NYISRI

New York Invasive Species Research Institute

2018 Annual Report

Message from the Director

Dear Partners,

It is a pleasure to share the New York Invasive Species Research Institute 2018 Annual report where we have highlighted the past year's collaborations, initiatives, events and accomplishments.

In 2018 we cast our net wider in an effort to share New York's experience and engage with and learn from the research and experiences of invasive species networks beyond New York State borders.

This effort has resulted in new, expanded and strengthened partnerships, new vision, a new advisory board, and engagement with more researchers and organizations who share our desire to bridge the gap between invasive species research and management.

We are thankful to have had the opportunity to gain a "bird's eye view" on invasive species research, management and policy efforts in North America and internationally. Together with guidance from partner organizations here in New York State, this perspective has helped us to lay the ground work as we plan our efforts for the coming years.

Carrie Brown-Lima

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College of Agriculture and Life Sciences

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Funding for the New York Invasive Species Research Institute is provided by the Environmental Protection Fund as administered by the New York Department of Environmental Conservation. NYISRI is hosted by Cornell University.

This report was prepared by Audrey Bowe and Carrie Brown-Lima.

Cover Images: Field of Goldenrod, Yonassan Gershom 2007. Canadice Lake in the Finger Lakes. Visit Finger Lakes 2008. Hemlock Forest on a Steep Slope. Nicholas A. Tonelli 2017. Fire Island Wilderness. National Park Service, S. Von Hagen 2015.

Background and Mission

Invasive species pose a serious threat to New York's vast natural resources. In recognition of this, New York State has invested in programs that work to prevent, manage, and educate the public about the negative impacts of invasive species. New York also has a wealth of expertise in the form of researchers and academics who study invasive species at universities and institutes. Despite independently rich networks, gaps exist between invasive species researcher and manager communities that reduce our ability to quantify, prevent, and manage these impacts.

Housed in the Department of Natural Resources at Cornell University, the New York Invasive Species Research Institute (NYISRI) spans the research-implementation divide, promoting communication and collaboration between invasive species scientists and the land managers and policy makers who need the information to improve the scientific basis of invasive species management and policies.

How We Work

The New York Invasive Species Research Institute works closely with the eight Partnerships for Regional Invasive Species Management (PRISMs), the New York Department of Environmental Conservation (NYDEC), and the iMapInvasives Program within the New York Natural Heritage Program (NYNHP).

To further its mission, NYISRI engages with researchers and managers from federal agencies, universities, organizations, and industry across the country and around the world.

The summer 2018 NYISRI Team. From left: Audrey Bowe, Sam Schultz, Jake Brenner, Naomi Haber, Grace Mortellaro, and Carrie Brown-Lima. Missing: Jen Price Tack

NYISRI acts strategically to:

- Establish and participate in solution-seeking networks
- Catalyze collaborations and new thinking
- Facilitate awareness, testing and adoption of innovative techniques, concepts and long term sustainable solutions for preventing, detecting, and managing invasive species
- Improve invasive species decisions using science and technology
- Understand research needs of stakeholders, connect research needs to appropriate researchers, and researchers with funding opportunities
- Provide scientifically-sound recommendations to policymakers and decision-makers
- Eliminate barriers and provide venues for co-creation of knowledge and knowledge sharing

Acknowledgements

We appreciate the guidance from our partners at each of the PRISMs, the New York Natural Heritage Program, and the New York Department of Environmental Conservation, and we are grateful for the continued support and involvement of all of our partners and collaborators.

Thank you to Jen Price Tack, Wade Simmons, and Stacy Endriss for contributing updates to this report.

Thank you to Jen Price Tack for reviewing a previous version of this document.

We also would like to thank Dr. Bernd Blossey and his lab group for feedback and support on many of NYISRI's projects and initiatives.

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Putting NYISRI on the Map

Though unique in its structure, New York is not alone in its endeavors to manage invasive species. NYISRI works to tap into the broader national and world-wide invasive species networks to share experiences from New York and bring new resources and ideas back to those working in the state.

In 2018, NYISRI Director Carrie Brown-Lima attended and presented at several national and international conferences, including **The International Symposium on Biological Control of Weeds** in Engelberg, Switzerland and the **NEOBIOTA 2018** Conference held in Dublin, Ireland. Here she learned about research programs and approaches to address invasive species and network with researchers and professionals from across the globe.

Key meetings and conversations included:

- Coordinating a side meeting with a group of international researchers to discuss strategies for advancing a biocontrol program for Japanese knotweed in New York
- Learning from researchers in the Midwest and Canada about their experiences with swallow-wort biocontrol
- Learning about new and unpublished advances on biocontrols for hydrilla, tree of heaven, and other species of concern in New York
- Discussing strategies for communicating about biocontrol and integration into management programs
- Exchanging ideas about integrating research and management with researchers from around the globe

To formalize national connections, NYISRI applied for and was accepted to serve as a Hub for the **North American Invasives Species Network (NAISN)**, a continent-wide collaborative of organizations and institutions working with invasive species. NYISRI will serve on the NAISN board of directors for the next two years. NYISRI also was invited to join the board of directors of the **North American Invasive Species Management Association** whose mission is to support, promote, and empower invasive species prevention and management in North America.

NYISRI is currently working closely with NAISMA (a traditionally western-US centered group) to co-host the annual NAISMA Conference in Saratoga Springs, New York. This will be the first time this meeting has been held in the Eastern US. The conference caters to a natural resource manager audience, providing a venue for conversations and networking among and between managers, researchers, and policy makers. The theme of the 2019 conference, which will be held September 30th – October 3rd, is "Connecting Science to Action", a reflection of NYISRI's mission.

Strategic Planning & Formalizing Processes

NYISRI formally established its Advisory Board in 2017, and held an Advisory Board Meeting in early April 2018. Members (listed in Appendix 1.) represent diverse expertise and institutional backgrounds spanning from economics to entomology and agencies to academic institutions. Feedback from this meeting on NYISRI's activities and role in the state was synthesized and used to kick off a Strategic Planning Process with guidance from senior human resources consultants at Cornell University. This plan is intended to guide the actions of the organization for the next 5 years. NYISRI will be seeking input from stakeholders and finalizing this document in 2019.

In 2018, NYISRI also reassessed its annual call for research needs from the Partnerships for Regional Invasive Species Management (PRISMs), requesting for participants not only to provide the usual research requests, but also to use a constructed scale to rank past and present suggestions by importance. The outcome of this exercise was a ranked list, which has since guided NYISRI's focus. NYISRI plans to further improve and refine this process in 2019 by working with an independent research group to utilize Group Concept Mapping, a transparent and replicable process to set research priorities among diverse stakeholders and advance translational research.

Strategic Initiatives

1. Regional Invasive Species and Climate Change Management Network

Successful long-term management of invasive species depends on the ability of managers to anticipate and adapt to a changing climate.. The Regional Invasive Species and Climate Change (RISCC) Management Network is an ongoing collaboration between NYISRI, the **University of Massachusetts Amherst**, and the **Northeast Climate Adaptation Science Center**. This group aims to address the question "How can we manage for upcoming biological invasions in light of climate change?" through synthesizing existing research, conducting new research, and facilitating communication and understanding among stakeholders. NYISRI is a co-founder of this network and plays a coordination role in the network's initiatives. In 2018, NYISRI worked with collaborators on: co-planning an annual conference (NE RISCC Management Symposium), maintaining and providing information to a list-serve of over 200 managers and researchers, writing management challenge white papers, and circulating weekly summaries of climate change and invasive species research.

Organizations involved: University of Massachusetts Amherst, Northeast Climate Adaptation Science Center
Key 2018 Accomplishments: Second Annual RISCC Symposium held, three Management Challenge documents created, weekly management summaries created and circulated via list-serve

Spotlight on: The 2nd Annual RISCC Management Symposium

The 2018 NE Regional Invasive Species and Climate Change Management Symposium was held at the University of Massachusetts during Invasive Species Awareness Week and had over 120 participants from 50 organizations representing 16 states. Feedback from participants included:

"Thank you for such an open and informative event - it was tremendously helpful to my work and own learning, and was incredibly well executed."

"The Symposium was extremely well-organized and very informative. The opportunity for small and large group discussion greatly improved participants ability to process the information and "take it home" with them."

Above, left: Co-founders of the RISCC Management Network. From left, Toni Lyn Morelli (NE CSAC), Bethany Bradley (UMass Amherst), and Carrie Brown-Lima (NYISRI). Above, right: Participants in the RISCC Symposium discussion sections. Photo credit: Val Pasquarella

2. Biological Control

Biological control, or the introduction of one organism to control populations of another, is currently one of the only long-term sustainable strategies for managing widely established invasive species. Because the development and experimental release of biocontrols depends heavily on the research community, NYISRI works closely with researchers and organizations who specialize in biocontrol to advance research on high priority species in New York.

Swallow-wort Biological Control Research Collaborative

The advancement of a biocontrol program for swallow-wort (*Vincetoxicum rossicum* and *V. nigrum*), a problematic and widespread perennial vining herb, emerged as a priority research need of PRISM partners in 2015. In response, NYISRI established connections with those conducting swallow-wort biocontrol research in New York, as well as in other regions including Canada and Rhode Island and to understand the state of the science and develop a research agenda. NYISRI then presented this need to the New York Invasive Species Council, and worked with the **NY Department of Transportation** and researchers to bring $750,000 of funding to New York State for this program.

In 2018, NYISRI brought together researchers from **SUNY ESF**, **Wells College**, **SUNY Cortland**, the **USDA ARS** and collaborators at the **University of Rhode Island** to establish the Swallow-wort Biocontrol Research Collaborative. This group responded to the DOT request for proposals and successfully secured the funding to advance this program in the form of field releases and monitoring effectiveness of *Hypena opulenta*, the leaf-feeding moth biocontrol agent of swallow-wort. This funding also supports the development of a rearing facility based at SUNY ESF which will provide a source for future *H. opulenta* releases in New York.

Organizations Involved: SUNY ESF, SUNY Cortland, Wells College, USDA ARS, University of Rhode Island, NY DOT
Key 2018 Accomplishments: $750,000 brought to New York to support swallow-wort biocontrol research, research sites established in New York State, research group formed

Above, from left: 1) Hypena opulenta larvae feeding on swallow-wort, 2) field elease cage, 3) H. opulenta defoliation, and 4) Jeromy Biazzo and Lindsay Milbrath of the USDA ARS Program at a release site. Photo Credit: Jackie Schnurr

Biocontrol Outreach Program

With the advancement of the swallow-wort biological control research program (detailed above) into the field-release stage, NYISRI and partners identified the need to develop an outreach and monitoring program for management professionals who will ultimately be releasing the agent, *Hypena opulenta* on a broader scale and monitoring its impact. In the past, New York State has required permits for releasing biocontrol agents, and thus release information has been traceable and archived. With the recent dissolution of state-level regulations pertaining to biocontrol releases, NYISRI recognized the need to continue capturing information on agent releases for the purposes of monitoring and measuring outcomes. Collaborating with staff at **Cornell Cooperative Extension**, **iMapInvasives**, and members of the **Swallow-wort Biocontrol Research Collaborative**, this project aims to understand manager perceptions of biocontrol and develop outreach materials, training, and a monitoring protocol for tracking releases.

Organizations Involved: Cornell Cooperative Extension, Cornell University/Invasive Plants Program, Swallow-wort Biocontrol Research Collaborative
Key 2018 Accomplishments: Program idea and collaboration developed, $90,000 procured to support project

Biological Control of Water Chestnut

Working under the NYISRI umbrella, the water chestnut biocontrol program, which has focused on a leaf-feeding beetle agent, *Galerucella birmanica*, is currently being advanced by researchers at Cornell University.

An Update by Wade Simmons, Graduate Student, Cornell Department of Natural Resources

The colony of leaf-feeding beetles (*Galerucella birmanica*) being evaluated as a biological control agent for water chestnut continues to be healthy in our quarantined lab facility. In 2018, we completed a first round of multiple-choice tests, which seek to evaluate the feeding and egg-laying behavior of the insects when presented a choice between water chestnut and multiple other plants. As predicted, feeding damage was primarily limited to water chestnut and the native watershield. Continued testing, scheduled for spring 2019, will further explore potential risks to watershield populations.

Above, Galerucella birmanica *adults feeding on a water chestnut leaf. Photo credit: Wade Simmons*

Previous attempts at over-wintering the colony of *G. birmanica* by simulating typical winter conditions have resulted in large mortality events and have set us back every spring. We believe that this is a result of highly artificial greenhouse conditions, rather than the suitability of our climate for the insects. This year we are skipping the 'over-wintering' phase and are continuously rearing new generations of insects. We have developed new methods to manage the colony and grow water chestnut plants indoors, and expect to enter spring 2019 with a robust colony ready for further testing. Currently, we are working on compiling all of the existing test results into a report to be submitted to the Technical Advisory Group that evaluates biological control programs.

Very little is known about the life-cycle of the native plant watershield, *Brasenia schreberi*. In 2018, watershield plants and seeds were collected from a number of populations in the northeast and brought back to our laboratory for propagation. We have designed a series of experiments to better understand the natural history of the plant, and the degree of impact that insect attack may have on it. In North America, water shield is attacked by a native leaf-feeding beetle, and in Asia the plant co-exists with water chestnut and the biological control beetle (*G. birmanica*), which occasionally feeds upon the plant but is unable to build up large populations on it. In our water-shield experiments, we aim to determine whether the feeding damage by the biological control agent would result in population level declines of the plant, or if the damage is cosmetic, transient, and without negative population consequences, as current evidence suggests.

Feeding damage by the native waterlily leaf beetle Galerucella nymphaeae *on water shield (Brasenia schreberi). Photo Credit: Wade Simmons*

A water chesnut population in Upstate New York. Photo credit: Audrey Bowe

Spotlight On: 25 Years of Purple Loosestrife Biocontrol

An Update by Dr. Stacy Endriss, Post-doctoral Research Associate, Department of Natural Resources, Cornell University

Over twenty five years have passed since the first releases of biological control agents for purple loosestrife in North America. In some regions, such as central New York and Washington, both anecdotal and empirical evidence support this program's success. In other regions, however, biocontrol agents have had only limited success: purple loosestrife has retained its usual dominance and remains a management priority. Further, a formal assessment of the North American distribution of the four species that comprise the biological control program is lacking. However, we can now investigate the long-term impacts of this program, as more than two decades have passed since the release of biocontrol agents in North America. To this end, we are taking a multi-pronged approach that relies on both field evidence and hands-on experience of land managers to investigate impacts at a local and regional scale. We aim to use our findings to inform management of purple loosestrife as well as to more rigorously respond to broad criticisms of biocontrol.

In 2018, we made significant progress towards understanding the local dispersal and distribution of biocontrol agents within central New York. We have also made important headway in planning for a larger-scale assessment of the biocontrol program, which we will implement in 2019. Below, we detail the progress we made towards each of these goals.

Dispersal and distribution of biocontrol agents within central New York

Starting in 1994, biological control agents were released at limited sites near Cornell University. These agents included two leaf-feeding beetles (*Galerucella pusilla* and *G. calmariensis*), a root-boring weevil (*Hylobius transversovittatus*), and a flower-feeding weevil (*Nanophyes marmoratus*). *Galerucella* spp. and *N. marmoratus* are all easily visible and exhibit clearly identifiable damage, making them ideal for monitoring the dispersal of these agents following release.

To this end, roadside-surveys of purple loosestrife were conducted in 2001 within a 15-km radius of Cornell University in Ithaca, NY. Revisiting these corridors in 2018 gave us the unique opportunity not only to see what habitats these insects now occupy, but also how the distribution and impact of these insects changed through time. We are currently analyzing data collected from this summer and will expand the radius of our assessment for the presence of these insects in 2019.

Lab technician Alex Beck during summer 2018 data collection. Photo credit: Stacy Endriss

Defoliation of purple loosestrife by a Galerucella beetle. Photo credit: Stacy Endriss

Above, from left: 1) Purple loosestrife in a roadside ditch, 2) purple loosestrife in fl wer, 3) roadside surveys in Tompkins County, New York. Photo credit: Stacy Endriss, Audrey Bowe

Nationwide assessment of impacts of purple loosestrife biocontrol program

In 2018, we made progress towards finalizing a nationwide-survey to focus on the current perceptions of purple loosestrife and its biocontrol program. Before the summer, I will email out an invitation to participate through multiple list-serves, including Eco-log, the New England Invasive Plant Newsbriefs, an extensive contact list maintained by the Resource Ecology and Management of Invasive Species Program at Cornell University, and networks maintained by the US Fish and Wildlife service as well as the National Park Service. In addition, I will personally request feedback from targeted individuals known to have a strong interest in management of purple loosestrife. As part of this survey, I will also ask permission to see long-term monitoring assessments of purple loosestrife, which will be integrated into a larger database of monitoring efforts. An analyses of monitoring efforts will allow a side-by-side comparison of the perceptions and evidence of success of these biocontrol programs.

Local assessment of impacts of purple loosestrife biocontrol program

Central New York historically prioritized management of purple loosestrife. Further, when biocontrol agents were released in this area in the 1990s many purple loosestrife populations were closely monitored both before and after release. This monitoring effort carefully documented native plant diversity as well as the presence/absence of each of the four biocontrol agents for purple loosestrife populations, data that is often missing for other regions across North America. In addition, strong anecdotal evidence suggests that biocontrol of purple loosestrife has dramatically reduced the abundance of large stands of purple loosestrife in this region, which allows me to investigate the long-term impacts of this biocontrol program in an area where these agents have been deemed largely successful. We have made preparations to revisit a selected range of these sites in fall 2019. This will allow us to assess whether:

- biocontrol only reduces the abundance of purple loosestrife in populations above a certain size threshold (and, conversely, whether purple loosestrife cannot exceed a certain population size in the presence of biocontrol agents)
- declines in purple loosestrife populations lead to recovery of native plant biodiversity

3. New York Invasive Species Prioritization & Optimization Project

An Update by Dr. Jennifer Price Tack, Post-doctoral Research Associate, New York Invasive Species Research Institute

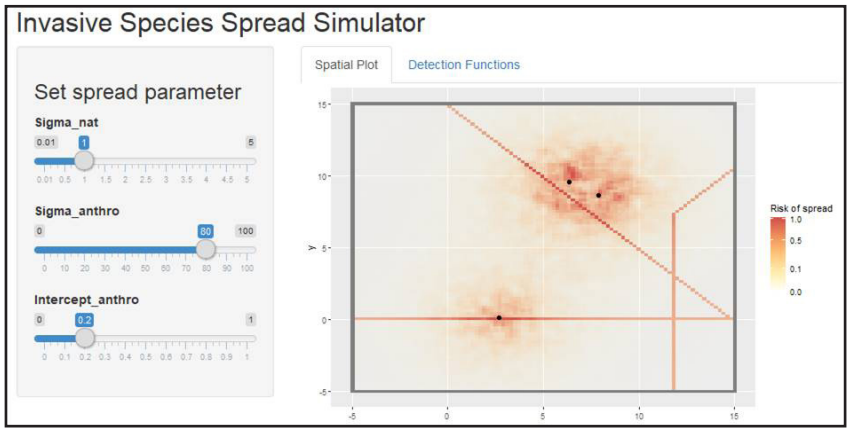
In New York, invasive species managers have expressed the need for tools to help inform the allocation of their limited resources. To address this need, we are developing a decision tool with, and for state and regional managers to optimize the treatment of multiple species across the state.

We are collaborating with **iMapInvasives** to use their statewide database of invasive species occurrences to model species current and potential distributions. Our approach uses a decision-making framework that engages decision makers and stakeholders in the identification of the objectives and alternatives of management. Based on their needs, we are using optimization techniques to determine the combination of species, areas, and strategies expected to minimize negative ecological, social, and economic impacts at the greatest treatment effectiveness.

Over the last year, we have made significant strides in developing the tool. We have held multiple workshops to identify the objectives of management and suite of alternatives that we want to include in the model. We have also held numerous meetings to elicit information from the invasive species managers that is not readily available in the scientific literature, including estimated costs of management and expected effectiveness of treatment alternatives. We have developed models of predicted dispersal patterns that consider anthropogenic and natural means of invasive species spread.

Organization Involved: Computational Sustainability Institute, NY PRISMs, NY DEC, NY Natural Heritage Program, iMap-Invasives, USGS NY Cooperative Fish & Wildlife Research Unit
Key 2018 Accomplishments: Multiple workshops held with DEC and PRISM leaders, including 2 in-person meetings to advance project. Presented work at two national conferences: The Wildlife Society Conference in Cleveland, Ohio and the NAIMA-UMISC conference in Rochester, Minnesota.

Above, participants in an elicitation workshop to inform model inputs. Photo credit: Angela Fuller



Above, the app developed by Jennifer Price Tack to engage managers in classifying invasive species based on methods of natural and anthropogenic dispersal. Users can change model parameters and see how the risk of invasion changes across the landscape. Photo credit: Jennifer Price Tack

4. Co-Creation of Knowledge Partnerships

Peer-reviewed studies on the effectiveness of management techniques rarely take into account real-world obstacles, such as pesticide labeling restrictions, the difficulties associated with needing a reference site, funding limitations, and many other factors that play into management decisions. NYISRI is initiating a pilot program that establishes partnerships between researchers and land managers to actively co-create protocols to measure effectiveness of invasive species management techniques in natural areas. Specifically, NYISRI played a coordination role in the development of a collaboration between researchers at **SUNY Cortland** and **New York State Parks** to understand ecological outcomes of swallow-wort management. As this project has evolved and progressed, NYISRI continues to provide support where needed. NYISRI staff member Audrey Bowe is also working with collaborators at the **APIPP PRISM** to advance a monitoring project assessing native community response after management of invasive *Phragmites australis* in Adirondack wetlands.

Organizations Involved: SUNY Cortland, NY State Parks, Cornell University, Adirondack Park Invasive Plant Program

5. Promoting Regional Collaboration

Invasive species are not limited by political boundaries, and many species that managers struggle with in New York are present across the Northeast. Inspired by the Western Governors Association and the Great Lakes St. Lawrence Governors & Premiers, groups with lawmaking influence in the western and Great Lakes region of the United States that address invasive species issues, NYISRI is working with the **Adirondack Park Agency** and other partners to establish a similar framework in the Northeast.

NYISRI and APA developed a strategy and has engaged with the NY ISC, NY ISAC and other entities to advance the idea. A Northeast Invasive Species Collaborative would regionally unite states working on invasive species issues and facilitate opportunities for greater collaboration, funding, and capacity.

Organizations involved: Adirondack Park Agency, New York Invasive Species Council
Key 2018 Accomplishments: Developed written proposal for collaborative, advanced comprehensive report on invasive species programs and related organizations for the New England states, plus Pennyslvania and New Jersey

6. Best Management Practices Intern Program

A one-size-fits-all method of prevention, detection and management does not exist, so environmental managers need species-specific guides to combat the more than 400 invasive species currently in New York State. During summer 2018, NYISRI hired three Cornell undergraduates to work on a pilot project supported by Engaged Cornell to work with the **Partnerships for Regional Invasive Species Management (PRISMs)** and **New York Department of Environmental Conservation (NY DEC)** to synthesize research and manager experiences and write best management practices for high impact species.

Over the course of the summer, interns interacted with managers and researchers, visited management and research sites, and conducted literature reviews to create up-to-date best management practice guides integrating manager experiences with the latest scientific studies.

Organizations Involved: Cornell University, New York PRISMs, NY Department of Environmental Conservation, Engaged Cornell
Key 2018 accomplishments: 7 Best Management Practice Guides produced, results presented and discussion facilitated at the annual Cornell Cooperative Extension In-service.

Above, left: Summer interns Grace Montellaro, Sam Schultz, and Naomi Haber during a visit to a giant hogweed site. Above, right: Interns Jake Brenner and Naomi Haber participating in a water chestnut pull in Seneca County. Photo credit: Sam Schultz

Cultivating & Supporting Research

NYISRI actively seeks out researchers and funding to support invasive species research that will benefit New York State. This year, NYISRI:

- Initiated conversations with researchers on how to advance the current state of Japanese Knotweed biocontrol research
- Assisted in assembling a research group and served as Co-PI on research proposal to the Atkinson Center for a Sustainable Future on a project investigating impacts of hemlock woolly adelgid on water quality.
- Participated in calls regarding advancing forest pest policy and collaboration among Great Lake or Northeast States
- Served as professional mentor on Smith Fellowship Research Proposal to create a citizen science network for identifying, preventing, and managing invasive earthworms
- Developed a proposal for funding to hire a post-doctoral associate to lead an expert workgroup in the synthesis of invasive species and climate change scientific knowledge and management actions
- Provided letters of support for invasive species related research proposals that relate to NYS priorities including the USDA NIFA: "Establishing a Roadmap for resilient and sustainable agricultural systems for Northeastern North America" that included addressing invasive pests and other species
- Encouraged the Forest Ecosystem Monitoring Cooperative to take on three invasive species projects that synthesize research including an economic analysis on the impact of forest pests in urban settings, an assessment of the risk of HWA impacts on waterways in NYS, and an initiative to understand invasive species and climate change interactions.

Providing Scientifically-Sound Recommendations to Policymakers & Decision-makers

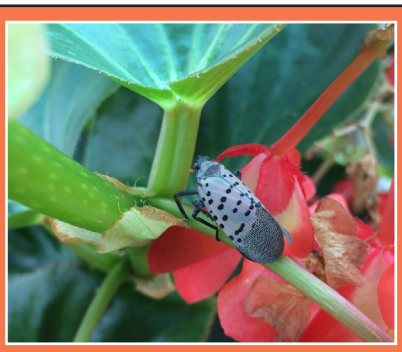
In accordance with its role in the state, NYISRI attends and presents updates at New York Invasive Species Council meetings. NYISRI also attends the meetings of the New York Invasive Species Advisory Committee (ISAC), and in 2018 was nominated to formally represent Cornell University at NY ISAC Meetings.

NYISRI also met numerous times both in person and by phone and provided multiple rounds of feedback during the development of the New York Invasive Species Comprehensive Management Plan, which was formally approved by the New York Invasive Species Council in December 2018.

Spotlight on: The Spotted Lanternfly

The spotted lanternfly (*Lycorma delicatula*) is an invasive leafhopper that feeds on over 80 ornamental and crop plants. Since its discovery in Pennsylvania in 2014, populations of this insect have skyrocketed and spread, sparking concern amongst neighboring states. In New York and regionally, a number of committees were formed to address this new pest, including the New York Spotted Lanternfly Response Team and USDA APHIS Spotted Lanternfly Science biweekly conference calls.

The New York Invasive Species Research Institute has been an active participant in these committees and has worked to compile and share research on what is known about *L. delicatula* in its native and other introduced ranges. NYISRI further assembled a scientific advisory group to support the development of the spotted lanternfly response plan.



Above, spotted lanternfly adult

Information Sharing & Communication

Throughout the year, NYISRI works to disseminate information regarding invasive species to partners and managers through organizing monthly speakers for PRISM Calls, planning conferences, giving presentations, presenting posters, writing articles, and collating and synthesizing research papers. NYISRI is also an active participant in many state and regional working groups and networks, a complete list of which can be found in Appendix 3.

Conferences

Cornell Cooperative Extension Agriculture, Food and Environmental Systems In-service

NYISRI hosts the Invasive Species Track of the annual Cornell Cooperative Extension In-service training, held every year in November at Cornell University. Over 100 people attended the 2018 In-service, which was comprised of 4 sessions:

- Working Dogs for Conservation & Applications for Invasive Species
- Designing Successful Citizen Science Programs
- Biological Control of Invasive Species: From Research to Implementation
- Invasive Species Best Management Practices: Developing Guides & Sharing Information

Participants and presenters at the 2018 Cornell Cooperative Extension In-service. Photo credit: Justin Patterson.

These sessions were followed by a day and a half workshop on Applying Behavioral Psychology to Stop Invasive Species led by Ken Donnelly of Beyond Attitude Consulting. Participants learned about behavioral psychology and participated in break-out groups to brainstorm idea on how these theories can be applied to invasive species programs.

Spotlight on: Beyond Attitude Consulting

Ken Donnelly of Beyond Attitude Consulting was first invited to speak to New York via webinar by Director Carrie Brown-Lima after she attended the 2017 North American Invasive Species Management Association Conference, where he was a keynote speaker. He is now working with the NY DEC to incorporate behavior change messaging into the state-wide boat steward program.

Additionally, Ken Donnelly gave a day and a half workshop on applying behavioral psychology to stop invasive species during the 2018 Cornell Cooperative Extension In-service (pictured left).

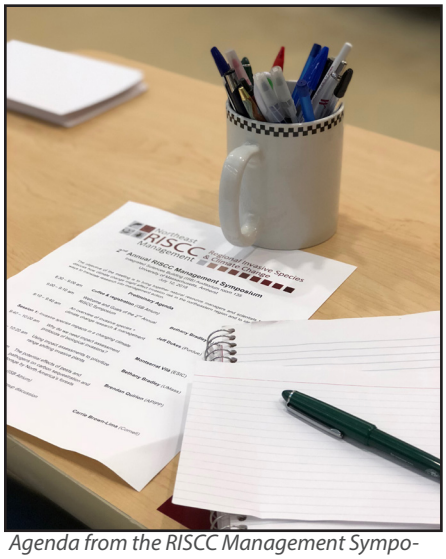
2nd Annual Northeast Regional Invasive Species & Climate Change Management Symposium

For the second consecutive year, NYISRI and Northeast Regional Invasive Species and Climate Change Management Network co-founders hosted a day-long conference on the topic of invasive species and climate change. The objective of the meeting was to bring together natural resource managers and scientists to discuss how climate change might affect invasion risk in the northeastern region and to identify ways to translate research into management action.

This year an international group of leading climate change experts attended and presented on their work. The conference was broken up into 3 sessions:

- Invasive species impacts in a changing climate
- Developing proactive invasive species regulations
- Emerging challenges for invasive species management

Appendix 2. lists the full line-up of presentations.



Agenda from the RISCC Management Symposium. Photo credit: Val Pasquarella

NAISMA 2019 Conference

Working closely with the Executive Director and Advisory Board of the North American Invasive Species Management Association (NAISMA), the New York Invasive Species Research Institute is co-hosting the 2019 conference in New York State. In 2018, NYISRI and NAISMA started working with key cities in New York to evaluate potential venues.

Presentations

In 2018, NYISRI Director Carrie Brown-Lima represented NYISRI at a variety of venues and spoke on a range of topics. Presentations are detailed below:

- "Managing invasive species in light of climate change" **Forest Ecological Monitoring Cooperative (FEMC) Conference**, Burlington, VT
- "Promoting science and innovation to reduce the impact of invasive species in New York State" Invited speaker at the **NAISMA Annual Conference**, Rochester, Minnesota
- "Bridging the gap between invasive species research and management in New York State USA" **NEOBIOTA Biannual conference**, Dublin, Ireland
- "Invasive species challenges and solutions in NYS" at the **Cornell Floriculture Field Day**, Ithaca, NY
- "Invasive Species Research needs in New York State" Invited speaker and panelist at the **Adirondack Research Consortium Annual Conference**, Lake Placid, NY
- "Trees under Siege: Pests, Pathogens, and Other Threats to Our Forest." Invited plenary speaker at the **Native Plant Center Annual Conference: The Future of Native Trees**. Westchester County, NY
- "The New York Invasive Species Research Institute: An overview" Invited speaker and panelist for faculty at the **University of Florida**, Gainsville, FL
- "The Northeast Regional Invasive Species and Climate Change Management Network" **27th USDA Interagency Forum on Invasive Species**, Annapolis, MD

Webinars

NYISRI coordinates the speakers and logistics for the monthly All PRISM Calls held on the last Wednesday of each month. Speakers and presentations from 2018 are listed in Appendix 4.

In response to requests for information on invasive jumping worms (Amynthas and Metaphire spp.), NYISRI coordinated a special webinar during National Invasive Species Awareness Week. The webinar, Invasive Earthworms: Impacts & Management, was given by Dr. Andrea Davalos of SUNY Cortland and Dr. Annise Dobson of Yale University and had over 150 attendees, and has been viewed over 350 times since.

Website

NYISRI utilizes a website (nyisri.org) to share information and resources. The NYISRI website features:

- Searchable Invasive Species Manager, Researcher and Lecturer Databases for New York State
- Archives of presentations from past conferences, meetings and workshops
- Links to funding opportunities for invasive species research and management
- The latest news and events for invasive species research in New York
- A blog featuring researcher spotlights, topical articles by researchers, and more
- Monthly Research Digests which compile the most recently published invasive species papers

Film & Print

NYISRI also supported information dissemination through other outlets:

- Providing logistical and planning support for an invasive species documentary being produced by Westfield Productions. During their daylong visit to Cornell University, NYISRI staff assisted in finding interview locations, facilitating filming invasive species and biocontrol agents at the Cornell quarantine facility, and setting up interviews with researchers.
- Facilitating the publication of an article written by Dr. Doug Tallamy on native plants and herbivores in the NY DEC's Conservationist Magazine
- Providing a biological control fact sheet to the Invasive Species Advisory Committee
- Providing an article on biocontrol program updates for the SLELO PRISM Newsletter
- Providing interviews to various news outlets, including the Ithaca Times, Cornell Chronicle, Post Standard, NCC News, Times Union, Great Lakes Echo, and The Environment in Focus

Westfield roduction Co. filming an in erview with Mark Whitmore in Mann Library at Cornell University. Photo credit: Audrey Bowe

Appendices

Appendix 1. New York Invasive Species Research Institute Board Members

- Dr. Bernd Blossey, Associate Professor, Department of Natural Resources, Cornell University
- Dr. Bethany Bradley, Associate Professor of Spatial Ecology & Biogeography, University of Massachusetts Amherst
- Dr. Rebecca Epanchin-Niell, Fellow, Resources for the Future
- Karen Feldman, Commissioner, Adirondack Park Agency
- Dr. Angela Fuller, Leader, USGS New York Cooperative Fish and Wildlife Research Unit & Associate Professor, Cornell University
- Dr. Stuart Findlay, Aquatic Ecologist, Cary Institute of Ecosystem Studies
- Dr. Jennifer Grant, Director, New York State Integrated Pest Management Program, Cornell University
- Dr. David Lodge, The Francis J. DiSalvo Director, David R. Atkinson Center for a Sustainable Future, Cornell University
- Dr. Gary Lovett, Forest Ecologist, Cary Institute of Ecosystem Studies
- Dr. Dylan Parry, Associate Professor, SUNY College of Environmental Science and Forestry
- Laura Eaton, Assistant Regional Biologist, U.S. Fish and Wildlife Service & Invasives Coordinator, Northeast National Wildlife Refuges
- Hilary Smith, Senior Advisor for Invasive Species, U.S. Department of Interior
- Brendan Quirion, Adirondack Park Invasive Plant Program Manager, The Nature Conservancy – Adirondack Chapter
- Gregory Parra, Pest Exclusion Specialist, PPQ Center for Plant Health and Technology, USDA APHIS

Appendix 2. Presentations from the 2nd Annual Regional Invasive Species and Climate Change Management Symposium.

An overview of invasive species & climate change research & management. Jeffrey Dukes, Purdue University

Why do we need impact assessment protocols of biological invasions? Montserrat Vila, Estación Biológicade Doñana

Using impact assessments to prioritize range shifting invasive plants for monitoring and management. Bethany Bradley, University of Massachusetts Amherst

The potential effe ts of pests and pathogens on carbon sequestration and storage by North America's forests. Brendan Quirion, The Nature Conservancy

Developing Proactive Invasive Species Regulation Emerging global invasion threats and response capacities. Regan Early, University of Exeter

Coordination opportunities and challenges for listing invasive plants in U.S. states. Jenica Allen, University of New Hampshire

Exploring the state-level regulatory process in Massachusetts. Julie Richburg, The Trustees of Reservations

Effe t of increasing water temperatures on aquatic invasions. Jennifer Price Tack, Cornell University

Climate change could awaken some 'sleeper' naturalized species. Brittany Laginhas, University of Massachusetts Amherst

Sleeper species case study - pests in a warmer world. Steven Frank, North Carolina State University

Lessons learned from Tug Hill - managing for resiliency to climate & invasive species. Gregg Sargis, The Nature Conservancy

Success and impacts of species invasions in a changing world. Cascade Sorte, University of California Irvine

Appendix 3. Working groups and networks NYISRI participated in.

- Invasive Species Advisory Council
- PRISM Leader Meetings
- Structured Decision Making Priority Setting Workshops
- APIPP Communication Campaign Development Team
- Spotted Lanternfly Response Planning Team
- NY DEC Tabletop Snakehead Meeting
- Invasive Species Documentary Advisory Committee
- Northeast Aquatic Nuisance Species (NEANS) Panel
- USDA APHIS Spotted Lanternfly Science Calls
- Sustainable Forest Initiative/ESFPA Adirondack Committee Meeting
- Slender False Brome Working Group
- Forest Ecosystem Monitoring Collaborative
- Woody Invasives of the Great Lakes Collaborative
- APIPP Communication & Outreach Campaign Committee
- NYIS Website Advisory Committee
- North American Invasive Species Network Board
- North American Invasive Species Management Association Board
- Regional Invasive Species & Climate Change (RISCC) Management Network (see above)
- Invasive Species Awareness Week 2018 Planning Committee
- iMap Invasives 3.0 Feedback Group

Appendix 4. Speakers and Presentations for All PRISM Calls

Quantifying the social and economic benefits of eed biological control (November 2018). Dr. Brian van Wilgen, Emeritus Professor at the Centre for Invasion Biology, Department of Botany and Zoology at Stellenbosch University, South Africa.

A Summary of New York's Fifth Annual Invasive Species Awareness Week (October 2018). Emma Antolos, Invasive Species Education & Outreach Coordinator with the New York Department of Environmental Conservation.

Timing is Everything – Tools for understanding invasive species phenology (September 2018). Alyssa Rosemartin, Partner & Application Specialist, USA National Phenology Network.

New York State Response to Spotted Lanternfly (June 2018). Willow Eyres, Response & Management Coordinator, NY DEC Bureau of Invasive Species & Ecosystem Health.

A New York crayfish prime : basic identifi ation, historical fauna and global status (May 2018). Dr. Chris Pennuto, Research Professor, SUNY Buffalo.

Managing Invasive Birds in New York State (April 2018). Robyn Bailey, NestWatch Program Leader, Cornell Lab of Ornithology.

Protecting Rare Plants from the Threat of Invasive Species (March 2018). Steve Young, Chief Botanist, New York Natural Heritage Program.

Are Deer Eating Your Woods? (February 2018). Kristi Sullivan, Co-Director, Conservation Education and Research Program, Cornell University.

Applying Behavioral Psychology to Stop Invasive Species (January 2018). Ken Donnelly, Beyond Attitude Consulting.