CRISP

Catskill Regional Invasive Species Partnership

2016 Annual Report

Hemlock Training Mountain Top Arboretum

Prepared By:

John Thompson

Catskill Regional Invasive Species Partnership Coordinator

Dan Snider

Field Projects Manager

Catskill Regional Invasive Species Partnership

Catskill Center for Conservation and Development

Arkville, New York

Executive Summary

The accomplishments of the Catskill Regional Invasive Species Partnership (CRISP) in 2016 include convening a Hemlock Conservation Team of stakeholders to begin developing a strategic plan to conserve hemlock forests across the CRISP landscape to provide quality habitat, important natural benefits and an essential cultural resource. We began developing a shared digital data collection form to be used statewide to collect hemlock health and pest information. To combat the spread of Hemlock Woolly Adelgid, a collaboration with Cornell University and the New York State Hemlock Initiative resulted in a biocontrol release at a site that will be continually monitored.

The CRISP Watershed Steward Program trained 34 Watershed Stewards to provide interpretation and boat-inspections to 5,000 water-body users this year alone, addressing a major vector in the movement of aquatic invasives in lakes and rivers. To further promote prevention, a new boat wash station was established at Cooperstown. An early detection survey for 15 highly invasive species was performed at eight State owned campgrounds. An early detection survey for 15 highly invasive species was performed at 8 campgrounds. 3000 stems of Mile-A-Minute were pulled or treated in Cochecton. Giant Hogweed was treated at 12 sites, including removal from 2.5 miles of streams. A high priority Early Detection species list was developed to guide efforts in the future.

Contents

Introduction

The Catskill Regional Invasive Species Partnership (CRISP), an initiative of the Catskill Center for Conservation and Development, promotes prevention, early detection and rapid response, and control of invasive species to protect natural and economic resources. CRISP conducts outreach programs to raise awareness about invasive species and supports research investigating the ecological impact and effective controls of invasive species. The CRISP region covers 3.2 million acres, encompassing all of Otsego, Delaware, and Schoharie Counties and parts of Greene, Ulster, Sullivan and Orange Counties. The public/private partnership of CRISP has focused on prevention and early detection to protect the most vulnerable areas from invasive species. The CRISP Steering Committee includes the following partners: The Nature Conservancy, New York State Department of Agriculture and Markets, NYS Department of Environmental Conservation, NYS Department of Transportation, New York City Department of Environmental Protection, Catskill Forest Association, Cornell Cooperative Extension of Greene County, State University of New York Oneonta, Watershed Agricultural Council and the Catskill Center for Conservation and Development serving as the host organization. CRISP is one of eight Partnerships for Regional Invasive Species Management established in New York State.

The Catskill region has great ecological value, supporting a diversity of ecological systems based on unique soils, elevation and microclimates. The forests of the Catskill Mountains support rare plants and animals while serving as the source of drinking water for nine million consumers in New York City. After more than a century of land protection, the Catskill Mountain region represents one of the greatest opportunities to preserve large unfragmented forest systems in the High Allegheny Plateau ecoregion. By connecting lands conserved in the Catskill Park with land protected for the New York City watershed there is potential to protect forest systems large enough to ensure the survival of species that depend on interior forest habitat and important migratory pathways. The major threat to biodiversity in this region and throughout the state is invasive species, with Catskill forests being especially vulnerable to forest pests due to our proximity to globally significant shipping ports. Effective invasive species prevention and control efforts positively impact 12 sites highlighted in the New York State Open Space Plan and both terrestrial and aquatic habitats for high priority Species of Greatest Conservation Need such as the globally significant Bicknell's Thrush populations and one

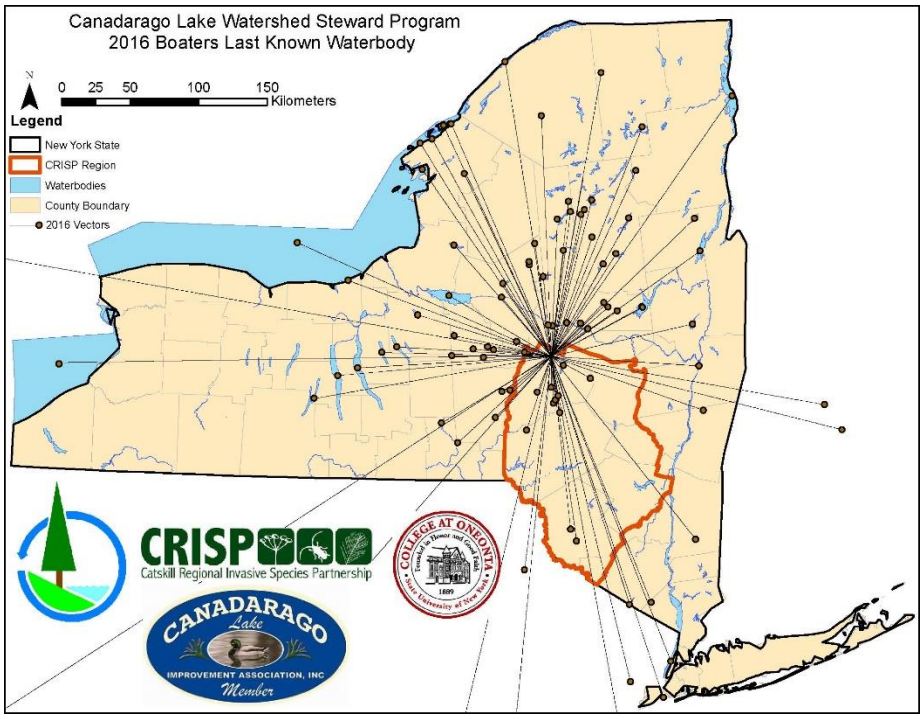
of the largest known Dwarf Wedgemussel populations in the nation. Maintaining and restoring the ecological integrity of ecosystems in the Catskill region will not only provide habitat for numerous Species of Greatest Conservation Need, but will further build ecosystem resilience to climate change impacts.

In order to protect the region from invasive species, CRISP successfully established an early detection and rapid response network which provides free invasive species identification to callers in the Catskills and contributes hundreds of new locations of invasive species each year to a statewide database. CRISP has participated in the NY State's giant hogweed removal program since 2011, responding to and controlling all populations of the plant within the region. CRISP has collaborated with the NY State Department of Agriculture and Markets on an ash health inventory and an Emerald Ash Borer biocontrol release and monitoring project. The CRISP Watershed Steward Program established in 2012, working with SUNY Oneonta and the National Park Service, has trained over 124 Watershed Stewards, stationed at six high-use water bodies, and those stewards provided education for 12,000 water body users, addressing a major vector to slow the spread of aquatic invasives. CRISP conducted hemlock woolly adelgid (HWA) and hemlock health survey of the Catskills, to characterize the infestation and state of hemlock forests throughout much of the region, and are using this data to develop treatment strategies. Since its establishment in 2010, CRISP has lead over 145 citizen science trainings and workshops on invasive species identification, control and management, reaching over 2,700 individuals. CRISP has published numerous brochures and fliers and distributed them to over 12,000 homes, raising awareness about approaching invasive species and providing homeowners with information that they can use to identify, report and control invasive species on their own property.

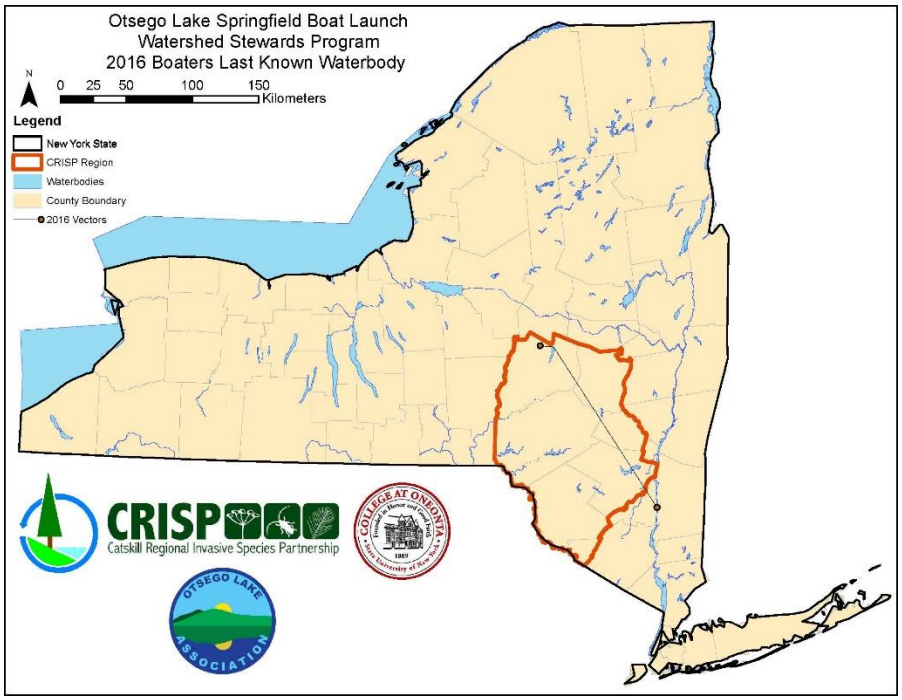
Prevention

CRISP subcontracted with SUNY-Oneonta to provide a Watershed Stewards Program for the fifth consecutive year. SUNY Oneonta trained 31 Watershed Stewards to interpret invasive species prevention and collect waterbody use data at high use access sites. Watershed Stewards provided information and boat inspections at Otsego Lake, Canadarago Lake, and along the Delaware River within the Delaware River National Scenic Recreation Area.

Last used waterbody maps show that many of the boats being used at the CRISP launches are coming from outside the CRISP region and could potentially bring invasive species with them.



Last used waterbodies prior to 2016 entry at Canadarago Lake.



Last used waterbodies prior to 2016 entry at Springfield Landing on Otsego Lake.

Early Detection

Once an invasive species becomes established, the only remediation action possible is the partial mitigation of negative impacts of the invasive. The goal of Early detection and Rapid Response (EDRR) efforts are to increase the likelihood that invasions will be eradicated before they become established. Molly Marquand, former CRISP Coordinator, was retained as a subcontractor during 2016 to create a priority early detection list based on the following criteria:

- Species is capable of invading forest or riparian habitats such as those present within CRISP,
- Species can be spread within the region, and
- Known, problematic infestations already established within CRISP.

The high priority Early Detection Species list (Table 1) was developed to provide trainers with the focal species of Early Detection trainings and these species will be the highest priorities for control within the PRISM.

Table 1. CRISP Priority Early Detection Species

Terrestrial

1.	***Persicaria perfoliata***	Mile-A-Minute
2.	***Brachypodium sylvaticum***	Slender False Brome
3.	***Aralia elata***	Japanese Angelica-tree
4.	***Syringia reticulata***	Japanese Tree Lilac
5.	***Impatiens glandulifera***	Himalayan Balsam

Aquatic

1.	***Hydrilla verticillata***	Hydrilla
2.	***Ludwigia peploides***	Floating Primrose-willow
3.	***Hydrocharis morsus-ranae***	Common Frogbit
4.	***Nymphoides peltata***	Yellow Floatingheart
5.	***Egeria densa***	Brazilian waterweed
6.	***Cabomba caroliniana***	Carolina fanwort

Through a program established by DEC and SUNY College of Environmental Science and Forestry, Evan Sweeney was hired as 2016 Catskill Invasive Species Campground Steward. Evan, SUNY ESF M.S. candidate, worked for 14 weeks beginning on May 2nd. Evan's primary project was to perform Early Detection surveys on the eight DEC Campgrounds in the Catskills region. Campgrounds are a high-risk area for invasive species infestation. Visitors traveling from outside our region can potentially work as vectors for invasive species movement. This Early Detection survey monitored for species that have the potential to invade Catskills habitats and that pose an ecological threat (Table 2.).

Table 2. Catskill Campground Early Detection Survey Plants

Species	Common Name
Ludwigia peploides ssp. glabrescens	Floating primrose-willow
Persicaria perfoliata	Mile-A-Minute
Ampelopsis brevipedunculata	Porcelain Berry
Cabomba caroliniana	Carolina Fanwort
Aralia elata	Japanese Angelica Tree
Paulownia tomentosa	Princess Tree
Hydrocharis morsus-ranae	Common Frogbit
Impatiens glandulifera	Himalayan touch-me-not
Viburnum plicatum	Japanese Snowball
Hedera helix	English Ivy
Petasites japonicas	Japanese Sweet Coltsfoot
Daphne mezereum	Daphne
Primula japonica	Japanese Primrose
Persicaria nepalensis	Nepalese Smartweed
Carolina vulgaris	Late Thistle

In addition, three forest pests were surveyed for: Asian Longhorned Beetle (*Anoplophora glabripennis*), Emerald Ash Borer (*Agrilus planipennis*), and Hemlock Woolly Adelgid (*Adelges tsugae*) within 50 feet of the firepit at each campsite.

An infestation of Himalayan Balsam was found subsequent to the survey along the boundary of the Beaverkill Campground at the confluence of Berry Brook and the Beaverkill in the Town of Rockland. The observation of Himalayan Balsam was entered into iMapInvasives.

Control

Mile-A-Minute

Mile-A-Minute is a highly invasive vine native to Asia and it is listed as an Early Detection Rapid Response species in CRISP. Only one infestation has been found within the CRISP region. The site is along the Delaware River. Landowners were approached and access agreements were developed to get access to sites. CRISP staff visited the site twice during the season and the National Park Service followed up to find satellite populations along the Delaware. The Invasive Plant Management Data Management Tool (IPMDAT) http://www.ipmdat.org/ was completed for the site. Working with Trillium Invasives Species Management and the National Park Service, an estimated 3000 Mile-A-Minute stems were either pulled or treated over an area of 8.8 acres.

Giant Hogweed

Giant Hogweed was treated or monitored at 12 sites, including removal from 2.5 miles of streams. More than 700 Giant Hogweed plants were dug up or the flower heads were removed from the site for any plants that were in flower.

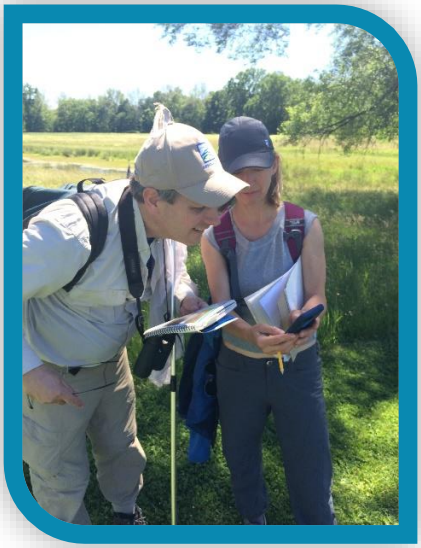
Japanese Knotweed

CRISP Partnered with DEC and the Open Space Institute to map Japanese Knotweed at Beaverkill Campground. Evan Sweeney worked managed the Excelsior Conservation Corps to perform three folding treatments of Japananese Knotweed at the Beaverkill Campground. The method of folding the stems was chose as the control treatment to limit fragmenting the plants and unintentionally spreading it and with split stems and it was expected that the aboveground portions of the plants would continue to drain rhizomes of their resources. Stalks were folded at the first node, or as low to the ground as possible. The folding treatment was followed by an herbicide treatment in September.

Hemlock Woolly Adelgid

CRISP staff worked with the New York State Hemlock Initiative to get Hemlock Woolly Adelgid biocontrol. A total of 425 *Laricobius nigrinus* were released on a HWA infested hemlock hedge at a private residence in Shokan. CRISP will monitor these beetles in the hedges, hoping that their population will increase and staff will be able to sustainably harvest them in future years to introduce them to other areas of the Catskills.

CRISP staff added to the database of hemlock hedges throughout the Catskills. This database will contribute to determining possible future release locations for biocontrol for hemlock woolly adelgid. Ideally, hemlock hedges will be greater than 30 feet long and 8 to 12 feet tall, with dense inner-growing branches and a heavy infestation of HWA.



Awareness

In 2016, CRISP staff led 37 events for 1221 participants, five were tabling events (Table 3 and Table 4). Some of the largest programs of the year were Mine Kill State Park Sixth Grade Conservation Field Day and Thorn BioBlitz.

Thorn BioBlitz 2016 took place at Thorn Preserve over a two day period, June 10th and 18th. A total of 271 taxa were documented during the BioBlitz. Programs celebrated the biological diversity of the Thorn Preserve, focusing on soils, trees and shrubs, herbaceous plants, invasive plants, aquatic macroinvertebrates, insects (native, domesticated and invasive), reptiles, amphibians, birds and mammals. Observations were documented by trained citizen scientists on field forms, photos were taken of each species when possible, and data was subsequently entered into iNaturalist.

Taxa Documented During the Thorn BioBlitz

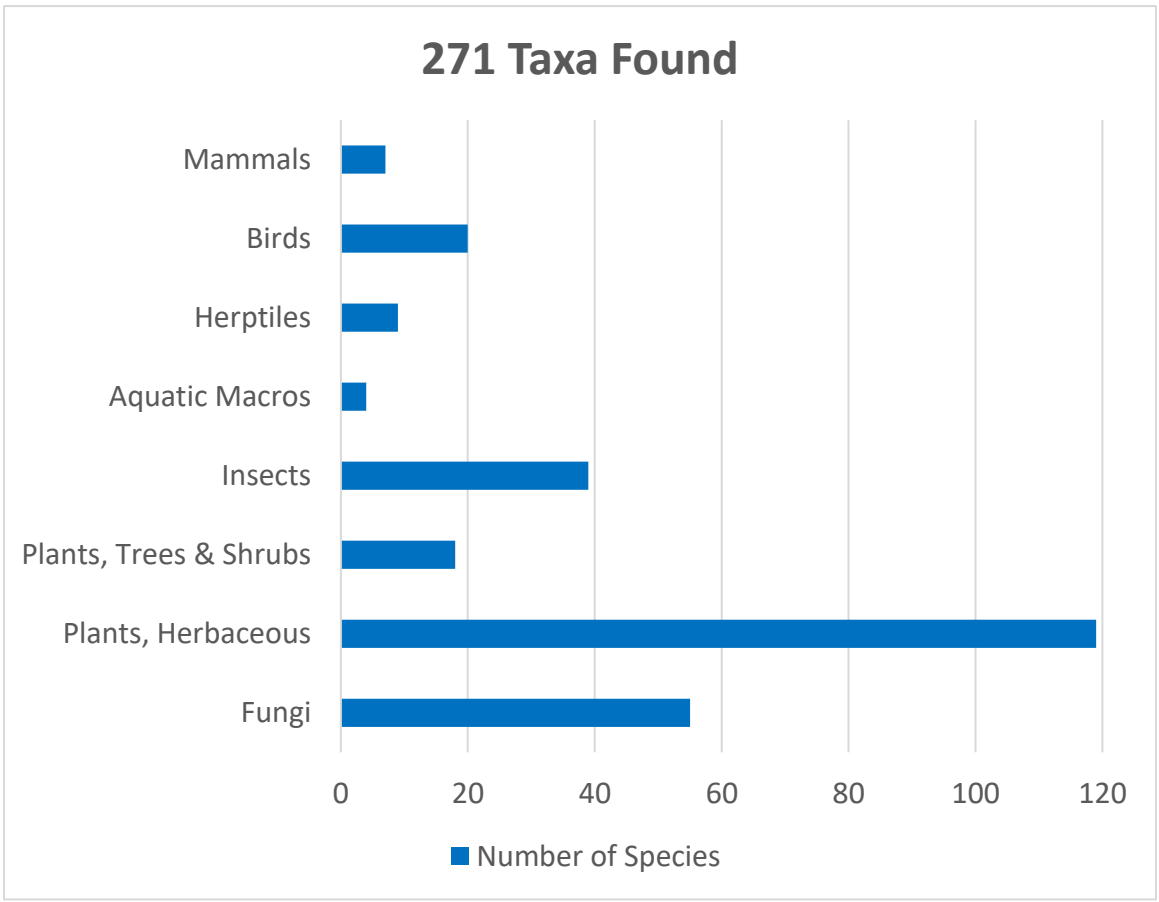


Table 3. Tabling and Festival Events

Event	Date	Number of Participants
Minekill State Park Snow Fest	1/30	60
Community Youth Summit Delaware County	3/11	120
New York Outdoor Expo	7/9	11
Pakatakan Farmer's Market	7/16	70
Schodack Island Fall Fest	10/1	55
Total		**316**

Table 4. Programs and Trainings

Program	Date	Number of Participants
EAB/HWA Presentation– Livingston Manor	3/3	18
EAB/HWA Presentation – Town of Colchester	3/16	15
Schoharie Watershed Summit	3/24	40
Woodstock Day School Terrestrial Invasives Training	5/5	15
Deer Hunting on Nature Preserves: Examples of How to Administer your own Program	5/6	15
The How's and Why's: Strategies for Building a Research Program at a Nature Preserve	5/6	18
Invasives Pull at CIC	5/7	12
HWA Presentation at Mountain Top Arboretum	5/21	16
iMapInvasives Field Walk	5/21	6
Invasive Species Presentation at Pine Hill Annual Plant Sale	5/29	8
National Trails Day Hike with 3500 Club	6/4	9
HWA Presentation at NYS Trout Unlimited	6/4	23
HWA Training at CIC	6/5	5
Thorn Bioblitz	6/10&18	110
HWA Presentation at Taking Flight	6/11	23
Mine Kill State Park 6th Grade Conservation Field Day	6/17	250
HWA Presentation at New York Outdoor Expo	7/9	11
Paddle and Pull at Goodyear Lake	7/10	8
Mile-A-Minute Pull	7/11	1
Biocontrol Recapture at New River Gorge at Adirondack Forest Pest Summit	7/11	60
Film Screening: "The Hemlock Woolly Adelgid: A Film About the Loss of an Ecosystem"	7/13	7
Digging Knotweed at Mohican Farm	7/13	4
Emerald Ash Borer Walk	7/15	13
HWA & EAB Presentation at Catskill Forest Festival	7/30	20
Friends of the Beaverkill	8/15	50
iMapInvasives & ID Training at Mountain Top Arboretum	9/9	41
Platte Clove Hemlock Survey Training	9/10	12
Invasives Pull at CIC	9/10	15

Program	Date	Number of Participants
HWA Training with Adirondack Mtn Club & NYNJTC	10/8	12
Catskill Conf	10/22	54
Mid Atlantic Regional Seed Bank Seed Collection Training	10/29	3
Catskill Invasives Presentation at Onteora High School	11/14	11
Total		**905**

Science

On May 14th, Jennifer Dean provided an iMapInvasives training at the Maurice D. Hinchey Catskill Interpretive Center in Mount Tremper. Citizen scientists learned how to use iMapInvasives to record invasive species observations. This training was followed by Mark Whitmore (Cornell University) giving a presentation, "Controlling Hemlock Woolly Adelgid and Emerald Ash Borer in the Catskills."

During 2016, 31 iMaps users added 230 observation records and 17 advanced records on plant assessments, surveys and treatments. More observations were entered by mobile app than by on-line entry.

Another aspect of CRISP's work this year has been training citizen scientists to recognize hemlock woolly adelgid and to report it when they see it out in the Catskills' forests. These trained citizens are contributing to hemlock conservation by locating valuable hemlock stands, and are providing us with important information on the hemlock woolly adelgid infestations. CRISP hosted 7 trainings and workshops to train citizen scientists to locate hemlock stands and collect information on HWA infestation and hemlock health.

CRISP subcontracted with Ecological Research Institute to produces a literature review of the ecological services and conservation values of hemlock-dominated forests entitle, "Relating Eastern Hemlock (*Tsuga canadensis*) Ecosystem Services to Stand Attributes in the Catskills." There is a link to the report on the CRISP website: http://catskillinvasives.com/index.php/links/

Partnership

Partner meetings were held on March 31, July 15, and October 4. On July 15th, CRISP partners participated in an Emerald Ash Borer Walk on New York City Department of Environmental Conservation land, led by NYC DEP Forester, Todd Baldwin.

The CRISP listserv grew by 25 people in 2016. The listserve was used frequently by CRISP staff, New York Invasive Species Research Institute, DEC, and others to share info and promote events. When contacted by organizations and individuals that are new to CRISP, we send instructions to sign up to the listserv, so that they will be made aware of upcoming events and the latest findings: “to subscribe to the CRISP Listserv, open a blank email addressed to cce-crisp-l-request@cornell.edu . For the Subject of your message, type the single word "join" (without the quotes). Leave the body of the message blank; do not include any signature block or any other text in the body of the email.”

CRISP Executive Committee

Executive Committee	Affiliation
Chris Zimmerman- Chair	The Nature Conservancy
Ethan Angell	New York State Department of Agriculture and Markets
Marilyn Wyman	Cornell Cooperative Extension of Greene County
Jeff Wiegert	New York State Department of Environmental Conservation
Kris Gilbert	New York State Department of Transportation
Tom Pavlesich	Watershed Agricultural Council
Jeff Senterman	Catskill Center for Conservation and Development
Meredith Taylor	New York City Department of Environmental Protection
Ryan Trapani	Catskill Forest Association
Donna Vogler	SUNY Oneonta

The Catskill Center convened a Hemlock Conservation Team of stakeholders on October 6 to begin developing a strategic plan to conserve hemlock forests across the landscape that provide quality habitat, important natural benefits and an essential cultural resource. We began developing a shared digital data collection form to be used statewide to collect hemlock health and pest information. Within the Catskill Regional Invasive Species Partnership region hemlock dominated stands comprised ~ 10% of forest and have unique ecosystem functions. Hemlock Woolly Adelgid (*Adelgis tsugae*), a small aphidlike insect native to Asia, threatens the persistence of hemlock in the

Catskills and was originally detected in the Catskills in the late 1980s and has since spread through many hemlock stands across the region. Hemlock Woolly Adelgid feeding damages the canopy of the host tree and causes eventual mortality. Hemlock Woolly Adelgid is regarded as the greatest threat to hemlock forests in the region, and has been found to infest most surveyed hemlock stands in the Catskill Mountains. Another important hemlock pest, Elongate Hemlock Scale (*Fiorinia externa*), has been documented as widespread in the eastern Catskills. To date, half of 35 surveyed hemlock stands were in "moderately severe to severe decline."

The Hemlock Conservation Team developed a Regional Vision for Hemlock on the Landscape: Hemlock cathedral forests distributed across the landscape that provide quality habitat, important natural benefits, and provide an essential cultural resource. The Hemlock Conservation Team developed the following goals:

1. Protect and maintain genetic diversity of hemlocks across the landscape over the long-term.
2. Protect hemlock forests that provide important cultural and economic value, including historical, recreational, educational, and environmental benefits.
3. Preserve and protect hemlock stands in locations with cold water streams and brook trout habitat.

In addition, the Hemlock Conservation Team will be working to develop goals that can be used to guide actions in the following areas:

- Maintain hemlock as a viable component of the natural landscape.
- Mitigate ecological impacts of hemlock loss and keep areas forested by implementing treatment on priority hemlock stands in decline.
- Implement biological control of Hemlock Woolly Adelgid
- Identify additional threat to hemlock throughout the Catskill region from Elongate Hemlock Scale.

Future actions that will be taken include ground-truthing old growth hemlock stands and creating a GIS data layer that will identify all hemlock research sites in our region.

Looking Ahead

The Catskill Center for Conservation and Development was chosen as the host site for CRISP and is contracting with the New York State Department of Environmental Conservation to continue the CRISP PRISM at the Catskill Center. The five-year contract will run from 2017-2021.

CRISP will continue to provide training for Early Detection and perform Rapid Response on species found. Control efforts will follow best management practices and will be strategic. Education programs will continue to be provided, especially focused on Early Detection species and encroaching threats. CRISP is prioritizing our education efforts in the region, retargeting audiences and utilizing new means of outreach to effect lasting results and recruitment to citizen science and volunteer efforts. By developing an active citizen science and volunteer corps, CRISP will engage more people in participating in and supporting the work of CRISP in an in-depth and meaningful way. During 2017, the CRISP website will be improved and social media will be better utilized to promote communication with our partners and stakeholders.

Through working collaboratively with our partners, CRISP will become more effective in controlling invasive species and engaging the public. The five year contract with NYS Department of Environmental Conservation will provide CRISP with resources to build on its previous successes in education, expand our early detection network, perform rapid response, and grow its partnerships.

CRISP Staff

John Thompson, CRISP Coordinator, joined the Catskill Center staff in February 2016. John has over twenty years of experience collaborating with scientists and land stewards throughout Southeastern New York State promoting science-based management. John has developed partnership workplans to build integrity and resilience in ecological communities while establishing landscape connections. At CRISP, John is collaborating with partners to develop prioritized invasive species management plans; coordinating partner invasive species eradication projects for mile-a-minute; leading training sessions on invasive species, monitoring and management, and leading education and outreach programs on invasive species, natural history and ecological management. John works through the New York State Partnerships for Regional Invasive Species Management (PRISM) network on statewide initiatives and initiatives across PRISM boundaries. In addition, John is currently contributing to the Northern Institute of Applied Climate Science Mid-Atlantic forest vulnerability assessment. John was elected this year as Secretary of the Natural History Section of the Ecological Society of America. John earned an MS in Geology at University of Pennsylvania in 1995 and a BS in Environmental Conservation from the University of New Hampshire in 1989.

Dan Snider, Field Projects Manager, has been with CRISP for two and a half years, working first as an intern and currently as the program's Field Project Manager during which time he has cultivated familiarity with the common invasive species of the Catskills region. Dan has hosted more than 15 workshops and training events regarding identification and control of the common invasive species in the Catskills, targeting the public at large, Student Conservation Association volunteers, college students, and more. Dan has also hosted or participated in a number of surveys and invasive species pulls targeting species such as hemlock woolly adelgid, emerald ash borer, Japanese barberry, and the bush honeysuckles. Dan regularly advises private landowners and partner organizations on the various management strategies available to them to help control common invasive species infestations of various sizes, requiring he stay up-to-date on current best management practices. Dan also spearhead's CRISP's surveys and control of giant hogweed each year, controlling about 700 stems of giant hogweed each year. Prior to his time at CRISP, Dan worked on an invasive species control team in West Virginia, dealing notably with emerald ash borer, hemlock woolly adelgid, kudzu, stilt grass, tree of heaven, and Japanese barberry, among others. Dan held a pesticide technician license in West Virginia, and so is familiar with pesticides and their application methods. Dan holds a BS in Ecology and Evolutionary Biology from the University of Maryland, 2012.