



Department of  
Environmental  
Conservation

Agriculture  
and Markets

# 2020 New York State Pollinator Protection Plan Update

Andrew M. Cuomo, Governor | Basil Seggos, Commissioner | Richard Ball, Commissioner





# State Initiatives

## NYS Department of Agriculture and Markets

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### Apiary Program

The Department of Agriculture and Markets (AGM) currently employs a state apiculturist and three seasonal apiary inspectors, stationed on Long Island and in Wayne and Schoharie Counties, with assigned territories within New York's 62 counties. The Department estimates that there are approximately 3,000 beekeepers in the state. These range from large commercial migratory operations with more than 200 colonies to hobbyists with just a few colonies. The large commercial operations tend to be in the rural parts of the state, but the smaller operations can be found anywhere, including heavily populated areas of the state, such as New York City and Long Island.

The Apiary Inspection Program focuses on the inspection of commercial migratory beekeepers who require inspection certificates for interstate transportation of their colonies, health certification of nucleus colonies (nucs) and queens produced within the state, and general inspections to ensure the health of New York's honey bee population within apiaries of all sizes. From 2019 to 2020, the apiary program:

- Inspected 455 apiaries and 8,387 colonies for American Foulbrood (AFB) disease, as well as Varroa mites and Nosema. 114 colonies of bees, owned by 16 beekeepers, tested positive for American Foulbrood and were destroyed. This is the fourth consecutive year with an increased incidence of American Foulbrood-diseased colonies. By way of comparison, from 2010 to 2014 incidence of American Foulbrood (AFB) ranged from three to eight cases a year. (2019)
- Saw an uptick in the number of apiaries and colonies inspected, with 537 apiaries and 9,835 colonies inspected for AFB. For the fifth consecutive year, there was

an increase in the number of colonies found to be positive with American Foulbrood disease. Inspectors found and destroyed 139 colonies owned by 14 beekeepers across 12 counties infected with AFB. (2020)

- Certified approximately 48,146 colonies to exit the state in the fall by inspecting approximately 4,800 colonies or 10% of the colonies destined for out-of-state shipment, in 2019. The number of migratory colonies rose slightly in 2020 with 49,079 colonies certified to leave the state.
- Implemented a new program, inspecting starter unit colonies (nucleus colonies or nucs) for American Foulbrood disease that are for sale to other New York State beekeepers. In the spring of 2019, over 2,160 nucs were certified in 47 New York beekeeping operations. The number of nucs certified in New York continued to rise in 2020, as more nuc producers become aware of the inspection requirements. In 2020, the Department saw an 86% increase in nuc production with 70 operations issued certificates for 4,028 nucs.

### National Honey Bee Survey

Annually, USDA-APHIS funds a National Honey Bee Survey (Survey) with 37 states participating. The Survey has three goals:

1. To identify potentially invasive pests such as the exotic mite *Tropilaelaps* and problematic *Apis* species such as *A. cerana*;
2. To continue an epidemiological survey to help develop a long-term overall baseline picture of colony health; and

3. To identify risk and protective factors that predict colony health and operational success by correlating honey bee health measures over time with annual colony losses. The information collected is shared with each beekeeper, the participating state, and is entered into the Bee Informed Partnership's database.

AGM continues to work with the USDA/APHIS/ARS to create a baseline of honey bee information for New York State and the United States. The Department surveys 19 beekeepers each year to develop a track record of each honey bee operation. Five of the beekeepers are sampled twice annually for a total of 24 samples collected. The inspectors collect bee and wax samples and these samples are sent to the USDA for analysis. The bee samples are examined for pests like Varroa and Tropilaelaps mites and pathogens, like the fungal disease Nosema, and nine viruses. The wax samples are sent to the USDA National Science Lab to be analyzed for pesticides.

The baseline results collected over the past eight years have identified differences among the various beekeepers' operations. The results from 2019 saw a positive trend where 67% of the beekeepers were able to keep their varroa mite counts below the recommended threshold, which reduced virus pathogen load. Beekeepers who exceeded the threshold were found to have three or more viruses present in their samples. Also noted in the results were that virus levels, on average, were limited to 1.9 viruses for stationary beekeepers but nearly doubled to an average of 3.3 viruses for beekeepers who were migratory. Migratory beekeepers were also found to have a greater number of pesticides, and at higher levels, than the stationary beekeepers who were sampled. The individual beekeepers receive their test results and the Department compiles all the beekeepers' results and submits a final yearly report to the USDA/APHIS/ARS. This National Honey Bee Survey provided insight regarding problems New York State beekeepers were experiencing in 2019, and as a result, AGM was able to recommend different approaches beekeepers can use to improve their bee operations.

## Apiary Industry Advisory Committee

The pollinator health information that has been gathered over the years and the research, inspection, and extension resources that have been devoted to the apiary industry have demonstrated the state's strong commitment to pollinators. Upon release of the Pollinator Protection Plan, AGM's Commissioner Richard Ball reconstituted and reinvigorated the Apiary Industry Advisory Committee (AIAC). The group represents the diversity of apiary operations around the state by including beekeepers from a broad array of disciplines and geographic areas than had previously been represented.

The Commissioner has enhanced the AIAC's role in providing the best information available to the beekeeping community and policymakers, and in making recommendations regarding pollinator protection efforts. As a result of discussions with AIAC, the Department devoted a section of its website to information on honey bee health, including links to best management practices to avoid American Foulbrood and other educational resources. Recent declines in pollinators have demonstrated to the industry the importance of education, inspection and the need for registration. AGM continues to support enhanced education through the Cornell University NY Beekeeper Tech Team, which, since 2016, has been working with beekeepers to improve honey bee health, reduce colony losses, and increase profitability of the beekeeping industry.

A report from the NY Beekeeper Tech Team was presented to the AIAC members along with a discussion of the literature review and research on the risks and benefits of neonicotinoids conducted by Cornell University. A draft revision of Article 15 that included beekeeper registration was also discussed with AIAC members, with input and comments solicited. The apparent increase in reported American Foulbrood cases, as well as new federal restrictions on the use of antibiotics, have resulted in increased concern among commercial and sideliner beekeepers. AGM responded to the AIAC indicating that the

Division of Animal Industry (DAI) would have a role in its apiary program. DAI is now available to assist beekeepers by navigating the FDA veterinary feed directive regulations and providing ongoing training for veterinarians in identifying and diagnosing honey bee diseases. The AIAC members have also been engaged in discussions on beekeeper registration, the Federal Motor Carrier Act and mandated rest

periods for truckers transporting honey bees, closing of the Beltsville Bee Laboratory and alternative labs for disease diagnosis, pollinator habitat along roadsides and the lack of trained veterinarians to prescribe antibiotics for American Foul Brood disease. AIAC meetings are posted on the Department's website to expand information sharing among the state's beekeepers.

## NYS Department of Environmental Conservation (DEC)

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The DEC continues to work with the NYS Natural Heritage Program (NYNHP) to create a baseline of native pollinator information. NYNHP facilitates conservation of New York's biodiversity by providing comprehensive information and scientific expertise on rare species and natural ecosystems to resource managers and other conservation partners.

The Natural Heritage Program currently has over 15,000 observations for more than 1,200 species of pollinators and over 500 people submitting photos on its project iNaturalist page. NYNHP has made progress in the study of New York's native pollinators through a number of mechanisms.

### Community Science and Partner Trainings

In 2020, NYNHP conducted Zoom training on the native pollinator survey and survey techniques to the Central Pine Barrens Commission and other interested parties. Information contained survey goals, methods, and how to participate in the survey, along with basic pollinator biology and characteristics of the focal taxa. In 2020, NYNHP also conducted an in-person training for the Adirondack Mountain Club Summit Stewards who assisted with targeted alpine habitat pollinator surveys this summer.

NYNHP also trained on methods to submit photos to iNaturalist using a hand-held device or laptop and provided videos on field survey techniques and specimen processing and pinning. NYNHP conducted webinars for staff in the spring, to increase participation in the 2020

field season among staff on a volunteer basis. In addition, NYNHP participated in a St. Lawrence/Eastern Lake Ontario PRISM and Indian River Lakes Conservancy lecture series on the project via webinar. This was part of their "Pollinator Pathway" project.

### Preparing for Field Survey

In spring 2020, NYNHP field crew scoped out sites for Malaise traps in the Adirondacks using known old-growth locations. NYNHP also worked with SUNY Cobleskill to identify the best places to trap, including recon to several old-growth forest sites. Traps were set in three Adirondack locations and three locations in central and western NY in May. The traps were checked weekly, accompanied by targeted netting, and removed the week of July 20.

NYNHP completed the 2020 extensive survey site screening and selection in April. Targeted peatland survey sites were also selected in May and the NYNHP field forms database was used to locate known host plant species for rare specialist bees to inform the targeted species surveys. In May, NYNHP trained the statewide pollinator field crew on field survey protocol, data collection, site navigation, logistical planning, expense reporting, and specimen processing. NYNHP supervised and coordinated the work of the field crew. The statewide crew sampled in Great Lakes, High Allegheny Plateau, St. Lawrence-Champlain Valley, and Northern Appalachian ecoregions by the end of June, completing surveys at 17 sites.

NYNHP conducted extensive surveys at Grafton Lakes State Park, Stewart State Forest, and a private farm in Cambridge, NY in the Lower New England/Northern Piedmont ecoregion as well as Knox Farm State Park and Evangola State Park. Heritage staff completed a targeted barrens survey at Saratoga Sandplains WMA and targeted peatland surveys at Capital District WMA, Partridge Run WMA, Pharaoh Lake Wilderness, and Shingle Shanty Preserve. Targeted species surveys were conducted at Grafton Lakes State

Park, Moreau Lake State Park, Batten Kill State Forest, Gee Brook State Forest, and Mount Pleasant State Forest.

NYNHP has also coordinated with Cornell University researchers trying to identify the best soil and seed mixes for roadside plantings around New York. NYNHP worked with the NYSDOT to set up an iNaturalist project to assist with their data collection, the results of which can be used for the Empire State Native Pollinator Survey as well.

## NYS Office of Parks Recreation and Historic Preservation (OPRHP)

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In 2016, New York State Parks received Environmental Protection Fund funding for the implementation of the New York State Pollinator Protection Plan. This funding was allocated towards 11 projects that enhanced native pollinator habitat and educated the public on the diversity and importance of native pollinators. Since the funding was allocated, these projects have established habitat utilizing native plant materials and engaged the public in hands-on habitat management and education. Many of the projects remain ongoing as part of multi-year efforts to establish and maintain pollinator habitats.

### Habitat Enhancement Efforts

#### Long Island Region

##### *Multiple State Parks and Park Preserves*

The Long Island Region has been able to expand the pollinator garden project initiative. Funding has been dedicated to signage and the region has invested in equipment that allows the sign shop to produce high quality interpretive signs in house. The region is planting new gardens in more parks and augmenting existing gardens with more plant materials.

Staff have altered small gardens, such as the one at Heckscher State Park, and have taken on more ambitious projects, like a new 20' x 60' garden at Hempstead Lake State Park. Below is a list of the Parks where existing gardens have been enhanced or new pollinator gardens installed.

- Plants for Hallock State Park Preserve – native plants were supplied to help the Park establish a large pollinator garden
- Plants for Heckscher State Park – native pollinator plants were used to change the composition of an existing ornamental bed
- Fencing and plants at Robert Moses State Park – fencing was needed because of a heavy deer browse problem
- Plants for Orient Beach State Park – a small garden was created near the main parking lot
- Fencing and plants at Belmont Lake State Park – native pollinator plants were planted in an existing bed near the comfort station. In 2020, a fence was installed to protect the bed, which was not thriving due to high patron traffic.
- Plants for gardens at Sunken Meadow State Park and Connetquot River State Park Preserve
- Plants for Valley Stream State Park – the Park has several ornamental beds. Plants were supplied to establish a native pollinator bed. More plants will be planted in the fall of 2020.

- Fencing and plants for Hempstead Lake State Park – the Hempstead Lake staff cleared a large area that was filled with invasive vines and shrubs. Fencing was installed and in July the region hosted their first “Stewardship Saturday”, getting the help of volunteers to plant over 150 trees, shrubs, grasses and forbs.

## Finger Lakes Region

### *Ganondagan State Historic Site*

Pollinator funding was used in the Finger Lakes Region to create signage explaining natural areas and include descriptions of various pollinators or the plants they would pollinate. Local artists and park volunteers from Ganondagan State Historic Site created visuals with Environmental Field Team staff that were used along two trails at the historic site.

Signage for the Green Plants Trail is interactive because it describes flowering plants that can be seen along the trail and invites the reader to be interactive with the trailside in their search. Green Plants Trail signage was designed to match the original style and general content of pre-existing signs along a patron-favorite connecting trail and is also tactile so it can be used for rubbings at site events, providing another layer of interaction for patrons to enjoy.

Signage created by local artists is for use along trails that go through the largest section of grassland restoration on the site. These signs explain known species in the area and is accompanied by beautiful renderings of those species pictured within the habitat or separated out to examine them closer. One sign showcases pollinator species alongside larger mammals with fire management taking place to represent the full spectrum of the natural area. Another set of signs explain bird species that can act as pollinators as well as the site history and Seneca Nation influence at Ganondagan.

## Central New York Region

### *Glimmerglass State Park*

At Glimmerglass State Park, a pollinator garden was planted by volunteers during an annual “I Love My Park” day event several years ago. The pollinator garden remains but has faced impacts from deer browse. One option under consideration is to transition the area from a maintained garden to a pollinator wildflower field.

### *Clark Reservation State Park*

Several years ago, a native pollinator garden was planted by the Council of Park Friends and a local garden club. The park continues to maintain this garden, which is located near the nature center. The funding will be used to support interpretive signage for this garden. Draft signs have been designed but the signs have not yet been purchased.

## Saratoga-Capital Region

### *Saratoga Spa State Park*

Approximately 6 acres of habitat were enhanced with seed from native nectar plants. The plants were specifically chosen to support the Karner Blue butterfly (federally endangered) and the Frosted Elfin butterfly (state threatened), as well as other pollinators. Maintenance and surveying are ongoing.

The Creekside Classroom is an environmental learning center at Saratoga Spa State Park. Pollinator funding was used to create a rain garden and other native plantings at the classroom. In addition to supporting native pollinators, the various gardens function as beautification for the entrance, a raingarden to capture and infiltrate stormwater, and the backdrop for a birdwatching area. Interpretive signage was installed to teach park patrons about the rain gardens and native plants at the site.

## Grafton Lakes State Park

The lawn area along the main entrance road at Grafton Lakes State Park has been converted into a wildflower pollinator meadow. The area was solarized, tilled, and planted with native species to establish pollinator habitat. Areas were reseeded in subsequent years to ensure success of plant establishment. The wildflower meadow is near the Grafton Lakes Nature Center, so that educators can utilize the area for public programming. The project was considered a demonstration project, enhancing visibility for the public and providing a framework for such plantings at other parks in the region.

## Taconic Region

### John Jay State Historic Site

Restoration efforts are underway on a wet meadow. The size of the habitat at the John Jay State Historic site has declined because woody plants and non-native invasives such as multiflora rose, and Oriental bittersweet started growing in the meadow. Woody shrubs have been removed to set back succession and restore the meadow habitat. Printing of pollinator outreach materials is planned to educate once the restoration is complete.

## Rockefeller State Park Preserve

A website was created “Guide to Wild Bees of New York featuring extensive photographic documentation, scientific classification, identification guides, and behavior and habitat information on over 80 species of bees in the Hudson Valley. In addition, a curated Wild Bees exhibit has been on display in multiple locations across the country.

At the main entrance, the park has been removing invasives in a wetland swale and restoring with native species of wildflowers and shrubs which support native pollinators and wildlife. This project has been supported by “I Love My Parks Day” volunteers. The second entrance of the park is undergoing conversion of a formerly mowed lawn into a meadow with native wildflowers and grasses. The wildflower trail is a designated section of historic carriage trail shoulder and adjacent field where there are altered mowing regimes and planted hardy native wildflowers selected for their value to pollinators. Several hundred plugs and potted plants have been purchased to support these restoration efforts. The native plants are thriving in these areas.

## NYS Department of Transportation (DOT)

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### Implementation of Best Management Practices

- Acreage with reduced or altered mowing practices has been increased to avoid disruptions to pollinator life cycles, to provide late-season forage and aid in wildflower seed dispersal, benefiting monarch butterflies, honeybees and other pollinators. While DOT mowing widths and locations are based on safety needs, they rarely need to mow the entire width of the right-of-way (ROW), creating an opportunity for innovation
- DOT mowing guidelines encourage Maintenance residencies to seek opportunities to reduce and alter mowing where possible. Altered mowing has occurred in Rochester, Buffalo, Utica and Poughkeepsie, and is on the increase.
- An award-winning example is Region 4’s pilot project on Interstate 390, south of Rochester, to preserve existing milkweed to support Monarch butterflies.  
<https://www.dot.ny.gov/regional-offices/region4/other-topics/pollinator-project>.

- Modified mowing, by exploiting the presence of favorable vegetation, can save on the cost of new plantings while controlling the spread of non-desirable vegetation.
- Pollinator gardens were established at two rest areas on Interstate 390.
- DOT continues its extensive program of Integrated Pest Management including:
  - Increased management to encourage native flora and fauna, including pollinators,
  - Increased awareness of pests, invasives and pollinator needs,
  - Improved housekeeping and expanded use of biological controls,
  - Minimized, targeted pesticide and herbicide application with strict adherence to the New York State Department of Environmental Conservation’s (NYSDEC) requirements for pesticides and labeling (especially regarding Neonicotinoids such as clothianidin, imidacloprid and thiamethoxam). Also, participated in NYSDEC/ NYS Office of General Services development of green specifications such as “Sustainable Landscaping,” including pollinator considerations.
- DOT has incorporated language, awareness, management recommendations, and best practices related to pollinators in its guidance documents such as the Highway Design Manual’s Chapter 28 on Landscape Architecture, the Environmental Handbook for Transportation Operations, and the Adirondacks Transportation Corridor Unit Management Plan.
- Through the NY Invasive Species Council and contacts in individual NYSDOT Regions, DOT works with the Partnerships for Regional Invasive Species Management (PRISMs) to improve natural habitats through invasive species awareness and control.
- Through the State’s Scenic Byways Program, DOT shares information and encourages Byways contacts and stakeholders to consider pollinator habitat in their outreach, management and tourism efforts.
- NYSDOT is increasingly using Web apps that incorporate pollinator and invasives information. Our Environmental Viewer, used by all Regions to screen projects for environmental concerns, now has a layer incorporating statewide invasive species information from iMapInvasives. A statewide vegetation management application is in development that will allow the tracking of management actions and locations such as wildflower seeding areas, altered mowing and dedicated conservation management areas.

## Habitat Enhancement Efforts

- In anticipation of the potential listing of the Monarch Butterfly under the Endangered Species Act, DOT Environmental and Operations staff from all 11 NYSDOT Regions and Main Office are collaborating to identify existing and potential Monarch Butterfly habitat across the entire system—over 135,000 acres. DOT may use this information to enroll in the Monarch Butterfly Candidate Conservation Agreement with Assurances (“Monarch CCAA”) administered by the University of Illinois-Chicago for the United States Fish and Wildlife Service. If enrolled, DOT would identify acreage within specific locations to implement the program’s recommended Monarch Conservation Management Practices.

- DOT prioritizes native species in all restoration and habitat enhancement projects. Use special specifications to increase the use of native grasses and test custom native seed mixes on Regional projects and other actions. Factor time of bloom for shrubs and trees into planting plans, with the goal of providing a continuous food source for pollinators throughout the season.
- DOT prioritizes planting in areas which provide the most benefit to pollinators such as adjacent to large, undeveloped tracts of land or known apiary locations. Are aware that plants supporting pollinators include not only herbaceous species but also shrubs and trees such as red maple, and factor this into planting choices. Understand that pollinators include birds, not only insects, and seek opportunities to incorporate such features as Bluebird nesting boxes in projects. Work with engineers to limit habitat loss and preserve continuity on projects and actions, to the extent possible.

## NYS Office of General Services (OGS)

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Executive Order 4 established the Interagency Committee on Sustainability and Green Procurement to create green procurement lists and specifications for commodities, services and technology to be used by State agencies and authorities during their procurements. Three of these specifications consider the impact on pollinators:

- Sustainable Landscaping
- Pest Management for Outdoor Spaces
- Turf and Ornamental Management

Additionally, the Interagency Committee is continuing to identify relevant commodities, services and technology in order to create new specifications that can be adopted to protect pollinators. The website information and the Executive Order 4 specifications also assist with plant selection and source considerations across the State. State agencies and authorities are required to purchase commodities, services, and technology that meet the approved green procurement specifications, so these specifications provide standards for plantings and site restoration.

The Executive Order 4 Interagency Committee's progress reports address the adoption of sustainable practices and operations by State government. During four fiscal years, pursuant

to the Pollinator Task Force recommendation, several pollinator related questions were added to the annual survey that is completed by State agencies and authorities in order to compile the progress report. The responses to these survey questions help to give a clearer picture of State agencies' involvement in protecting pollinators throughout the State.

### Habitat Enhancement Efforts

OGS considers planting pollinator friendly environments that contain native vegetation at State-owned and -managed buildings and facilities. OGS continues to assess the most viable and beneficial sites for these pollinator friendly environments. There are locations on the Harriman campus that OGS used to mow and have now allowed to grow that are now populated with pollinator friendly native plants. Also, OGS has planted pollinator friendly tree species on the Harriman campus near the SUNY ETEC building.

Additionally, OGS does annual flower planting on many of the OGS run properties and many of these plantings are grown by DOCCS. OGS has requested an increase in the number of pollinator friendly perennials and wildflowers to be planted at all appropriate locations. Therefore, the amount pollinator friendly species have been and should continue to increase on an annual basis.

## Implementation of Best Management Practices

- Mowing limits have been established along the Thruway mainline, interchanges and service areas to minimize the cutting of herbaceous vegetation while maintaining safety and addressing public concerns.
- The reduction of mowing results in the colonization of meadow wildflowers that are beneficial to pollinators.
- Additional mowing limits are being evaluated along the Thruway system. These areas will be evaluated for the potential to plant perennial wildflowers or other plantings, beneficial to pollinators.

## Habitat Enhancement Efforts

- Maintenance crews are planting willow bushes, lilac bushes, and wildflowers across the system, in select areas. To date, numerous areas have been planted with wildflowers. In addition, lilac bushes have been installed as companions to willow species planted as living snow fences.
- Future living snow fence installations will include flowering shrubs. Plans for planting lilac and willow bushes, as well as wildflowers, at various locations throughout the Thruway mainline right-of-way have occurred and will continue.
- Capital projects are reviewed during design to identify opportunities to substitute standard turf seed mixes with wildflower mixes. Projects are also evaluated to include flowering shrubs and trees, where appropriate. As part of the design of capital projects, any necessary tree removal is timed with consideration to wildlife, particularly bats.

The following summarizes specific projects occurring in each of the Authority's four Divisions:

### Buffalo Division

The Buffalo Division recently completed the geographical mapping of all mowing limits within the Division. Utilizing Geographical Information System (GIS), mowing limits were established and digitized to assist maintenance in developing and implementing comprehensive mowing plans. These mowing plans result in the minimization of general ROW mowing practices allowing for the colonization and expansion of native grasses and wildflowers, while maintaining and increasing the mowing frequency of the highway clear zone along with the manicuring of gateway interchanges and areas of public concern.

During the removal of hazardous and decaying trees in the ROW, Westfield Maintenance workers discovered several of these trees were being utilized by native honey bees and had active hives located within them. Care was taken to minimize disturbance to the hives while still removing sections of the decaying trees that resulted in a safety hazard. To aid in the survival of these bees along with assisting in the colonization of new hives, maintenance workers purchased and installed ten (10) bee boxes in suitable ROW habitat. Periodic inspections of these bee boxes have confirmed the establishment of new bee colonies.

Maintenance staff have planted more than 10 acres of wildflowers in the following locations: Corning, Interchange 46 east bound on 1-90, Batavia- Interchange 48 on 1-90, Depew- Interchange 49 on 1-90 and Buffalo Airport- Interchange 51 eastbound and westbound on 1-90.

Several projects in the following general areas have included pollinator plantings during construction:

- Westfield to Pennsylvania, planting of lilac shrubs as part of a living snow fence installation
- 1-390 to Victor on 1-90, planting of specialty seed wildflower mixes as part of the slope flattening work
- Buffalo Airport, Route 33 on 1-90, planting wildflower seed mixes to restore the right of way after construction activities

In addition, recent bridge construction projects have included pollinator plantings such as flowering bulbs and shrubs in the vicinity of Cheektowaga and Buffalo.

### Syracuse Division

In 2016, the Division utilized two areas to pilot planting wildflowers. The locations include a rest area and a portion of Interchange 34A. The pilots were very successful. The locations have been over seeded to promote additional growth.

More than 5 additional areas have been planted with wildflowers, including:

- Verona, Interchange Exit 33 on 1-90
- Herkimer, Interchange 31 on 1-90
- Syracuse, Interchange 34 A on 1- 90
- Warners Service Area on 1-90
- Manchester Interchange vicinity on 1-90

Flowering shrubs have been planted to supplement willow species in living snow fences at the following general locations:

- Herkimer, Interchange 32 on 1-90
- Rome, Interchange 33 on 1-90 Syracuse, Interchange 34A on 1-90 Liverpool, Interchange 38 on 1-90
- Weedsport Area, Interchange 41 ramp areas

### Albany Division

Division field staff are evaluating locations to reduce and eliminate mowing. Where meadows can establish, the colonization of wildflowers will occur through natural succession. The Berkshire spur is one such location with other areas being considered. The goal is to establish approximately 20 acres of meadows in one year.

UV-light traps have been installed at approximately 10 locations in the Division where mosquitoes and other nighttime pests are present. Other locations will be considered for future installations, which will eliminate the need to spray insecticides for pest management.

### New York Division

Division field staff are evaluating locations to reduce mowing and to create meadows with the colonization of wildflowers through natural succession that are beneficial to pollinators. Division staff have reduced mowing in multiple locations to once per year from three to four times per year.



# Education and Outreach

## NYS Department of Agriculture and Markets

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The Department of Agriculture, through a USDA grant, hosted the Honey Bee Health- First Responder Program, an outreach and education program directed to hobbyist and side-liner beekeepers. The goal of the program is to provide education and training to beekeepers, helping them to recognize and reduce the spread of infectious honey bee diseases. Once trained, the First Responders work within their local bee clubs to help inspect and assess members' hives, looking to raise awareness of honey bee diseases. In 2019, three local beekeeping clubs participated in the program.

A second component of the program included the training of local veterinarians to recognize diseases of honey bees. This allows them to issue antibiotic prescriptions for honey bee disease and meet the requirements of the Federal Veterinarian Feed Directive, that seeks to keep antibiotics out of the food supply. The veterinarian training was organized by Cornell University's Dyce Lab.

In addition to the First Responder program, the Department notified and provided educational materials to bee clubs in counties that had American Foul Brood detections. There were 11 counties impacted in 2019 with all bee clubs within those counties being notified.

Additionally, the State Apiculturist routinely meets with local beekeeping clubs and organizations to provide program updates and information on the Apiary Inspection Program. In 2019, the State Apiculturist gave a program overview to the Empire State Honey Producer's Association members at their fall meeting and was invited to speak to three other beekeeping clubs during the year.

## NYS Department of Environmental Conservation (DEC)

The DEC conducted the following public outreach activities:

- Recertification courses (6 classroom courses; 2 online courses) for certified applicators address protecting and/or encouraging pollinators.
- Announcements about pollinators during pollinator week in 2018 and 2019.
- Investigated two pollinator incidents (usually reports of bee kills) involving a response from field staff (inspections) and reporting to EPA.
- Agency pollinator protection web page updated with additional references as they became available, such as pollinator publications from Cornell, BMPs, and a Cornell Cooperative Extension virtual garden tour showing plants/flowers that attract pollinators.
- Distribution of over 400 copies of the 2016 NYS Pollinator Protection Plan to the DEC Regional Offices for distribution.
- Regional staff cover pollinator protection when appropriate during outreach events and inspections.

## NYS Department of Transportation (DOT)

DOT conducted the following education and outreach activities:

- Sessions on managing for pollinators, control of invasive species, Geographic Information Systems (GIS) applications, and use of native seed and plants were held in monthly Environmental/Landscape Architecture Training Series (ELATS), as well as in annual meetings for Design, Construction and Operations.

- Presented at statewide, national and international conferences that have included pollinator research and management best practices. Among these are: The International Conference on Ecology and Transportation (ICOET), Northeast Transportation and Wildlife Conference (NETWC) North American Invasive Species Management Association (NAISMA), and annual meetings of various Transportation Research Board's (TRB) committees.
- In partnership with the Seneca Park Zoo Society's Butterfly Beltway program and Green Thumb Environmental Beautification, Inc., maintained two interpretive gardens at Mount Morris and Genesee Rest Area where NYSDOT Region 4 initiated altered mowing practices. Rest area visitors, thanks to educational signs provided by the Zoo Society have the opportunity to learn more about the plight of pollinators and how they can practice conservation measures at home. The Society also harvests milkweed seeds from the Department's ROW for use in local conservation programs.
- The science behind the Region 4 pilot mowing program has also been shared across NYSDOT via training targeting residency personal and Maintenance Environmental Coordinators. If the workers doing the mowing understand the logic behind the change, they are more likely to help preserve the effort.
- The Federal Highway Administration (FHWA) has included NYSDOT's experience on their Pollinator website.
- Encouraged, supported and/or incorporated pollinator considerations into:
  - Federally funded locally let projects and programs we manage

- Permits to outside entities working on NYSDOT ROW
- Special initiatives, such as Solar Highways

## NYS Thruway Authority

The Thruway Authority educated and provided outreach on pollinators in the following ways:

- Trained maintenance employees in methods of vegetation and invasive species control, use of herbicides, pesticides and insecticides, mowing reduction limits, tree trimming and brush control.
- Internet and Intranet sites provide information on the NYS Pollinator Protection Plan in addition to the Authority's efforts to support pollinators.

## NYS Office of General Services (OGS)

OGS hosts the GreenNY website (<https://ogs.ny.gov/greenny>) that went live in April of 2017. A portion of the website is dedicated to pollinator information and links (<https://ogs.ny.gov/greenny/conserving-natural-resources#pollinator-protection>). This portion of the website provides information regarding sustainable landscaping and pollinator protection. The website includes resources including the Pollinator Protection Plan, federal pollinator guidance, information on invasive species, and a list of Native Plants for Pollinators.

## NYS Office of Parks, Recreation and Historic Preservation (OPRHP)

Educational banners and materials for exhibits and activities have been developed for use at the New York State Fair and other outreach events to highlight native pollinators and plants that are found in State Parks. These materials feature the partnership between NYNHP and OPRHP and are available for use by OPRHP

and NYNHP staff for other events and displays. The window-shade style banners were produced in 2017 and continue to be used across the state to promote pollinators and habitat protection, including the New York State Fair, conferences, nature centers, agency meetings, and more.

## Cornell University

Cornell University has been involved in education and outreach on pollinators through a number of programs throughout the university.

### Integrated Pest Management Program

- Northeast Pollinator Partnership, for apple growers, <http://northeastpollinatorpartnership.org>
- Pollinator Network at Cornell – Grower Resources, <http://pollinator.cals.cornell.edu/resources/grower-resources>
- A Pesticide Decision-Making Guide to Protect Pollinators in Tree Fruit Orchards,
- [https://pollinator.cals.cornell.edu/sites/pollinator.cals.cornell.edu/files/shared/documents/Tree%20Fruit\\_Pesticide%20Decision%20Making%20Guide\\_June%202020.pdf](https://pollinator.cals.cornell.edu/sites/pollinator.cals.cornell.edu/files/shared/documents/Tree%20Fruit_Pesticide%20Decision%20Making%20Guide_June%202020.pdf)
- Wild Pollinators of Eastern Apple Orchards and How to Conserve Them, <http://pollinator.cals.cornell.edu/sites/pollinator.cals.cornell.edu/files/shared/WildPollinatorsEasternAppleOrchards.pdf>
- Several publications were revised including articles on honey bee swarms and information on swarm catchers <http://pollinator.cals.cornell.edu/resources/removing-your-swarms>

## Cornell Cooperative Extension Pesticide Management Education Program (CCE PMEP)

Along with Cornell College of Agriculture and Life Science (CU CALS) Pollinator Network, PMEP co-authored “A Pesticide Decision-Making Guide to Protect Pollinators in Tree Fruit Orchards” and “A Pesticide Decision-Making Guide to Protect Pollinators in Landscape, Ornamental, and Turf Management” (<https://pollinator.cals.cornell.edu/resources/grower-resources/>).

PMEP has also reviewed and revised drafts of “A Pesticide Decision-Making Guide to Protect Pollinators in Small Fruits and Vine Crops” and “A Pesticide Decision-Making Guide to Protect Pollinators in Vegetable Crops”, which should be published by 2021.

At the 2019 CCE Agricultural In-Service, PMEP hosted a talk on Pollinator Protection by CU CALS Entomologist and Pollinator Network member Scott McArt. At the 2019 Ronald D. Gardner Food Processing Pest Management Workshop, PMEP hosted a speaker who presented to pesticide applicators on how to remove honey bees from structures. At the 2020 Food Processing Pest Management Workshop, PMEP invited Stephen Repasky, owner/operator of Bee Control Pittsburgh, to speak to pesticide applicators on how to relocate structure-infesting honey bees during the Structural Pest Control session.

In summer of 2020, PMEP collaborated with Dr. Bryan Danforth and Maria van Dyke of the CU CALS Pollinator Network on their “Northeast Pollinator Partnership”, a proposed project to generate training materials for agricultural service providers. PMEP would serve by providing review for these materials.

In January of 2019, PMEP Extension Support Specialist Dan Wixted co-authored a column on pesticides and bees with Scott McArt in the January issue of the American Bee Journal. ([https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/5278/files/2019/03/01-McArt-article\\_January2019-compressed-19mku16.pdf](https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/5278/files/2019/03/01-McArt-article_January2019-compressed-19mku16.pdf))

PMEP reviewed and supplied comments and suggestions on drafts of the “Neonicotinoid Insecticides in New York State: Economic Benefits and Risk to Pollinators” report, authored by Grout, Koenig, Kapuvari and McArt.

Over the past two years, PMEP has answered numerous pesticide-related questions from the CU CALS Pollinator Network, spanning a variety of topics and projects.

### NYS Beekeeper Tech Team

Annually AGM contracts with Cornell University to support a Tech Team consisting of an interdisciplinary group of professionals that provides colony inspection, parasite analysis, pesticide testing, and business development services to hobbyist, sideliner and commercial beekeepers in NYS.

The team works with between 25 and 30 beekeepers each year to sample 250 colonies each June and September. Participants can stay enrolled in the program for three years. Tech Team services are available to beekeepers who maintain colonies in New York State and who generate at least \$1,000 in annual revenue from beekeeping. The Tech Team aims for one third of participants to be commercial beekeepers (who manage 200 colonies or more). Priority is given to beekeepers who are interested in participating in the Financial Analysis and Business Benchmarking arm of the program, and any remaining slots are filled on a first-come, first-served basis. Starting in 2020, priority has also been given to beekeepers who are seeking help to overcome disease and parasite issues in their operation. The Tech Team services are open to hobbyist, sideliner, and commercial beekeepers.

Each beekeeper receives the following services:

- Spring and fall colony inspections each year for three years. During these inspections, technicians also take Varroa, Nosema, and pesticide samples. Timely colony health reports. These include:

1. a breakdown of their inspection results and parasite levels for all colonies inspected,
  2. a summary of how their colony metrics and parasite levels compare to other beekeepers sampled during the same period, and
  3. recommendations tailored to their operation.
- Annual Tech Team report. This report summarizes overall industry trends and new research results from working with the Tech Team participants. This report is publicly available.
  - One-on-one meetings. Beekeepers meet with the team individually for a two-hour meeting in late winter/early spring to discuss the year’s data collected from their operation, their major successes and challenges, and to provide recommendations for the upcoming year. Together, the beekeeper and team develop a realistic management plan for the operation moving forward.
  - Financial Analysis and Business Benchmarking services. Participants have the option to work with the team’s agricultural economist to understand the financial position of their beekeeping business, compare their business’ performance to industry benchmarks, and can seek advice about how to work toward their goals. Participants receive annual inventories of business assets and liabilities, a report of financial performance, and individualized analysis and recommendations. The annual Financial Analysis and Business Benchmarking Reports summarize the information from all participants and are publicly available. To date, 62 beekeepers have participated in this part of the program. Industry benchmarks for honey prices, honey yield, costs and income per colony, and profitability are documented in the annual Financial Analysis and Business Benchmarking Reports.

2020 marks the fifth year of the NYS Beekeeper Tech Team program. To date, the team has worked with a total of 58 beekeepers who manage 27,094 colonies in NYS. This includes 22 commercial, 18 sideliners, and 18 hobby beekeepers. The team has sampled colonies from 138 apiaries across 30 counties. It is evident beekeepers make important contributions to New York's agricultural economy. Beekeepers currently enrolled in the program harvested 318,561 pounds of honey in 2019, which comprises 11% of the approximately 3 million pounds of honey the industry produces annually.

All NYS Beekeeper Tech Team reports can be accessed at <https://pollinator.cals.cornell.edu/nys-beekeeper-tech-team/>

### **Veterinarian Continuing Education and Vet school Curriculum**

The new FDA Veterinary Feed Directive requires that antibiotic prescriptions for honey bees be issued by a veterinarian. Yet most U.S. veterinarians are not familiar with honey bees because they are not included in current veterinary training curriculum. Continuing education workshops for veterinarians are held on honey bee biology and disease control. In cooperation with instructors in the Cornell Vet School a new curriculum was developed to teach the school's first "Honey Bee Health and Conservation" course, available to 2nd and 3rd year veterinary students. Since June 2018 three continuing education workshops (122 veterinarians trained) and 5 classes for veterinary students (126 vet students trained) have been held.

### **Introduction to Honey Bee Queen Rearing Workshop**

Poor genetics is a major problem for honey bee health. Each June a workshop is held that teaches students how to rear locally adapted disease-resistant honey bee queens. Emphasis is placed on learning multiple techniques, ranging from small scale backyard production to larger scale commercial production.

<https://pollinator.cals.cornell.edu/resources/beekeeping-workshops>

### **Pesticide Risk to Pollinators: Extension of Information to Growers**

Most growers are interested in minimizing pesticide risk to non-target organisms such as bees, but they lack current information on how to do so. To fill this gap, a concerted effort is made to create extension materials and give talks to growers and applicators on how to reduce pesticide exposure and risk to pollinators.

There have been more than a dozen presentations for growers/applicators since June 2018, reaching approximately 1,075 individuals. There were additional extension presentations for beekeepers and other stakeholders that reach approximately 1,325 individuals since June 2018.



# Research

## Cornell University

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### NYS Integrated Pest Management (IPM) Program

The New York State IPM was established in 1985 in Agricultural and Markets Law to develop sustainable ways to manage pests and helps people to use methods that minimize environmental, health, and economic risks. The program has changed the behavior of farmers and pest managers in New York State and beyond by teaching the concepts of pest monitoring and exclusion, using population and weather modeling to apply pest controls more efficiently, and the use of biological controls.

Since 2017, the IPM program has calculated an Environmental Impact Quotient EIQ <https://nysipm.cornell.edu/eiq> value for seventeen new active ingredients. The EIQ determines the environmental impact of commonly used pesticides in agriculture and horticulture. The values obtained from these calculations can be used to compare the environmental impact, including the toxicity to bees, of different pesticides and pest management programs.

In addition, between 2018-2020 the Cornell IPM team initiated the development of a set of best management practices to assist pollinators:

- Pollinator habitat establishment trials were put in place in 2018 to determine costs of installation, bloom diversity and timing, and insect diversity over time for 6 methods of installation differing in weed management, time of planting and transplant vs. direct seeding. During the summer of 2019, at least 5 families and 18 genera of bees, primarily wild species, were collected and identified with the help of Cornell's Bee Lab. Several outreach programs including Field Days with growers were organized to demonstrate the benefits of creating and

maintaining habitats for pollinators and other beneficial arthropods. 80% of attendees from these events responded that they will spend time on creating and maintaining habitats near their crops.

- E-newsletters were written for New York State fruit programs to include resources and key tasks for pollinator protection in each issue
- NYS IPM working on documenting neonicotinoid insecticides use for each crop in NYS (vegetables, fruits, field crops ornamentals), including target pest, application method, risk to pollinators, importance of use, chemical and non-chemical alternatives to develop strategies to reduce risks to pollinators and economic risk.
- NYS IPM is providing support on a NE SARE grant project for the Northeast Pollinator Partnership on educating apple industry stakeholders on protecting wild bees in orchards.

### Research and Publications

Cornell researchers have published scientific research on the impact of pesticides, pathogens, and habitat on honey bees and wild bees to inform management decisions by beekeepers, growers and the public.

1. McArt, S. H. 2020. Parasite transmission between hives and spillover to non-*Apis* pollinators. In "Honey Bee Medicine for the Veterinary Practitioner", Eds. T. R. Kane and C. M. Faux, Wiley Blackwell Press.

A book written for veterinarians who are interested in learning more about honey bee health. Bee biologists and veterinarians describe basic honey bee

biology with a focus on health, diagnosis of diseases, and current methods for minimizing and controlling diseases in beekeeping operations of any size.

2. Urbanowicz, C. M., P. A. Muñiz and S. H. McArt. 2020. Honey bees and wild pollinators differ in their preference for and use of introduced floral resources. *Ecology & Evolution* 10:6741-6751.

Introduced plants may be important foraging resources for honey bees and wild pollinators, but how often and why pollinators visit introduced plants across an entire plant community is not well understood. Understanding the importance of introduced plants for pollinators could help guide management of these plants and conservation of pollinator habitat. Publication assessed how floral abundance and pollinator preference influence pollinator visitation rate and diversity on 30 introduced versus 24 native plants in central New York. Honey bees visited introduced and native plants at similar rates regardless of floral abundance. In contrast, as floral abundance increased, wild pollinator visitation rate decreased more strongly for introduced plants than native plants. Introduced plants as a group and native plants as a group did not differ in bee diversity or preference, but honey bees and wild pollinators preferred different plant species. A case study, focused on knapweed (*Centaurea* spp.), an introduced plant that was the most preferred plant by honey bees, and that beekeepers value as a late-summer foraging resource. The extent to which honey bees versus wild pollinators visited knapweed relative to co-flowering plants was assessed. Knapweed pollen and nectar collection by honey bees across 22 New York apiaries was quantified. Honey bees visited knapweed more frequently than co-flowering plants and at a similar rate as all wild pollinators combined. All apiaries contained

knapweed pollen in nectar, 86% of apiaries contained knapweed pollen in bee bread, and knapweed was sometimes a main pollen or nectar source for honey bees in late summer. Results suggest that because of diverging responses to floral abundance and preferences for different plants, honey bees and wild pollinators differ in their use of introduced plants. Depending on the plant and its abundance, removing an introduced plant may impact honey bees more than wild pollinators.

3. Iverson, A. L., C. Hale, L. Richardson, O. Miller and S. H. McArt. 2019. Synergistic effects of three sterol biosynthesis inhibiting fungicides on the toxicity of a pyrethroid and neonicotinoid insecticide to bumble bees. *Apidologie* 50:733-744.

Understanding how different pesticides influence bee health is inhibited by a limited knowledge about the interactions between different compounds to which bees are simultaneously exposed. Although research has demonstrated synergistic effects of some sterol biosynthesis inhibiting (SBI) fungicides on the toxicity of certain insecticides to bees, a high degree of variability exists in the relatively few SBI fungicide-insecticide interactions tested. Furthermore, most research has been conducted on honey bees, *Apis mellifera*, limiting the understanding of pesticide synergisms in native wild bees. The effects of the SBI fungicides difenoconazole, myclobutanil, and fenhexamid on acute contact toxicity of the insecticides thiamethoxam (neonicotinoid) and bifenthrin (pyrethroid) to the common eastern bumble bee, *Bombus impatiens*, were tested. Based on range-finding trials, a single dosage of each pesticide, with insecticides approximating LD20 values and fungicides approximating their maximum sublethal levels, was selected. It was found that the triazole SBI fungicide

difenoconazole interacted synergistically with bifenthrin, with a maximum synergy ratio of 1.48, while the triazole myclobutanil interacted synergistically with both bifenthrin and thiamethoxam, with maximum synergy ratios of 11.0 and 2.38, respectively. However, the hydroxylanilide SBI fungicide fenhexamid did not exhibit a synergistic effect on either insecticide. These results indicate that certain SBI fungicides, and potentially those from particular SBI classes, may be particularly harmful to bumble bee health when co-exposure with insecticides occurs, despite their low toxicity when experienced in isolation. At the same time, certain SBI fungicides may not be harmful to bumble bees when co-exposure with insecticides occurs.

4. Milano, N. J., A. L. Iverson, B. A. Nault and S. H. McArt. 2019. Comparative survival and fitness of bumble bee colonies in natural, suburban, and agricultural landscapes. *Agriculture Ecosystems & Environment* 284:106594.

Pollinators such as bumble bees are in decline as a result of many factors, including loss of habitat. Initiatives to improve and restore pollinator habitat are increasingly popular. However, to most effectively conserve pollinators, a better understanding of which habitats limit their survival and fitness at the landscape scale is needed. This study examined performance and fitness of the common eastern bumble bee, *Bombus impatiens* (Cresson), in four common landscapes for bees (natural, suburban, conventional agriculture, and organic agriculture). In the summers of 2016 and 2017, 64 bumble bee colonies per year were deployed across 16 sites (4 sites in each landscape type in each year) and their growth (weight and bee abundance), fitness (caste production), and survival were monitored weekly. Colonies in suburban sites in 2016, but not 2017, were lighter, produced fewer worker and

drone cells, and experienced queen death more quickly than colonies in natural and agricultural landscapes. The performance and fitness of colonies in natural, organic agricultural, and conventional agricultural landscapes in both years were similar. Additionally, across all landscape types, the proportion of developed land and impervious surface were significantly negatively associated with colony performance in 2016. Thus, results suggested that suburban landscapes are suboptimal for *B. impatiens* compared to natural and agricultural landscapes, and that this effect differs across years, potentially due to climactic differences. Future research is needed to identify the mechanisms responsible for reduced performance of bumble bee colonies in suburban landscapes, especially regarding floral resources and pesticide and pathogen stress. Such information could direct specific actions to improve suburban habitat for pollinators.

5. Urbanowicz, C. M., N. Baert, S. E. Bluher, M. Ramos, K. Böröczky and S. H. McArt. 2019. Low maize pollen collection and low pesticide risk to honey bees in heterogeneous agricultural landscapes. *Apidologie* 50:379-390.

Honey bees foraging on and around maize may be exposed to a number of pesticides, including neonicotinoids, but this exposure has not been well quantified in heterogeneous landscapes. Such landscapes may provide alternative foraging resources that add to or buffer pesticide risk. The influence of landscape context and maize pollen collection on pesticide levels during maize flowering. Pesticides were quantified in (1) bee bread from 49 hives across New York and (2) pollen trapped weekly in one yard. Landscape composition and percent maize pollen were not related to pesticide levels. Furthermore, pesticide risk was low (< 1% contact LD50) in all

but one of the pollen samples, and maize pollen was absent in the majority of samples. Results suggest that hives near maize fields during maize flowering are not necessarily exposed to high levels of neonicotinoids and other pesticides in pollen, especially if uncontaminated pollen sources exist nearby.

## 6. Neonicotinoid Report

Grout, T. A., P. A. Koenig, J. K. Kapuvári and S. H. McArt. 2020. Neonicotinoid insecticides in New York: Economic benefits and risk to pollinators. 432 pp. <https://pollinator.cals.cornell.edu/pollinator-research-cornell/neonicotinoid-report/>

concise summary: [https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/5278/files/2020/09/09-McArt-article\\_September2020.pdf](https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/5278/files/2020/09/09-McArt-article_September2020.pdf)

In August 2018, with funding provided through the NYS Environmental Protection Fund to research potential adverse impacts of pesticides, such as neonicotinoids, Cornell began developing a risk-benefit analysis of neonicotinoid insecticide usage in New York State with the following three goals: 1) Estimate the pest control and plant protection benefits of neonicotinoid insecticides under current usage in New York, 2) Estimate the risk from neonicotinoids to pollinators, and 3) Evaluate the relative benefits and risks of likely neonicotinoid substitutes (i.e., other insecticides or pest control strategies) compared to neonicotinoids. The report was published in June 2020 (see link to the publicly available document above). Results have been summarized in the September 2020 issue of *The American Bee Journal*, at the November 2020 Annual Meeting of the Entomological Society of America, the December meetings of the American Honey

Producers Association and American Beekeeping Federation, and numerous NY beekeeping club presentations.

7. Pesticide Decision-making Guides for Growers. Publications for growers on how to apply pesticides safely, and the relative toxicity of each pesticide product to honey bees compared to alternatives that may be effective against target pests. In addition, the guides summarize all existing knowledge about synergisms that can occur between specific fungicides and insecticides.

Van Dyke, M., E. Mullen, D. Wixted and S. H. McArt. 2018. A pesticide decision-making guide to protect pollinators in tree fruit orchards. 31 pp. <https://pollinator.cals.cornell.edu/resources/grower-resources/>

Van Dyke, M., E. Mullen, D. Wixted and S. H. McArt. 2018. A pesticide decision-making guide to protect pollinators in landscape, ornamental, and turf management. 36 pp. <https://pollinator.cals.cornell.edu/resources/grower-resources/>

8. Articles in the *American Bee Journal*, since June 2018:

A monthly column in *American Bee Journal* called “Notes from the Lab: The Latest Bee Science Distilled,” which reaches ~15,000 subscribers. Each month, a recent pollinator health paper from the primary literature for a non-scientific audience is summarized. The goal is to make the emerging pollinator health science more approachable and relevant to beekeepers and the public. Each article is freely downloadable: <http://blogs.cornell.edu/mcartlab/notes-from-the-lab/>

## New York Farm Viability Institute

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The New York Farm Viability Institute (NYFVI) is a farmer-led not-for-profit that provides grant funds for applied research and outreach education projects that help farms increase profits and provide models for other farms. Since the 2018 Pollinator Protection Plan Update, the NYFVI has provided grant funds for a study: “Examining the Efficacy of a Novel Control Method for *Varroa destructor* in New York Honey Bee Colonies. (Complex)”.

## NYS Thruway Authority

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- The Authority is participating in a research study being led by the New York State Department of Transportation. The research is being undertaken by the Rochester Institute of Technology and is designed to identify the impacts of a modified mowing regime on pollinators. Three locations on the Thruway will be included in the study. The findings from the research are anticipated in 2022.
- The Authority will continue to monitor the health of existing wildflower plantings and where applicable, evaluate the stressors affecting the area.
- UV-light traps have been installed at select tollbooth locations where mosquitoes and other nighttime pests are present. Based on empirical evidence, these traps appear to be effective. Other locations will be considered for future installations, which will eliminate the need to spray insecticides for pest management.
- The Authority continues to investigate alternative, low maintenance plantings appropriate for a highway right-of-way.

## NYS Department of Transportation (DOT)

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The DOT initiated and actively manages several research projects, using federal State Planning and Research funds, focused on or of benefit to pollinators: SPR C-16-02 Soils to support Pollinators (\$500,000) analyzes the characteristics of native soils currently supporting pollinator-friendly vegetation in all major state ecoregions. This will serve as the basis for development of manufactured topsoil specifications to improve the Department’s ability to better mimic natural conditions when restoring areas where topsoil has been lost or diminished. SPR C-17-12 Effects of a Modified Mowing Regime in NYSDOT ROWs on Pollinators and Vegetation (\$200,000) evaluates the effect of standard and altered mowing practices on presence and quantity of pollinator and wildflower species in 30 paired test sites across the state. The analysis will strengthen roadside vegetation managers’ ability to determine the benefits and costs of altering mowing practices for safety/operational concerns and pollinator insects. SPR C-18-01 Swallow-wort Biocontrol (\$750,000): supports the development and field trials of potential biocontrols for the invasive plant Swallow-wort that, in addition to overtaking native vegetation and reducing diversity, can attract monarch butterflies but kill the larvae that hatch. All these efforts will result in both professional publication and practical application, include a training component, and will have wider applicability to other DOTs and land managing entities.

DOT also works closely with other agencies and partners for mutual sharing and support of research and knowledge. For example, discussions with the Xerces Society and the Federal Plant Conservation Alliance have informed our efforts to develop seed mixes that can withstand roadside stressors, with minimal ground preparation.

# Future Recommendations

The Pollinator Protection Plan has helped advance many of the State's goals to protect its pollinator populations, including developing voluntary best management practices for all pollinator stakeholders; developing habitat enhancement efforts to protect and revive populations of native and managed pollinators; supporting research and monitoring of pollinators to better understand, prevent, and recover from pollinator losses; and expanding outreach and public education on the importance of pollinators.

Moving forward, there are many opportunities to build on the actions taken so far to protect New York's pollinators.

## Best Management Practices

### Register Apiaries for BMP Implementation and Improved Disease Control

Pass legislation to create the Cooperative Honey Bee Health Improvement Plan to provide the NYS Department of Agriculture and Markets with beekeeper information on number of colonies, county location and contact information.

### Expand the Reach of the New York State Tech Team

Expand the Tech Team's geographic range to enroll beekeepers in unrepresented areas, such as the North Country, Hudson Valley, New York City and Long Island. Provide components of Tech Team program in a virtual platform and with web-based learning.

### Develop Best Management Practices to Promote Pollinator Health

Target Integrated Pest Management Program (IPM) efforts to develop and distribute BMPs on using treated seed in crop production and fungicides in specialty crops.

## Habitat Enhancement Efforts

### Increase Pollinator Friendly Plantings at State Sites

Given the current status of native pollinator populations and habitat loss, NYS Office of Parks, Recreation and Historic Preservation can play a role in the protection of native pollinators by strategically improving pollinator habitat throughout the state. NYS OPRHP should continue to conserve, maintain, and expand pollinator gardens and larger pollinator habitats, emphasizing the use of native plantings.

## Continue Research

### Control of the Varroa Mite

IPM Research on alternative control measures and treatment for the Varroa Mite as it is the top stressor for honeybees and biggest indicator of colony loss.

### Establish an IPM Workgroup

Examine alternative products and control measures for those pesticides (neonics, fungicides) used in New York and for which pollinator exposure is of concern. Research should include the availability, cost, efficacy and application method/equipment of potential alternatives and as well as their risk to pollinators, environment and human health.

## Pollinator Exposure to Pesticides

Replicate Cornell University on-farm research related to pesticide spray practices and pesticide residues (pollen, wax) conducted on strawberry and apple farms to other New York cropping systems and commodities.

## Data and Information on Current Farming Practices

A Cornell (Dyson School) study (including farmer survey) of the use of fungicides and neonicotinoids in New York's farming community.

## Vulnerable Native Pollinator Communities

Use Natural Heritage baseline data on pollinators to identify key pollinator species for New York and correlate with key agricultural land use patterns. Monitor pollinator community over time.





