

2021 Metrics Workshop:

How do we measure our success in invasive species management?

Post-workshop Report

February 22nd, 2021

12:30-4:30pm

Via Zoom



Acknowledgements

This workshop was coordinated in partnership between the New York Invasive Species Research Institute (NYISRI), Cornell University (the Blossey Lab), and the New York Natural Heritage Program (iMapInvasives) in response to requests from the New York Invasive Species Network. We thank Dr. Bernd Blossey, Dr. Andrea Dávalos, Dr. Stacy Endriss, Brendan Quirion, and Wade Simmons of the Blossey Lab for the development and coordination of this workshop.

Carrie Brown Lima, Audrey Bowe, Jennifer Dean, Abby Bezruczyk, and Justin Dalaba facilitated workshop coordination, discussions, and compiled this report.

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Participants

Approximately 66 people from across the state participated in the workshop, including representation from the following organizations:

Adirondack Park Invasive Plant Program
Adirondack Research
Capital Region PRISM
Cornell University
Cornell Botanic Gardens
Ecological Research Institute
Finger Lakes PRISM
Lower Hudson PRISM
Lower Hudson PRISM / New York-New Jersey Trail Conference
Long Island Invasive Species Management Area
New York City Department of Environmental Protection
New York Natural Heritage Program
New York Invasive Species Research Institute
New York City Department of Environmental Protection
New York State Department of Environmental Conservation
New York State Department of Agriculture and Markets
SLELO PRISM / The Nature Conservancy
SUNY Cortland
SUNY ESF

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Agenda

12:30 pm	Welcome & Introduction <i>Carrie Brown-Lima, New York Invasive Species Research Institute</i> <i>Jenn Dean, iMapInvasives, New York Natural Heritage Program</i>
12:45 am	Roundtable Presentations <i>How are different organizations in NYS currently measuring success of invasive species projects?</i>
2:00 pm	Break <i>We'll be back in 10!</i>
2:10 pm	Introduction to Breakout Room Discussions
2:15 pm	Breakout Group Discussion I <i>Choose a topic, and join that room</i>
3:00 pm	Break <i>We'll be back in 10!</i>
3:10 pm	Breakout Group Discussion II <i>Return to your topic room and start discussion II</i>
3:45 pm	Discussion & Report-back from Breakout Groups
4:10 pm	Determine Next Steps & a Path Forward <i>What are priority actions we should take or advocate for to better measure success of our actions in reaching our goals?</i>
4:30 pm	Adjourn

Overview and Objectives

The workshop began with a presentation by Carrie Brown-Lima from the New York Invasive Species Research Institute (NYISRI) and Jennifer Dean with the New York Natural Heritage Program (iMapInvasives). This set the stage, providing objectives for the workshop as well as some background information. The main workshop objectives included:

- ⇒ **Objective 1:** *Share ways we currently work to measure our success of invasive species management in New York.*
- ⇒ **Objective 2:** *Define what success looks like for invasive species management in New York and how we would like to document our success.*
- ⇒ **Objective 3:** *Brainstorm barriers to measuring success and strategies for addressing these.*
- ⇒ **Objective 4:** *Establish next steps.*

We coordinated this workshop in response to requests from the NY Invasive Species Network as expressed in NYISRI's annual solicitation of research needs. From this solicitation, we found that three of the top ten research needs identified were related to measuring success of invasive species management (Table 1).

The challenge presented is that often with invasive species management (specifically) and land management (in general), we measure activities such as acres managed, number of invasive species removed, and resources expended, rather than measuring whether we met our objectives for managing to begin with, such as conservation and restoration of native species, improved recreational opportunities, or increased aesthetics among others (Table 2).

However, outcomes are harder to define and measure than activities, and therefore are the motivation for this workshop. If we do not measure outcomes, we will continue to miss the opportunity to learn from our experiences and know whether we have achieved our goals.

Table 1. Importance ranking based on research needs expressed for 2021.

**Asterisks indicate three of the top ten research needs identified that are related to measuring success of invasive species management*

Importance Rank	Statement
1*	Designing and testing a protocol and developing metrics to assess the effectiveness of invasive species control measures.
2	Strategies for working with transportation departments to help prevent spread of invasive species.
3	Continued identification of species (in horticulture and from the south) to screen for potential addition to Part 575 regulations.
4	Understanding the effect that a changing climate will have on the range and dynamics of existing invasive species.
5*	Development of simple metrics for measuring success of restoration efforts, both for use in the monitoring phase after initial removal and to allow for quicker intervention. For example, thresholds that are low enough to allow for (and recommend) intervention before issues become too costly to address.
6*	Estimating efficacy of invasive species management in NYS to date and whether the benefits have outweighed the costs.
7	Modeling what species we need to look out for due to climate change.
8	Understanding the long-term impact of invasive forest pests on forest ecosystem functions and services
9	Developing tools to connect New York managers to managers in the mid-Atlantic to put together proactive best management practices for invasive species likely to expand into New York with climate change.
10	Advancing swallow-wort biocontrol development and release.

Table 2. Examples of commonly measured activities and outcomes.

Activities are more often and easily reported than outcomes, however the outcomes are our core motivation for managing invasive species. The outcomes listed below serve as common examples, but may not be the most useful and should not be taken as our recommendations.

Activities (Operational)	Outcomes (Ecological, Economic, Human Health)
Acres managed	Ecosystem services maintained
Volunteers engaged	Rare and endangered species protected
Resources expended	Reduced human health impacts
Herbicide applied	Forest health maintained or improved
Events hosted	Native species habitat protected
Meetings held	Property values protected
Number of partners	Recreation increased or maintained

Roundtable Presentations

After the introduction, participants representing each organization presented then participated in round-table introductions and single-slide presentations on how they think about or incorporate metrics into their own work. There were 18 presentations, ranging from reporting and mapping aquatic invasive species in lakes to measuring invasive shrub suppression in forests.

Breakout Groups

In the second session of the workshop, participants joined one of six breakout groups on the following topics: Forest pests, aquatic species, terrestrial plants, place-based, state-wide, and economic/social metrics (See appendix A1).

Each group spent approximately one hour discussing and taking notes on two prompts associated with their topic. The first prompt focused on articulating the ultimate goals of management and linking these with actions and appropriate measurements. The

second prompt asked participants to describe a real or hypothetical situation and brainstorm ways to measure success under different scenarios.

The breakout groups then reconvened and shared salient points from their discussion with the whole group. Some of the take-aways from each group are highlighted below:

Forest Pests

The **forest pest** group shared the ultimate goal they created to "minimize catastrophic species-level mortality due to forest pests to maintain the diversity of ecosystem processes that native northeastern forests provide," along with actions and proposed measurements associated with their Lake George hemlock woolly adelgid scenario.

Aquatic Species

The **aquatics** group shared their ultimate goals of "habitat & natural community conservation, and protection of natural heritage." They also spoke about the importance of prevention and emphasis of early detection and rapid response in aquatic systems. The group brought up questions of how to deal with conflicting or competing goals in management, as well as those to do with how one might compare metrics across different categories (i.e. ecological, economic, recreation).

Terrestrial Plants

The **terrestrial** group highlighted the difficulties of establishing metrics due to varying scales of management (i.e. temporal, spatial, funding) and varying goals on a project-to-project basis. The group also emphasized that project evaluation and funding entities should reward ultimate ecological goals rather than keeping a narrow focus on short-term metrics, including acres treated, number of volunteers, and amount of herbicide applied.

Place-Based

The **place-based** group echoed the terrestrial group's point of metrics depending on myriad goals, and the difficulties of standardizing these across scales. The group also highlighted that baseline information for comparison is often missing or difficult to identify. They also identified barriers with resources as a limitation.

Statewide

The **statewide** group shared that both management and prevention metrics (which will be measured differently) are needed on a state-wide level, and that big-picture metrics will help us tell a more comprehensive story than some that make sense on a smaller scale. They highlighted the difficulties of communicating and measuring the impacts of prevention, and also the connectivity that is inherent to many of New York state's systems.

Economic/Social

The **economic/social** group shared the importance of the goals we set being representative of all constituencies affected, especially underrepresented communities and cultures. They also emphasized the need to demonstrate that we are stewarding funds effectively, and that there is a lack of consistency and accountability in how we are measuring across scales. The group highlighted that many of the metrics we'd like to use lack accurate reporting (i.e. reductions in disease or injury incidence).

Challenges

Challenges to measuring success were identified throughout the workshop. One of the first challenges raised is the scale at which we should be measuring. Whether we are at local or site-based versus statewide, regional or national scale determines what kind of metrics are feasible. Another question raised is how to measure invasions or negative impacts that did not happen thanks to a management effort. For example, how many people were not burned by giant hogweed or which native species were protected from the eradication of an early detection invasive species from a few sites.

The lack of baseline data from pre-invasion also poses challenges as managers often do not know whether a site has been restored to a state resembling pre-invasion. Another important point raised is that different species and different management objectives will require different metrics.

As we include the additional work of monitoring and measuring pre- and post-treatment, we cannot expect our budgets to increase with the work and therefore we would need to reduce the amount of actual management we do to have the resources to conduct the monitoring. This would need to be reflected in the contracts and expectations for the Partnerships for Regional Invasive Species Management (PRISM)

and other grant funding. Furthermore, funding cycles do not always allow for continued monitoring and subsequent learning from failures and successes (Figure 1).

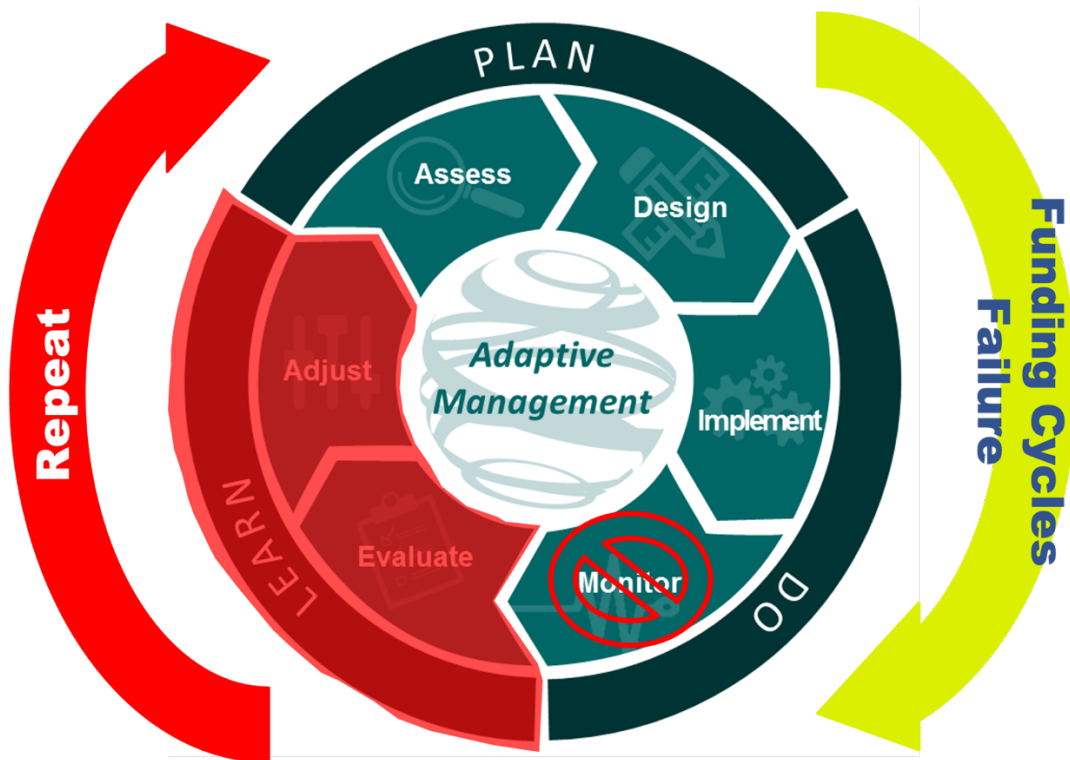


Figure 1. Funding cycle diagram representing how end of funding cycles do not always allow for continued monitoring and subsequent learning from failures and successes.

Additionally, in order to come to a consensus on how to measure, we would need to improve communication across different organizations about ongoing work and regions, which is not happening currently. There is a lack of cohesive and standardized data collection methods regionally, with no common repository for these sorts of measurements to live. The latter could be resolved by utilizing iMapInvasives' platform, but would require appropriate formatting to do so.

Recommendations & Considerations

In the final brainstorming session of the workshop, participants generated a list of considerations and possible next steps for moving this conversation and larger initiative forward.

*Summarized below are the **recommended considerations** the group proposed:*

As we develop metrics, we should be mindful of other ecological factors that are influencing the systems we work in. An example of this is climate change, which is predicted to lead to myriad changes (i.e. allowing many species' ranges to shift northward). We should also be cognizant of other ecological stressors, such as seer, earthworms, or eagerness of people to rush to action, which may influence our success metrics.

Scale is also important since metrics may vary depending on the size and scope of the management project at hand.

Our landscapes are interconnected, and we should be conscious that our metrics can scale up to capture impacts on a statewide scale. We should be able to tell a story of what we are accomplishing across New York State.

Capturing incidences of failure (i.e. inability to prevent a population of an invasive species from expanding, not observing the return of a target native species) and lessons learned are just as important as capturing successes.

In future discussions, this group could use the following approach: First, ask "What do we want to know?" Next, ask "What metrics are we using, and do these allow us to answer our questions?" Based on our answers to those questions, we can come up with additional metrics needed.

*Summarized below are the **recommended actions** the group proposed:*

Establish:

- Common definitions of terms
- Consistent ecological integrity metrics based on consensus and baseline data
- Shared folder for resources and protocols (i.e. Box folder)
- Defined levels of invasive species management and associated metrics (i.e. early detection/rapid response, eradication, containment)
- Differentiated and comparable metrics collected for:
 - › Operations (i.e. herbicide app/person hours)
 - › Reporting (i.e. number acres/sites treated)
 - › Ecological evaluation (i.e. ecosystem health metrics)

Create:

- Flowchart or decision tree for each taxa/habitat and associated impacts to visualize what we want to achieve
- Baseline metrics and reporting system

Compile:

- Comprehensive catalog of existing metrics for outputs and outcomes as well as associated monitoring protocols currently in use by partners and others
- List of ecosystem service metrics currently available that could be easily incorporated to show their continuity (i.e. stream flow for hydrologic stability)

Develop:

- Common framework or decision flow chart for goals, strategies, outputs and outcome measures so we can fit our work into common tools (i.e. logic model template or theory of change template)

Advocate:

- For funding sources or sponsors to diversify types of projects funded for different stages of invasive species management and restoration; not just new projects. This includes advocating for longer-term support for follow-up monitoring and data collection for shorter-term projects.

Next Steps

In a subsequent Partnerships for Regional Invasive Species Management (PRISM) leader meeting where the “recommended actions” above were presented, the group came to the following consensus:

Within their projects this summer, PRISM leaders will think about what is most important to collect as well as the feasibility and logistics of collecting this information. The group will touch base in July 2021 during the summer PRISM leader meeting.

A second workshop focused on defining terms, reflecting on summer work, and advancing recommendations will be held on October 7th, 2021. The workshop will include discussions about definitions, summer observations, and ideas moving forward. The fall meeting will set the course for activities and discussions in 2022.

Appendices

A1. Breakout Group Prompts

The example below uses prompts from the forest pest breakout groups. Each group had language interchanges in the bold section to reflect their discussion topic.

Session 1:

Think about situations where you might address **invasive forest pests** to avoid **environmental** impacts. With these in mind, please reflect on the following:

- ⇒ What different ultimate goals might organizations have when managing **invasive forest pests**?
- ⇒ What types of negative impacts are you trying to reduce or eliminate by managing **invasive forest pests**?
- ⇒ What types of measurements are needed to determine if a **forest pest management** project has achieved its goals?

Session 2:

Describe a hypothetical **forest pest management** project, with species, location, and action taken. What types of measurements would you collect to determine whether or not the project was **ecologically** successful for each of these different scenarios:

- ⇒ With 10 years of sufficient funding and staff to revisit the project as much as needed
- ⇒ With just one summer intern to revisit the project a half day per summer for the next 3 years

What sort of information or support is needed to improve our ability to measure success in **forest pest** projects?

A2. Group Photo

The screenshot displays a Zoom meeting interface with 48 participants arranged in a 10x5 grid. The participants' names are listed below their respective video thumbnails. The interface includes a 'Recording' indicator at the top left, a 'View' button at the top right, and a bottom toolbar with various controls: Mute, Stop Video, Security, Participants (48), Chat (2), Share Screen, Record, Breakout Rooms, Reactions, and a Leave button. Navigation arrows are visible on the left and right sides of the grid.

Row	Col 1	Col 2	Col 3	Col 4	Col 5
1	Audrey Bowe	Abigail Bezrutczyk	Jennifer Dean	Carrie Brown-Lima	John Thompson
2	Stacy Endriss	Brendan Quirion	Kristopher Williams	Julia Luna	Wade Simmons
3	Rob Williams	Ezra Schwartzberg	Kyle Webster	Andrea Davalos	Meredith Taylor
4	Bernd Blossy	Andrea Locke	Timothy Howard	Linda Rohleder	Ryan Goolic
5	Zaidee Powers Rosales	Caroline Marschner	Catherine McGlynn	Matthew Gallo	Brittany Hernon
6	Kyle Webster	Andrea Davalos	Meredith Taylor	Bernd Blossy	Andrea Locke
7	Timothy Howard	Linda Rohleder	Ryan Goolic	Zaidee Powers Rosales	Caroline Marschner
8	Catherine McGlynn	Matthew Gallo	Brittany Hernon	Molly Hassett	Lindsay Charlop
9	Tammara Van Ryn	Kate Monacelli	thom allgaier	Kelsey McLaughlin	Jonathan Rosenthal
10	Mike Usai	Dan Snider	Hilary Mosher	Radka Wildova	Samuel Beck-Andersen