

Long Island Botanical Society

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The Hardy Kiwi (*Actinidia arguta*) Eradication Project At Coffin Woods Preserve, Locust Valley, NY

By Allan J. Lindberg
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Introduction

In December 2013, the North Shore Wildlife Sanctuary (NSWS), along with its partners the Long Island Botanical Society and Portledge School, was awarded a grant by the Long Island Invasive Species Management Area (LIISMA) to eradicate an approximately 2000-square-m population of hardy kiwi (*Actinidia arguta*). This species has been classified by LIISMA as an “early response” invader: plant species that have fewer than five infestations in the area. This designation increases the likelihood that localized invasive populations will be found, contained, and eliminated before they become widely established.

Project field work began in November 2014. The physical eradication of the *Actinidia* was accomplished in early May 2015. Site monitoring for regrowth of *Actinidia* and its removal began in late May 2015 and continued through mid-June 2016.

Site Description

The area targeted for eradication is a small, less-than-half-acre section of Coffin Woods Preserve, a 73-acre preserve, part of the North Shore Wildlife Sanctuary system in the Village of Matinecock, Nassau County, New York (Fig. 1). This mature



Figure 1. *Actinidia arguta* infested site as it appeared in 2014, vines covering trees and ground. [Photo by L. Lindberg.]

forest, with towering tulip poplar (*Liriodendron*), oaks (*Quercus sp.*), and beech (*Fagus sp.*) trees, also includes some shagbark hickories (*Carya ovata*) and one of the largest butternut (*Juglans cinerea*) trees on Long Island. A rare population of *Euonymus americana* (American strawberry-bush) occurs there, as well as a vigorous population of *Dendrolycopodium obscurum* (flat-branched tree-clubmoss), hundreds of *Trillium erectum* (red trillium) and *Erythronium americanum* (yellow trout-lily), and several species of ferns. The predominant ecological community is an oak-tulip tree forest. The preserve is bounded on the north by Long Island Railroad tracks, just south of Oyster Bay Road. The southern boundary is the Portledge School campus, and the east and west boundaries have private residences.

Publicity and Recruitment of Monitoring Volunteers

A one-page article announcing the grant was published in the Winter 2014 edition of the LIBS newsletter (Quart. Newslett. Long Island Bot. Soc. 24:2). Four volunteers were recruited to monitor any regrowth of the *Actinidia* and remove other invasives as needed. Just prior to the physical work, informational signs were posted at the site, notifying the public of the “Invasive Species Control Project,” the species being controlled, and the partners sponsoring the project.

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Long Island Botanical Society

Founded: 1986 • Incorporated: 1989

The Long Island Botanical Society is dedicated to the promotion of field botany and a greater understanding of the plants that grow wild on Long Island, New York.

Visit the Society's Web site
www.libotanical.org

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Society News

LIBS receives grant from Biodiversity Books, Inc. In March 2017, LIBS Treasurer Carol Johnston received a letter saying, in part: "We are pleased to enclose for Long Island Botanical Society an unrestricted one-time grant of \$500 from Biodiversity Books, Inc. at the recommendation of its President Mr. Guy A. Tudor. . . . Keep up the good work!" LIBS sincerely appreciates this grant! What a nice surprise. Thank you Guy!

Traveling Exhibition of Native Plant Drawings. At the May 2017 LIBS meeting, Diane Bouchier presented an excellent program on "Botanical Art: Tradition and Revival." Working in cooperation with the Long Island Native Plant Initiative, Diane has created a series of colored pencil drawings of Long Island native plants that will be on exhibit from June to August 2017 at Sweetbriar Nature Center in Smithtown, and in September and October at Seatuck Environmental Association, Scully Mansion in Islip. The goal of the exhibition is to make the public more aware of the subtle beauty of these plants that are so essential for our pollinators.

LIBS is acknowledged by East Hampton Garden Club. LIBS has been working with other groups for the past 30 years trying to save populations of native orchids on the South Fork. At Barnes Hole in East Hampton Township, several groups are currently working to save New York State's last known population of the yellow fringed orchid, *Platanthera ciliaris*. Julie Sakellariadis and the East Hampton Garden Club have been coordinating the effort and they were recently honored with the Native Plant Conservation Award, presented by the New York Flora Association, for the effort to preserve *P. ciliaris*. In accepting the award, Julie wrote: "I'm stunned and thrilled, and especially want to thank the many wonderful partners and advisers who share the glory of this award with us: the Town of East Hampton, the East Hampton Highway Department, the South Fork Natural History Museum, the Broadview Property Owners' Association, The Nature Conservancy, Saskas Surveying Co., Long Island Botanical Society and the New York Botanical Garden."

"Atlas of the Flora of Long Island, New York" by the LIBS Flora Committee has been accepted for publication by the Torrey Botanical Society and will be published as volume 30 of *Memoirs of the Torrey Botanical Society*. Printing is planned for 2019.

LIBS member Larry Liddle has moved to Santa Barbara, California and he will be dearly missed. Larry has been an active member of LIBS for many years leading field trips, writing articles for the newsletter, presenting programs, and regularly attending monthly meetings. Larry participated in the LIBS 30 year anniversary trip to the Sierra Nevada in California. Thank you Larry, for your service to LIBS, and keep in touch.

Eric Lamont and Mike Feder published in June 2017: "*Eupatorium capillifolium* (Asteraceae) new to New York" in *Phytoneuron* (2017-43: 1-4). [Abstract: *Eupatorium capillifolium*, dog fennel, is reported new to the flora of New York based on a 2015 collection from eastern Long Island, Suffolk County, and observations from 2013 to 2017.]

(Hardy Kiwi continued from cover)



Figure 2. Heavy equipment used by the landscape contractor to clear the site to bare ground. [Photo by C. Johnston, 4/14/15.]

In addition, an article entitled “[Invasive Hardy Kiwi at Coffin Woods](#)” written by LIBS member Dan Kriesberg, one of the project’s volunteers, appeared in the “Locust Valley Leader.”

Pre-removal Plant Inventories

Plant inventories carried out by a group of students from Portledge School supplied information on the species occurring in the *Actinidia*-infested site as well as an adjacent control site. The infested and control sites were in close proximity and had the same degree of forest cover. Two belt transects were run through each site.

The *Actinidia*-infested site was densely overgrown with another non-native, *Akebia* (five-leaf), and with *Toxicodendron* (poison ivy). At that site both belt transects were run along the trail edge in order to limit the students’ exposure to poison ivy and other harmful plants. The control site lacks poison ivy and is more typical of a forest shrub layer, so one belt transect was located along the trail edge, and the second from the trail into the center of the control site.

Physical Removal of the *Actinidia* Population

The physical removal of the *Actinidia* population was done with equipment well-suited to the requirements of the removal. The pre-removal mowing of the infested site

revealed many downed *Liriodendron* (tulip poplar) trunks of 1 m diameter and several large surface boulders. These were moved to the site perimeter to effectively finish the remainder of the work. An excavator then carefully scraped the entire site to a depth of 5 to 50 cm, removing a majority of the surface vegetation below the root zone (Fig. 2). The debris was loaded into dumpsters, and removed from the preserve for disposal. The site was then given a rough grading with the excavator, followed by final grading using a tractor rake (Fig. 3).

Initial observations indicated that the *Actinidia* was effectively removed from 95 percent of the site, with sprouts regenerating primarily from the area at the trail/removal site interface. Shallow removals (5 cm) had been done at the trail interface to avoid damaging the preserve trail system. In areas of removal deeper than 15 cm, the *Actinidia* seems to have been successfully removed.

Post-Removal Site Monitoring

Prior to site monitoring, eight permanent 2-square-m quadrats were installed and marked with stake flags. Surveys conducted by volunteers from the Long Island Botanical Society started on May 28, 2015 and continued at 2- to 3-week intervals through the end of the growing season (Fig. 4). A final inspection was done on June 6, 2016. On each survey day, a general random inventory was first conducted throughout the cleared site, changing the route each time to ensure site coverage. Once the random walk-through was completed, each of the eight quadrats was examined for percent plant cover and species present. Plants were then listed in a database of plant species

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Figure 3. Site after work was completed. Information sign is posted on trees. [Photo by L. Lindberg, 5/13/15.]

(Hardy Kiwi continued from page 19)



Figure 4. Long Island Botanical Society volunteer researchers (l to r): Bill Titus, Andy Greller, Project Coordinator Al Lindberg. [Photo by L. Lindberg, 7/8/15.]

found at the site. When *Actinidia* regrowth was located, each plant was numbered and flagged for eradication, and photographed.

As expected, these surveys mostly revealed plant species that had previously occurred in the removal site or within Coffin Woods. Species uncommon in the preserve but new to the site were non-natives *Paulownia tomentosa* (princess-tree) and *Catalpa speciosa* (northern catalpa); entirely new to the preserve is *Macleaya cordata* (plume-poppy) which appeared as several seedlings in the cleared ground. It is possible that the *Macleaya* was brought in with the removal equipment. However, given Coffin Woods' estate history, it is more likely that the species occurred at the site during the estate period, its seeds remaining in the soil seed bank.

Eradication of *Actinidia* Regrowth

In general, the *Actinidia* regrowth was in the form of small vining plants that could be traced back to a fragmented root, or in a location that couldn't be gotten into by the excavator. A total of 37 re-sprouts were located. Each individual plant was treated with Roundup™ herbicide. The plants responded well to the herbicide treatment; no reapplication was needed, and the plants were dead to the roots within ten days. These plants remained flagged through the winter of 2015–2016, and when checked the following spring, there was no sign of re-sprouting. One newly re-sprouted plant was found during the June 2016 survey, suggesting that a rootstock

could have remained dormant in the soil for at least a year following the eradication.

Fortunately, this population appears to have consisted of all male plants. During the entire survey no female flowers, fruit, or obvious germination of plants from seed were observed.

Summary

Although the eradication of the hardy kiwi population at Coffin Woods has been very successful, there is no way to guarantee that we have removed all the *Actinidia*. Finding a freshly sprouted *Actinidia* during our final survey suggests that there are probably root fragments that could re-grow at the site for years to come. Therefore, the site should be re-checked several times a season for the next three to five years. If re-sprouting plants are found, they should be treated and/or removed.

At this point, the eradication site is recovering quite nicely, and about 85% of the site is totally revegetated (Fig. 5). During the growing season, the cover in many sections has become quite dense, dominated by *Rubus sp.* (blackberry) shrubs and *Phytolacca* (pokeweed), often reaching seven feet tall. Normally this would be desirable, but in this study site, the cover should be kept low and workable to adequately monitor and control re-invading *Actinidia*. Ideally, the area should be mowed periodically, not only to keep the site manageable but to help in controlling other invasives that inhabit the site.

Our method of eliminating and monitoring the *Actinidia* worked well. However, the question remains, is this the best way to control a population of *Actinidia arguta*? While one would ideally use only physical removal, the combination of physical and chemical control was undoubtedly more



Figure 5. Vegetation recovery at site, July 2016. [Photo by L. Lindberg.]

effective. We did our physical control first, opening the site with heavy equipment, removing the material and following up with monitoring, using chemical control as a backup. Unfortunately, this left a good number of rootstocks to re-sprout. A better method may have been to first locate, cut and apply herbicide to major vines before the physical removal, giving the vines enough time to die to the roots. Subsequent monitoring could then indicate a back-up chemical control where needed.

Observing the re-vegetation of a site stripped to mineral soil was an educational experience for us all. As the vegetation returned, we quickly learned what the soil seed bank had to offer. Each survey was truly an interesting walk-through, documenting which species re-populated the site, which ones were new, and puzzling over “mystery plants” to identify. Our surveys also revealed that the *Actinidia* had not been totally eliminated, and gave us the opportunity control what remained.

Overall, the methods used during the project—removal, pre- and post-removal monitoring, eradication and post-eradication follow-up—all worked well. With a little fine tuning, our methods could be suitably used by other groups in future hardy kiwi eradication projects.

Acknowledgments

The Coffin Woods Hardy Kiwi *Actinidia arguta* Eradication Project has been accomplished by a partnership of organizations. In particular, I would like to thank Steve Young of NYSDEC and LIISMA for his help and guidance; Carolyn Chiu and the Advanced Placement Biology Class of Portledge School for their work on the initial plant surveys; Andy Greller, Dan Kriesberg, Lois Lindberg and Bill Titus of LIBS for their excellent botanical work on the post-removal plant surveys; and finally, Carol Johnston and Tom Hornosky of NSWS for their photography and support throughout the project.



University of the State of New York.
16th Advanced Academic Examination.
BOTANY.
June, 1883—Time two and one-half hours, only.

48 credits, necessary to pass, 36.

1. Name the sub-kingdoms of plants and, give the characteristics of each? 4
2. Name the classes into which each sub-kingdom is divided, and name at least one plant in each class. 5
3. What are the four characteristics of an exogen? 4
4. Define in words or make drawings of, a fibrous root, a napiform root, and fascicled (fibro-tuberos) roots. 3
5. What are tendrils and what is their office? 1
6. Distinguish between suckers and stolons. 2
7. Describe the process of grafting by scions. 2
8. What are sessile leaves? 1
9. Name the two classes of compound leaves and make a drawing of each. 4
10. Draw an ovate leaf with an acuminate apex and crenate margin. 3
11. Define the terms raceme, spike, and umbel. 3
12. What are perfect flowers? staminate flowers? irregular flowers? 3
13. Describe the fertilization of the ovules in the flower. 2
14. What is the pericarp of the fruit? 1
15. What is a drupe? A legume? A five-valved capsule? 3
16. Distinguish between the terms *species* and *variety*. 2
17. Name the order, or family, to which each of the following belongs: *Ranunculus acris*, *Erythronium Americanum*, *Fragaria vesca*, *Viola cucullata*, *Pyrus malus*. 5
18. How many botanical specimens have you collected and prepared for your herbarium this season? 5

Carefully read and obey the following directions:
Do you now, at the close of this examination, conscientiously declare, that you had no previous knowledge of the questions to be proposed, that you have neither given to any other scholar, nor received from any source, explanations or other aid in answering any of them. If so, write in the next line after the end of your set of answers, near the right side of the paper, the words "I do so declare."

and underneath subscribe your name.
Every set of papers lacking this full declaration and signature, however satisfactory in other respects, will be rejected, on the presumption that the required declaration could not conscientiously be made.
Fold your MS. in proper form for filing, and endorse the last leaf with the name of the institution, your own name, the subject, and the date of the examination.

Try this High-School Botany Exam

This image, found at <http://www.forgottenbookmarks.com/2011/03/botany.html>, is a copy of the 1883 Botany Regents Exam. Stony Brook University professor Keith Sheppard, who provided this link, states that this is the oldest high school Regents exam he has found to date (of all science subjects). He reports that the first Regents botany exam appears to have been given in November 1878. The 1883 exam is not available through the NY State Archives--their holdings start in 1890, nor is it in the Library of Congress (earliest exam available is 1887).

Will someone volunteer to provide an answer key?

Book Review

By MaryLaura Lamont

Bees : An Identification and Native Plant Forage Guide

by Heather Holm, 2017.

ISBN 9780991356355 (Paper \$24.95) 228 pp.

Pollination Press, Minnetonka, Minnesota

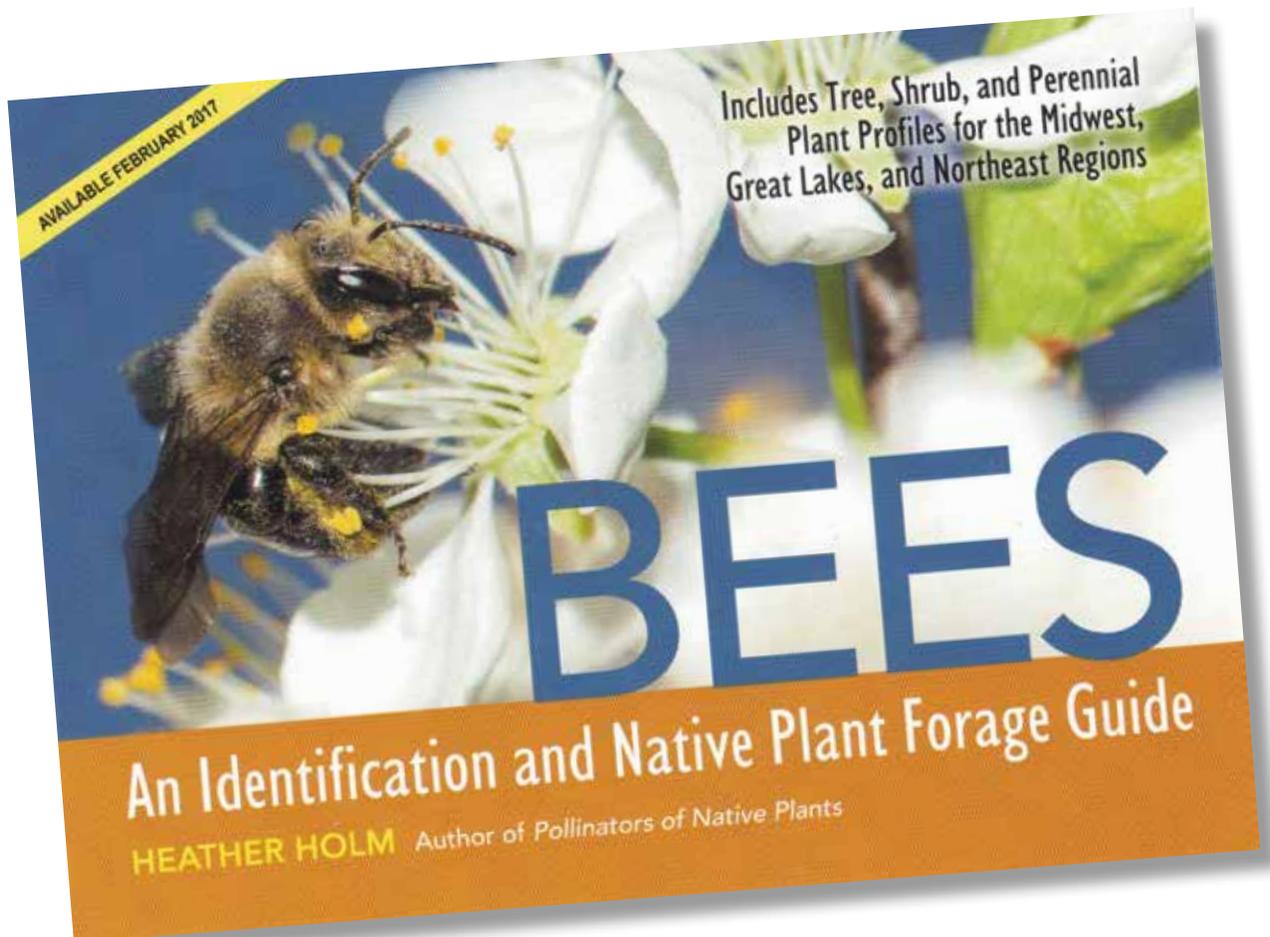
Some people may wonder why I am reviewing and highly recommending a book on bees in the newsletter of a botanical organization. The answer is that while it is an excellent guide to just about everything you may want to know about bees and their life histories, over half the book deals with the important plants these bees depend on.

Author Heather Holm has done an outstanding job of writing about bees and the plants they interact with. She discusses the insects' all-important nectar sources as well as plant materials certain bees use for nesting. These plants include wild and cultivated flowers, native shrubs, and large and small trees. She shows flowering timelines and which bees use each plant. She discusses the plants' habitats and soil types and their sun and shade tolerances. This larger-format

field guide discusses just about everything you could think of concerning the interconnected nature of bees and plants.

The top-notch close-up images are not just of bees, but the flowers and plants they depend on. Icons of butterflies, other insects and birds denote the importance of the plant for other species. Additionally, Holm writes about the factors causing bee declines, such as the awful pesticides that contain neonicotinoids.

The book covers bees found from the Northeast to the Midwest. For every book purchased one dollar is donated to the Wild Bee Squad Fund to support native bee research by the University of Minnesota. This book is very worthwhile and a great resource guide. I highly recommend it.



FIELD TRIPS

July 22, 2017 (Saturday) 10 AM (Co-listed with the Torrey Botanical Society)

Pacama Vly

Krumville, Ulster County, NY

“Joint Field Meeting with the Olive Natural Heritage Society”

Trip Leaders: Uli Lorimer and Paul Harwood

For further information on this trip please go to the Torrey Botanical Society website at www.torreybotanical.org/field-trips/

August 12, 2017 (Saturday) 10 AM

Calverton & Manorville sites: sandy roadsides, abandoned cranberry farms, and coastal plain ponds

Suffolk County, NY

Trip Leader: Eric Lamont

E-mail: elamont@optonline.net

We will see a variety of plants native to dry, sandy soils as well as wetland species including carnivorous plants and maybe an orchid or two. We will visit one or two coastal plain ponds but high water levels from this year's wet spring may limit the number of species.

Meeting Place: Meet at the McDonald's, exit 70 on the LIE (495). Take Route 111 south ¼ mile to the McDonald's and we will proceed to the first site.

Bring water, lunch/snack, insect repellent and sunscreen. The only bathroom facilities at lunch are the bushes. For more information or to register for the walk please contact Eric by email the week before the walk. Please contact Eric by email if torrential rain showers are predicted. For the day of the field trip, Eric's cell phone number is 631-235-7641.

September 9, 2017 (Saturday) 9 AM – 3 PM (Co-sponsored by NYFA & LIBS)

Jones Beach State Park, Nassau County, NY

“Beach Botany at Jones Beach”

Trip Leaders: Steve Young and Mike Feder

Long Island's beaches have a flora unique to the state, and what better place to learn it than the most famous beach in New York. Jones Beach has a diversity of habitats from the open beach with rare plants like seabeach amaranth and seabeach knotweed, to dunes, back dunes, and interdunal swales where a wide variety of herbs, shrubs and trees, common and rare, survive at the mercy of the shifting sands. Join leaders Steve Young from the NY Flora Association and Mike Feder from the Long Island Botanical Society for a look at this interesting ecosystem. Please bring a lunch, water, sunscreen and insect repellent.

If you plan to attend and for trip details, contact Steve Young at 518-588-8360 or nyflora1@gmail.com

September 24, 2017 (Sunday) 10 AM (Co-listed with the Torrey Botanical Society)

Mount Loretto Unique Area, Staten Island, NY

Trip Leaders: Ray Matarazzo and Will Lenihan

For further information on this trip please go to the Torrey Botanical Society website at www.torreybotanical.org/field-trips/

September 30, 2017 (Saturday) 10 AM (Co-sponsored by LINPI, LIBS & Torrey Botanical Society)

TNC Mashomack Grassland

Shelter Island, Suffolk County, NY

The Nature Conservancy Visitor Center 79 South Ferry Road, Shelter Island, NY

Trip Leaders: Clara Holm, LINPI Board Member and Seed Collection Coordinator, Mid-Atlantic Regional Seed Bank, Green Belt Native Plant Center, Staten Island, NY

Uli Lorimer, Torrey Botanical Society and Native Plant Curator, Brooklyn Botanic Garden, Brooklyn, NY

The Long Island Native Plant Initiative, Long Island Botanical Society, and Torrey Botanical Society are teaming up to host a fall botanical hike through the grasslands at The Nature Conservancy's Mashomack Preserve. The day's botanical journey will begin at the Visitor Center and will traverse a wide diversity of coastal and upland ecological communities en-route to the extensive grasslands within the core of the preserve. Fall is the perfect opportunity to examine, experience, and botanize the unique grassland-dependent flora, as the native grasses and herbs will be at peak bloom, exemplifying the splendor and beautiful vistas of Mashomack's grasslands. Fall migration may also provide the opportunity to catch glimpses of more uncommon wildlife during this stroll through one of the region's most beautiful preserves.

Please bring lunch, sunscreen, tick/insect repellent, water and wear long pants and sturdy footwear. Please provide yourself extra time for travel by ferry.

To register, please visit:

<https://mashomackgrasslandbotanicalhike.eventbrite.com>

Note that registration is required and limited, so register early!

Directions: From South Ferry, Greenport: Take Route 114 North for 1 mile to The Nature Conservancy Visitor Center (right hand side of road).

From North Ferry, Noyak: Take Summerfield Place (0.1 mile) off the ferry, turn **right** on Grand Ave S. (0.3 mile), and **left** onto Chase Ave. S. (0.1 mile) through Shelter Island Heights, which will naturally transition into Rt. 114S. Stay on Rt. 114S (North Ferry Rd), traveling through Village of Shelter Island to small traffic circle. Take the third exit off the traffic circle, staying on Route 114S. (South Ferry Road). The Nature Conservancy Visitor Center (79 South Ferry Road) will be 0.4 mile south of traffic circle on the left side of the road.

UPCOMING PROGRAMS

September 12, 2017*

Tuesday, 7:30 PM

A.W. Cafarelli: "Cypripedium acaule and the Phenology and Preservation of Native Orchids."

One of the most spectacular wildflowers remaining in Nassau County is the pink-flowered lady-slipper orchid, which faces pressure from declining open space, herbivory, and anthropogenic disruption. Drawn from the speaker's current research on *Cypripedium acaule* life cycle, population shifts, and augmentation techniques and obstacles, orchid ecology offers a lens for examining issues facing native forbs, including dismantled habitats, the role of remnant populations, designation of common and rare taxa listings, and the management of nature preserves as refugia for declining and vanished native species. A.W. Cafarelli, Ph.D., J.D., is a forb consultant and ecological historian, whose current field research centers on endangered and at-risk plant species and habitats.

Location: Bill Paterson Nature Center
Muttontown Preserve, East Norwich

October 10, 2017*

Tuesday, 7:30 PM

Andrew Greller: "The Vegetation of Central Mexico." This talk will cover the plant life of Guanajuato State, Mexico. It will highlight the cacti, thorn scrub, and fir forests. Andy is VP of LIBS and Professor Emeritus in the Biology Department of Queens College. He has published many articles in peer-reviewed journals on vegetation ecology.

Location: Bill Paterson Nature Center
Muttontown Preserve, East Norwich

* Refreshments and informal talk begin at 7:30 p.m.
Formal meeting starts at 8:00 p.m.

Directions to Muttontown or Stony Brook: 516-354-6506