails or other pests.

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trampled or mowed down; and so forth.

■ It's hard to take a precise count of plants among the surrounding plants.

■ The beetles often fall off the plants or fly between plants before I can count them accurately.

■ Many lily leaves appeared to have leaf damage even though I had not found any beetles or larvae in the patch. I eventually realized that other critters were munching on the leaves. A common culprit seems to be snails.

I thus decided that it would be much more practical (yet sufficiently rigorous) to classify the levels of infestation into four broad categories:

■ No evidence of infestation (no beetles or larvae seen; no leaf damage, egg cases or frass).

■ Low infestation.

■ Medium infestation.

■ High infestation.

Having looked qualitatively at these populations of lilies over two summers, I've found that very few patches have medium levels of infestation. Rather, most patches have either no signs of infestation (or perhaps just an occasional beetle or two)

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or are heavily infested. This suggests that a critical number of beetles must accrue before an infestation can get established, but once it does it quickly builds into a heavy infestation. This is a common pattern when invasive species arrive in a new area.

I'm hoping that over time this study sheds light on factors involved in how infestations might spread between populations. For example, I've found instances where a patch of lilies shows no sign of beetles even though there are heavily infested patches nearby. In one case, a small patch of eight wild lilies within a village park has shown no signs of beetles, even though there are home gardens with heavy infestations about 1,500 feet away.

There are a number of factors that could affect the spread of infestations:

■ Whether beetles find lilies through sight versus smell (i.e., prevailing wind direction might play a role in spreading infestations).

■ How long beetles can survive without having lilies to feed on (limiting how far can they disperse).

■ Whether the beetles disperse only at specific times in their life cycle.

■ Whether the beetle might have two breeding cycles in a single summer.

■ Whether the number of lilies affects whether an infestation can get established (i.e., before they destroy all their food).

Understanding these factors might be helpful in fashioning strategies for controlling the spread of the beetle, perhaps even in unexpected ways. For example, the dense population of stunted lilies in the roadside ditch showed no signs of the beetle, even though the beetle is present in nearby areas. Perhaps mowing was a factor that prevented the beetle from becoming established there?

Indeed, the first mowing of this patch has been occurring at the time when the beetle begins laying eggs. If the lilies are mowed down before the larvae can pupate, that might prevent the beetle from becoming established in that patch. Yet, the lilies seem able to survive yearly mowings (albeit as a patch of stunted clones). Thus, well-timed mowings of patches of wild lilies might (paradoxically) protect them until the imported parasitic wasps that control the beetle move into the area.

A New Mystery

An unexpected side-effect of this study is that I've found populations of native lilies growing in counties where they hadn't been reported previously.

One particularly interesting finding is a patch of lilies that look a lot more like *L. michiganense* than *L. canadense.* (see photo) This would be significant, because *L. michiganense* is listed as critically endangered in New York, typically found in five or fewer sites. However, the relationship of *L. canadense* and *L. michiganense* has been debated over the decades, and some writers have considered them to be variants of the same species.

Other writers believe that they are different species but related closely enough to produce natural hybrids where their ranges overlap. A number of state botanists hope to discern whether these are indeed *L. michiganense*, a natural hybrid, or perhaps an unusual variant of *L. canadense*. If they turn out to be either *L. michiganense* or a hybrid, they would be the easternmost population of *L. michiganense* on record. ***QB***

PAUL SISKIND

These lilies may be *L. michiganense,* a natural hybrid or an unusual variant of *L. canadense*.