Preserving New Jersey's Natural Diversity

New Jersey Natural Lands Trust

2021 Annual Report

# NEW JERSEY NATURAL LANDS TRUST

## 2021 ANNUAL REPORT

## STATEMENT OF PURPOSE

The New Jersey Natural Lands Trust was created in 1968 by legislation which became effective on January 23, 1969, making 2021 the 52nd Anniversary of the Trust. The intent of this legislation was to create an independent agency with the mission to preserve land in its natural state for enjoyment by the public and to protect natural diversity through the acquisition of open space. The Trust preserves land primarily by donations of open space through acquisition of title in fee simple or of conservation easements, and manages its properties to conserve endangered species habitat, rare natural features, and significant ecosystems. The Trust invites passive use by the public for recreational or educational purposes wherever such use will not adversely affect ecological communities and biological diversity.

The Trust also recognizes that ownership and management alone are not enough to achieve its mission. Public education is an integral function of protecting natural diversity. The Trust distributes information designed to convey a conservation ethic for the protection of open space and its natural values.


**New Jersey Natural Lands Trust**

Mail Code 501-04

P.O. Box 420

Trenton, NJ 08625-0420

Phone: (609) 984-1339

Fax: (609) 984-1427

Email: NatLands@dep.nj.gov

**www.njnlt.org**



**Report Photos:** William Culp, Martin Rapp, David Snyder, Kathleen Walz, Cari Wild


Freshwater Tidal Marsh in the Delaware River Back Channel.

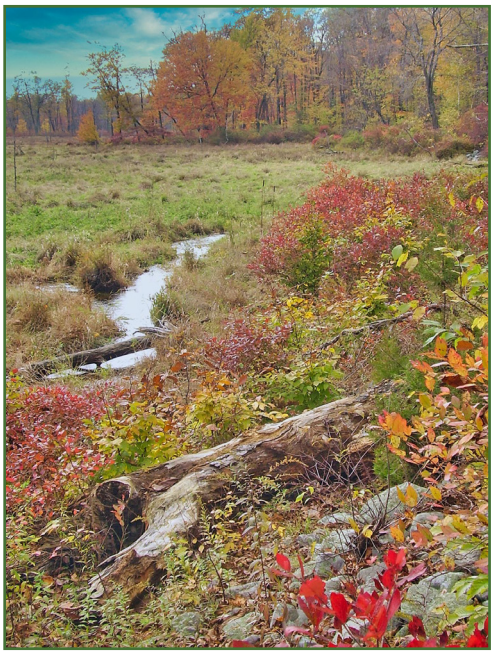
## INDEX OF PRESERVES

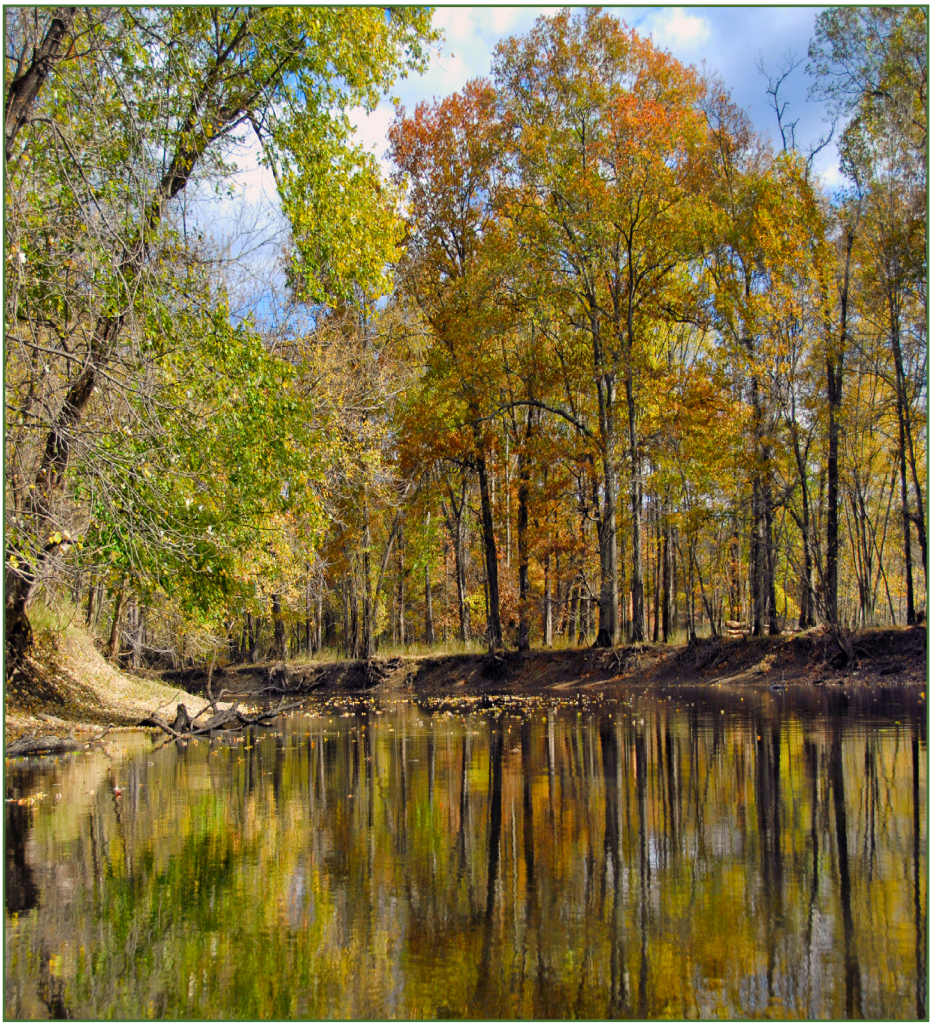
Referenced within 2021 Annual Report

# In 2021...

The New Jersey Natural Lands Trust brought approximately 146 new acres under Trust stewardship adding to its system of more than 120 preserves throughout the state.

The acquisitions in 2021 built upon the **Clarks Landing, Mankiller, Lincoln Grove, Great Piece Meadows, and Reinhardt** preserves.





**Clockwise from top left**: Long-time Trust Board Trustee Theresa Lettman enjoying a walk at the Clarks Landing Preserve. Ms Lettman retired from the Trust's Board in 2021 when she was appointed to the NJ Pinelands Commission; Beautiful day along the Passaic River at the Great Piece Meadows Preserve; and a glorious fall day at the Reinhardt Preserve.

# Fond Farewell to Martin Rapp:

## Retiring After Three Decades as the Trust's Land Manager

By Cari Wild

On October 1, 2021, long-time Trust Preserve Manager, Martin Rapp, retired. People say that no one is indispensable, but in Martin's case that's highly questionable. At some point, the Trust will hopefully be able to fill Martin's vacancy, but Martin's passion, expertise, experience, and overall good nature cannot be matched.

To begin with, Martin always greeted you with a "Howdy," which set a nice, comfortable tone. And when making a point, Martin often concluded with, "Just sayin'."

NEW JERSEY NATURAL LANDS TRUST, KAREN, TABLE MTN.PINE, SPREADING GLOBE FLOWER, NORTHERN METALMARK BUTTERFLY, INDIANA BAT, GREAT PIECE MEADOWS, THOMAS F. HAMPTON, BARNS, HARDWICK MEADOWS,GIS, CARI WILD, SMALL WHORLED POGONIA, BLACKBEARD ISLAND NWR, WOOD TURTLE, MATTAMUSKEET NWR, ARKANSAS, DWARF WEDGE MUSSEL, NJCF, CEREMONIAL STONE LANDSCAPES, DOWSING, BOB CARTICA, MITCHELLS SAYTR BUTTERFLY, LONGTAIL SALAMANDER, CHAINSAW, MACKENZIE'S BOG, BIOSTAR ASSOC. CORN SNAKE, CROSSLEY, LIMESTONE KILNS, PINE SNAKE, LOGGERHEAD SEA TURTLE, KNIESKERN'S BEAKED RUSH, DUMPERS, GREAT SWAMP NWR, WILDLIFE PRESERVES INC., GOYN REINHARDT, SWAMP PINK, TNC, HOWELL FARM, DOODLEBUGS, HOWDY, TAYLOR, DORTHEY ABANDONED FARM, HAINESVILLE WOODS, NJ FOREST FIRE, MYSTIC ISLAND, GREEN ACRES, MONARCH, HUNTERS, ENSP, HAGEDORN, BENNETT BOGS, HYPER HUMAS, BALD EAGLE, GOLDENSEAL, FARMERS, CERVETTO PINEY'S CABIN, BOG TURTLE, HIBERNIA, MAGGIE'S MISTAKE. BOY SCOUTS, PETTYS ISLAND, RAMAPOUGH LENAPE, STONEWALL FEN, RATTLESNAKE MASTER, INVASIVES, BLACK MEADOWS, FARM SILOS, SENECA SNAKEROOT, CROOKED SWAMP CAVE, WILD COMFREY, HIGH ROCKS, HIRST PONDS, GINSENG, OYSTER CREEK MIDDEN, BUCKMOTH, WALLKILL... THESE ARE JUST SOME HIGHLIGHTS

Upon his retirment, Martin sent a card with him pictured next to his favorite orchid, small whorled pogonia, and with a list of notable people and projects over the course of his illustrious career as a wildlife biologist.

Early on, Martin had a love of the outdoors--as a boy scout or just hanging out in the woods near Parsippany-Troy Hills where he grew up, and especially at the Jersey City Reservoir where, dressed in cutoffs and Converse sneakers, he'd sneak off to go fishing. Although Martin relished the outdoors and has never enjoyed drama in his personal life, he loved the theater, starring in high school plays as sailor Luther Billis in *South Pacific*, cowboy Will Parker in *Oklahoma*, and Dr. Armstrong in Agatha Christie's *Ten Little Indians*.

As he got older, he would embark upon what he referred to as "hobo" adventures where he would set out in his trademark railroad cap to backpack along railroad tracks for days on end. He progressed to ice floe adventures where he once jumped onto a passing Delaware River ice floe with a canoe and tried to ride that floe as far downstream as possible. [1]

1 *Warning, stunts like these can only be attempted by true professionals like Martin. Do not try this at home!*


Petty's Island trail construction crew from left: Martin, Bob Shinn, Joe Steinfeld, Cari Wild, Jack McCrossin, Trust Chair Michael Catania, Trust Vice Chair Anne Heasly, and Jon Wagar.

In 1988, after attending college in Arkansas to become a wildlife biologist, Martin returned to New Jersey to take a job first with the Department's then Division of Fish & Game picking up dead deer, and then as a zoologist with their Endangered and Nongame Species Program. In 1991, he was recruited by the Trust's Executive Director Thomas Hampton to manage its system of preserves dedicated to the preservation of biodiversity which consisted of about 7,000 acres. In some respects, Martin's career path was similar to that of biologist Edward Osborne "E.O." Wilson who said about his career, "I could not imagine any activity more elevating than to acquire … knowledge, to be a steward of animals and plants, and to put the expertise to public service."

For over three decades, Martin was the sole Preserve Manager for the Trust's entire system of preserves. To do his job, Martin was given a pickup truck and a chainsaw. As he retired, he noted, "I have worn out several pickup trucks and am now responsible for 130 preserves totaling over 35,000 acres and still nobody can tell me if I'm allowed to use the chainsaw." Well, Martin used the chainsaw, whether he was allowed to or not, and nobody got hurt![1]

While the Trust is the smallest of the three state land managers, which also include the Division of Fish and Wildlife and the Division of Parks and Forestry, Martin always took great pride in the fact that Trust preserves are home to some of New Jersey's most important biodiversity such as:

- The world's largest populations of the rare plants, Knieskern's beaked rush and spreading globeflower
- The small whorled pogonia, a globally rare orchid, which is also the rarest orchid in the eastern United States
- Nesting peregrine falcons and bald eagle
- Most of the critical bog turtle habitat in New Jersey

Indeed, the Trust's Bennett Bogs Preserve alone has over 90 documented rare plant species, making it perhaps New Jersey's most significant biodiversity hot spot. Foremost among Martin's many accomplishments during his career was his success in finding new populations of the small whorled pogonia, both on and off Trust land.

1 *Martin was DEP-certified to use a chainsaw but couldn't get anyone to say whether his title would allow him to use it in his work.*

Martin always enjoyed managing the Trust's preserves using tractors and wagons, but he was amenable to using the strength of oxen or horses to get the job done.

Martin's passion for natural and cultural resources went beyond his 9-5 Trust job, which was never a 9-5 job for him anyway. Over the past decade, Martin became very interested in the stone walls he observed across many of the Trust's preserves. As he noted in an article in the Trust's 2020 Annual Report, "I have been wandering the woods my whole career, practically my whole life, and never thought that these stones I was seeing might have meaning and purpose for Native Americans. Like many of us, I've found all types of stone walls interesting and artistic. Many indeed are typical colonial farm walls that formed field and property boundaries. Since learning to identify Native American stonework, as I walk through the woods, I am much more aware, peering at groupings of stones which have gone unnoticed, perhaps for centuries." To better understand his observations of boulders, rock piles, and stone walls on Trust preserves, Martin established relationships with the Lenape in New Jersey, including Chief Vincent Mann, the Turtle Clan Chief of the Ramapough Lenape Nation, and Turtle Clan Mother Michaeline Picaro Mann. As Martin noted, "Perhaps with renewed interest and sharing across cultures, we can decipher the lingering messages."

But it wasn't just the natural and cultural resources on the Trust's preserves that fascinated Martin; it was the people behind the history of the preserves and their stories. This began with his friendship with Goyn Reinhardt who donated one of the very first Trust preserves, the Reinhardt Preserve. In the Trust's 2018 Annual Report, Martin reflects upon all he learned from Goyn and his vision for conservation. Goyn, in turn,introduced Martin to Peg Miller, who had inherited a neighboring farm from her mother, Marion Jean Beman Chute. Martin related Peg's story of how the Trust preserved Peg Miller's farm as an addition to the Reinhardt preserve in the Trust's 2013 Annual Report. Peg's mother had been a dear friend of Dr. Dorothy Hansine Andersen, known to her friends as "Andy," who had originally purchased the farm for $8 an acre. As Martin recounted, "Andy worked at the Babies Hospital, Columbia-Presbyterian Medical Center, New York. She was the first physician to recognize cystic fibrosis as a disease and, together with her research team, created the first tests to diagnose it. Andy's scientific work and successes led to her being inducted into the National Women's Hall of Fame in 2002." Recently, after reading Martin's stories in the Trust's annual reports, Martin was contacted by a physician from Columbia University, Dr. J. Scott Baird, who is writing a biography about Andy. After spending an afternoon with Martin touring the Reinhardt Preserve, Dr. Baird commented, "I applaud his dedication to your mission, his historical concerns, and his knowledge of the natural history of the area. You are lucky to have him." Truer words could not have been spoken.

Office of Natural Lands Management staff listening with rapt attention to Martin Rapp describing Native American stone landscapes.

Martin's overwhelming zeal for the natural world and utterly unique personality render him irreplaceable. In what is perhaps one of the greatest understatements ever, in notes Martin left about the status of the Trust's preserves upon retirement, he added this p.s., "I hope I've left these preserves in the best stewardship I could have, considering…." You absolutely did, Martin! Thank you for three decades of passion, public service, collegiality, and excellent stewardship!

**So long Martin!**
You'll be missed!

Newly retired Martin and his lovely wife Karen enjoying leisure time on a bench that's part of the Water Spirit Art Project at the John Heinz National Wildlife Refuge.

# Petty's Island Update:

## The Eagle Has Nested

As the Petty's Island Preserve transitions back to nature after a century as an industrial site, wildlife is rebounding, including the bald eagle. For the first time in almost 20 years, a pair of bald eagles nested on the island and a juvenile eagle successfully fledged in late June 2021.

Many will recall the bald eagle that galvanized the environmental community into opposing a 2004 redevelopment proposal for the island, which included a golf course, a 250-room hotel and 721 homes. The developer's consultant undertook some activities which stressed nesting bald eagles and resulted in a 11-week-old eaglet covered with maggots being found on one of the island's service roads in June 2004 and which died en route to a wildlife rehabilitation center. Seeking to protect the only known eagle's nest in the history of Camden County, environmental groups joined forces with CITGO Petroleum Company (CITGO) and the Trust to successfully preserve the island. Although the island was preserved in 2009 and bald eagles continued to nest in Camden County, they didn't nest at Petty's again until last year. After this history, it is especially exciting to have nesting bald eagles back on the island!

Petty's Island eaglet

The Trust's Petty's Island Preserve is not only its first urban preserve, but the only preserve where we currently offer environmental educational programming. In 2021, the Trust marked more than a full decade of programming at Petty's Island. Seems hard to believe.

For the past decade, the New Jersey Audubon Society (NJAS) was the Trust's programming contractor at Petty's. When the Trust first acquired the island, it seemed impossible to establish a trail system there, let alone educational programming. But with sheer determination, and NJAS's support, we did both.

When the contract with NJAS expired in 2021, following competitive bidding the Center for Aquatic Sciences (CAS) was awarded the contract. This change in providers is bittersweet; endings are always hard. NJAS has been an amazing partner over the past decade. Kelly Wenzel, the NJAS Project Director for Urban Education and Outreach, brought unmatched enthusiasm, energy, expertise, and optimism to the programming at Petty's Island and quickly gained CITGO's trust, ensuring that programming went smoothly and successfully.

But new beginnings can be invigorating and provide an opportunity to take stock and reset. As more fully explained in prior annual reports, Petty's is one of 23 environmental education centers comprising the Alliance for Watershed Education (AWE), which receives funding support from the William Penn Foundation and shares a mission to collectively increase and enhance constituent appreciation, knowledge, and stewardship of the Delaware River watershed. CAS is also one of the AWE centers, as well as being one of our partners in Discover the Delaware, which promotes education of and access to the Delaware River, and includes the County of Camden, UrbanPromise, New Jersey Conservation Foundation, Independence Seaport Museum, Camden Community Partnership, Camden County Municipal Utilities Authority and Upstream Alliance. Through our AWE and Discover the Delaware relationships, CAS and the Trust has worked cooperatively to provide dozens of programs at Petty's over the past five years, so their transition to CAS becoming our programming provider is expected to be seamless. Most significantly, CAS is located in Camden and has built relationships and worked with schools throughout Camden County for more than a decade. Through these relationships and proximity, the Trust hopes to better engage and respond to the needs of the Camden community.

This year the Trust was again fortunate to have the support of an AWE fellow throughout 2021. The William Penn Foundation sponsored each of the AWE centers to host a summer fellow and provided financial support for fellowship extensions through the remainder of the year. The Trust's fellow, Priscilla "Cilla" Rios, collaborated with other Camden-based AWE centers and the Camden community in constructing, interpreting, and promoting AWE's art program, called "Water Spirit," on Petty's Island and throughout Camden. Water Spirit is the subject of the next article, and we hope you'll read about it.

William Penn Fellow Cilla is comfortable with the island's critters.

William Penn fellows from Camden and Philadelphia enjoying the views of Philadelphia from Petty's Island.

# Water Spirit:
## Focus on Petty's Island Art and Culture

Water Spirit is an art project of the Alliance for Watershed Education's (AWE) Lenapehoking~Watershed program, which looks to activate its member centers as places to enjoy water, art, and culture throughout the entire Delaware River Watershed from the Poconos to the Brandywine Valley. Under this wide-ranging art project, artists used native and non-native grasses found within the Delaware River Watershed to create art in innovative and participatory ways.

Visitors to Al-Mudhif

The various art installations were constructed throughout the spring and summer of 2021 with the opening ceremony of Water Spirit on June 24, 2021, at the Schuylkill Environmental Center to celebrate "Al-Mudhif—A Confluence." For more than 5,000 years, Iraqi inhabitants of lower Mesopotamia have been building mudhifs, which are designed with nature at heart to be used for community gatherings and ceremonies but also where community member may go to discuss and resolve differences. Environmental artist Sarah Kavage and Iraqi immigrant and social designer Yaroub Al-Obaidi co-designed and worked with a team of volunteers to construct "Al-Mudhif," thought to be the first mudhif outside of Iraq. Iraqi immigrants and veterans of the Iraq and Afghanistan wars worked together to construct the mudhif entirely of the invasive, non-native wetland grass phragmites, also known as phrag, which had been harvested by volunteers as part of PhragFest, reported on in the Trust's 2020 Annual Report.

The more than 200 people gathered at the Opening Ceremony enjoyed speeches by the artists, as well as a land acknowledgment by Trinity Norwood of the Nanticoke Lenni-Lenape and Native American stories, and music by Tchin, an internationally known, award winning storyteller and musician. Veteran Affairs Chaplain Chris Antal concluded the program with a blessing acknowledging military members and Iraqi immigrants lost in the Iraq and Afghanistan wars and the hope that this mudhif brings healing both from its construction and its use.

Throughout the summer and into the fall, AWE centers offered multiple opportunities for visitors to discover new things, meet new people at outdoor cultural gatherings, and enjoy solitary meditations on art and nature as part of Water Spirit. At its Capital City Farm, the Tulpehaking Nature Center offered an elaborate straw bale garden, juxtaposing urban community space alongside farm operations. At the Independence Seaport Museum, a boat called the "ARC" was constructed from phrag using Aymara reed boat techniques. The Aymara people, located in Peru and Bolivia around Lake Titicaca, build boats, houses, and entire floating communities out of Totora reed. Because phrag does not float like Totora, recycled plastic bottles were placed in the center of the "ARC" to provide buoyancy. The combination of plastics and phrag prompted serious conversations about important topics such as climate change, invasive plants and pests, environmental degradation, and climate migration. In total, Water Spirit comprised 17 different sculptural elements, including a trio of benches at Petty's Island named "Beginnings."

Despite its name, "Beginnings," it was also the site for the closing ceremony for Water Spirit during Indigenous Peoples Month, which was especially appropriate given that Petty's Island is the ancestral home of the Lenape. The documented history of Petty's Island begins with a 1678 "deed" by four Lenape chiefs known as sachems to Elizabeth Kinsey, a Quaker woman. As with most other early colonial Native American deeds, this one did not so much transfer control of the island as it did assign certain respective land uses, some to Kinsey and others to the Lenape. Basically, it says the Lenape intend to share the island with Kinsey, retaining their

rights to hunt, fish, and gather Tuckahoe, an edible aquatic root. But it suggests that Kinsey intended to grow hay and raise livestock on the island, since the Lenape pledged not to kill her hogs or burn her fields. Kinsey also agreed to pay the Lenape 600 Dutch guilders and make annual payments of rum and gunpowder. In the agreement, the parties refer to Petty's Island as the "great island" before Shackamaxon, which was purportedly the site of the treaty between William Penn and Tamanend of the Lenape (currently Penn Treaty Park) where they agreed that their people would live in a state of perpetual peace. Shackamaxon, also spelled Sachemexon, meant the "place of the sachems," so Petty's Island was linked to an important place for the Lenape.

A 17th century Swedish map by Peter Lindstrom indicates that the Lenape called this island Aequikenaska (Akeykenaska), which initially the Trust was told may be translated as "Where the Panther Ran." Later the Trust learned from the Lenape Language Project in Oklahoma that the name sounded a lot like Kwënàskunk (cwenaskun), which is the Lenape word for "Place of Tall Grass or Reeds." Of course, centuries later, there is no way of confirming the name or how it may have come into existence.

It seemed fitting to gather for the Closing Ceremony at the "Place of Tall Grass" to celebrate Water Spirit's art made from grasses and to acknowledge all of the important opportunities that Water Spirit provided across the Delaware River Watershed during 2021: to learn and talk about invasive plant species and their adverse impacts to our natural environment; to consider that invasive species impacts may be exacerbated by climate change; and to learn and celebrate Indigenous culture and history. In essence, Water Spirit brought people of many different races and ethnicities together to discuss difficult things in a shared safe space with the common theme being resilience and strength.

Many of Water Spirit's artists gathered at Petty's Island for the closing celebration.

Red-tailed hawk
**Photo**: William Culp

Many of the Closing Ceremony participants spoke movingly about how much Water Spirit had meant to them, including Trinity Norwood of the Nanticoke Lenni-Lenape, who observed two red-tailed hawks soaring above as she was speaking. She explained to those gathered that in Native American culture the presence of a hawk reminds us to infuse our daily life and actions with spiritual awareness and enlightenment. Because hawks can fly to dizzying heights, yet still see clearly what is happening on the ground, they symbolize a link between the material and spiritual worlds. The spirit of the hawk should serve to remind us to effortlessly soar above the noise and take in guidance from the spirit realm.

While Water Spirit celebrated the transformation of phrag into something artistic and functional, "Beginnings" also celebrates the journey of the island from a degraded state, after centuries of agricultural and industrial use, back to a natural state. In a natural state, it will be habitat for plant and animal species such as the bald eagle, an important rest stop for migratory birds, a buffer to protect the community across the Delaware River Back Channel from the effects of sea level rise and flooding from climate change, a space for the community to gather and access the waterfront, and a place to be inspired and uplifted by our natural world. Fully restored to the "Place of Tall Grass," Petty's Island will make people and the environment stronger and more resilient.

Closing Ceremony at Petty's Island

Mountain doll's-daisy
(*Boltonia montana*)
**Photo**: Kathleen S. Walz

*Because the Trust's mission is to preserve land in its natural state and protect New Jersey's natural diversity, our annual report profiles a selected rare plant each year. This year we profile* ***Boltonia montana,***

# Mountain Doll's-daisy

By Kathleen S. Walz

This year the Trust decided to showcase a critically imperiled and State Endangered plant that grows only in the unique limestone ponds of the Kittatinny Valley in northwest New Jersey. This region, known as karst, is a hot spot for biodiversity, supporting rare plants and ecological communities such as fens and sinkhole ponds within a landscape of rich forests dominated by oaks and hickory on rocky terrain.

Karst is the term for a landscape underlain by carbonate bedrock (dolomite, limestone, marble) with features such as caves, sinkholes, springs, and underground streams. The bedrock in the Kittatinny Valley was formed in and along the coast of ancient seas from 540 to 400 million years ago and was uplifted, tilted, folded, and fractured during Appalachian mountain-building. You can still find fossil coral, shells and even tidal mudflats preserved in the bedrock. Ice from the last Wisconsinan Glaciation scoured the soils, leaving exposed bedrock and ponds formed in glacial lake depressions that filled with peat and marl. The marl, or lime (calcium carbonate), was historically mined for fertilizer, mortar, and cement, and was heated in lime kilns, the relics of which are scattered throughout Sussex and Warren counties. Mountain doll's-daisy (*Boltonia montana*) occurs in sinkhole ponds underlain by ancient bedrock scoured by glaciers 21,000 to 17,000 years ago, with deep marls and peats gradually deposited over the post-glacial millenia.

Mountain doll's-daisy in seasonally flooded calcareous sinkhole pond shore habitat of northern New Jersey.
**Photo**: Kathleen S. Walz

Two distinct doll's daisy (*Boltonia*) species occur in New Jersey--mountain doll's-daisy (*Boltonia montana*) and eastern doll's-daisy (*Boltonia asteroides* var. *glastifolia*). Both are rare plants, and both live in intermittent pond habitat but at opposite ends of the state. Mountain doll's-daisy occurs in basic (high pH of 7-10) calcareous sinkhole ponds in the Kittatinny Valley of Sussex County, and eastern doll's-daisy occurs in acidic (low pH of 4-5) coastal plain intermittent ponds such as at Bennett Bogs Preserve in Cape May County. In a typical year, these seasonal pond habitats are flooded in the winter and spring and then dry in the summer and fall. These pond species are adapted to wide fluctuations in water level and to the specific water chemistry derived from the underlying geology. Both *Boltonia* taxa are listed by the NJ Natural Heritage Program as S1, critically imperiled in New Jersey because of extreme rarity with five or few populations statewide and are listed as State Endangered.

Mountain doll's-daisy is in the Aster family, a large group of flowering plants known as composites with two different types of flowers on each head. In *Boltonia montana*, the disk flowers in the center are yellow (these produce the seeds) and the strap-like ray flowers with white, pink, or light lavender petals surround them (not seed producing). Each plant can have a few to dozens of flowers. The leaves are a silky pale green blue (referred to as glabrous) with smooth edges and are placed alternately on the ribbed, glabrous stems. The plants often root at the leaf nodes when under water or stranded on exposed soil, creating new plants that can float away and root nearby. Individual plants can be four feet tall standing or prostrate. And these beautiful perennials can flower from mid-August through late-October.

This rare plant was formerly thought to be a variety of *Boltonia asteroides*, but taxonomic and genetic work in 2005-2006 by Virginia Natural Heritage Program botanist John F. Townsend and co-author V. Karaman-Castro revealed that the specimens from the Kittatinny Valley in New Jersey and the Blue Ridge Mountains in Virginia were a new species, *Boltonia montana*. In fact, the type specimen that Johnny Townsend used to describe the new species is from Muckshaw Ponds Preserve, owned by the Ridge and Valley Conservancy, in Newton. [1]

1 *A type specimen is selected to serve as a reference point when a plant species is first named. As a result, these specimens are extremely important to botanists who are attempting to determine the correct application of a name.*

*Boltonia* is a calciphile, or a plant that thrives in rich calcareous soil. Calciphiles are interesting plants that have evolved adaptive mechanisms for living in soils with high concentrations of calcium and the ability to mobilize potassium needed for growth. In addition to living in habitats with basic or high pH soils and water, *Boltonia* is adapted to living with seasonal flooding, surviving months during winter and spring under water, and exposed during summer and fall. In fact, this plant survived when extended seasonal flooding occurred, such as in 2021 when back-to-back tropical storms Henri and Ida dumped about 15 inches of rain on Sussex County in late August to early September. Rainfall enters the groundwater quickly through the conduit system of fissures in the karst bedrock, and the water level in the ponds are a lens into the regional and local water table – what you see in the ponds IS the groundwater. Many other remarkable and rare plants that co-occur with *Boltonia* in NJ's calcareous sinkhole ponds are also calciphiles and have adaptations to wide seasonal fluctuations in water levels.


**Figure 1**: Illustration of *Boltonia montana* by John F. Townsend, as published in Townsend, J.F. and V. Karaman-Castro. 2006. A new species of *Boltonia* (*Asteraceae*) from the Ridge and Valley physiographic province, U.S.A. Sida 22(2): 873-886.

Let's back up a bit in time to 1981. Before he became the NJ Natural Heritage Program botanist, David Snyder was searching for rare plants in the calcareous sinkhole ponds in Sussex County. Based on Rutgers University's Chrysler Herbarium records from 1887 to 1946, he relocated records for what was then called *Boltonia asteroides* and updated the nomenclature to *Boltonia asteroides* var. *asteroides* in the ponds of northern NJ to separate it from *Boltonia asteroides* var. *glastifolia* in the ponds of the southern NJ coastal plain. He collected new specimens for the Chrysler Herbarium, the New York Botanical Garden, and the Philadelphia Academy of Natural Sciences. These important collections and David's extensive knowledge of the species were important during Johnny Townsend's research when he described the new species *Boltonia montana*. In addition, during research on sinkhole pond communities in 1997 and in subsequent years of monitoring of *Boltonia montana*, Kathleen S. Walz, ecologist with the NJ Natural Heritage Program, discovered several new populations in Sussex County. Still, there are only a handful of sites that support this extremely rare plant.

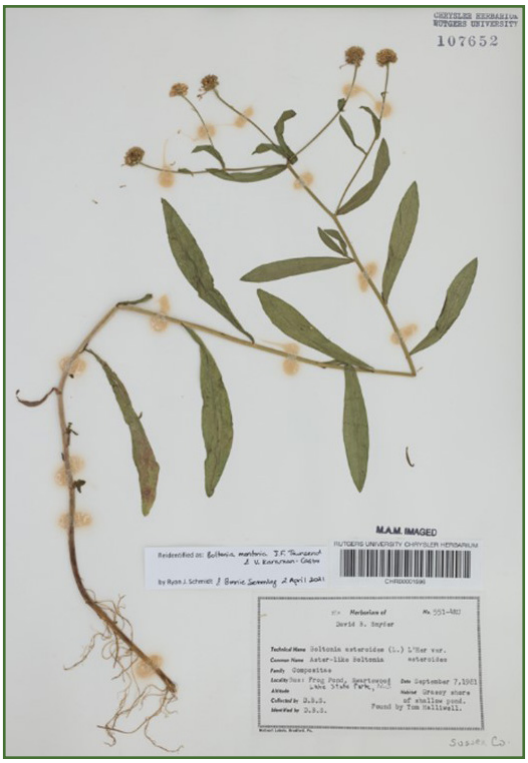



**Figure 2**: Specimen of *Boltonia montana* (formerly known as *Boltonia asteroides*) from the Herbarium collection of David B. Snyder, collected at Swartswood State Park in 1981.

Conservation of *Boltonia montana*, associated rare plants, and breeding salamanders in the fish-less ponds, requires protection and management of the pond habitat as well as the surrounding forest. This forested buffer is critical to protect water quality and the ecological integrity of the wetland. Resilience is strengthened by the groundwater connectivity between ponds near one another. Muckshaw Ponds Preserve is a good example of how protecting a series of ponds in a forested and largely unfragmented local landscape helps protect the rare species and ecological processes that plant species depend on. Understanding the dynamics of the local watershed is an important part of long-term planning to protect the ecosystem processes that support *Boltonia montana*.

Threats to *Boltonia montana* include habitat fragmentation, competition by non-native invasive species such as common reed (*Phragmites australis*) and the native aggressive wetland Canary reedgrass (*Phalaris arundinacea*), changes in hydrology including local groundwater withdrawal from regional wells, and climate change driven catastrophic flooding or severe drought events.

This tough, beautiful perennial plant has built-in resilience, but that resilience is being challenged by human activity today. Thankfully, conservation organizations and the New Jersey Department of Environmental Protection are working to protect *Boltonia montana* and manage these remarkable calcareous sinkhole ponds.

Unusual storm influenced flooding of this calcareous sinkhole pond during the late summer of 2021 where *Boltonia montana* is under 3-8 feet of water.

**Photo**: Kathleen S. Walz

*Boltonia montana* thriving in the same location as above in 2016.


SOURCES

https://www.state.nj.us/dep/njgs/enviroed/infocirc/glacial.pdf
https://www.nj.gov/dep/njgs/enviroed/infocirc/karst.pdf
https://www.state.nj.us/dep/njgs/enviroed/infocirc/valley-ridge.pdf
https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.768861/Boltonia_montana

# Zena Rudzki

## (1936-2022)

## Environmental Activist

## By Kathleen S. Walz

When I first met Zena Rudzki in 1997 during botanical surveys of the calcareous sinkhole ponds at Muckshaw Ponds in Andover she graciously showed me the beautiful forest and wetlands that she and her husband, Adam, owned and protected. When their realtor, Jim Zamos, and avid birder and nature enthusiast introduced them to the property in 1983, Zena immediately fell in love with the land, especially with the dolomite rock ledges. She loved the beautiful, pink flowers of *Boltonia montana* that bloomed late in the summer and fall around the sinkhole pondshores. Botanist Johnny Townsend was welcomed by Zena, and she was thrilled that he used a type specimen from one of their Muckshaw ponds to describe *Boltonia montana* as a species new to science.


Kathleen Walz with inholding landowners Zena and Adam Rudzki at Muckshaw Ponds Preserve in 2020.

While keeping an inholding for their home, gardens, and outcrops overlooking one of many ponds, Zena, Adam, and their daughter Ariana, transferred a portion of their land to The Nature Conservancy in 1988; it was then transferred to The Ridge and Valley Conservancy in 2020, to protect and manage forever as Muckshaw Ponds Preserve. Zena cared deeply about issues affecting health and the environment. She was an environmental and animal activist, and actively supported organizations that championed these causes. In addition to Zena's love of nature, she adored cooking, foraging for some of her favorite foods - mushrooms and berries - locally, and traveling the world.

Zena was a delightful, woodland sprite of a woman, passionate about learning and always curious to explore. Zena continued to welcome me to their land and home for more than two decades until her passing last winter. I will never forget her kindness and commitment to conservation. She will be greatly missed.

# A Sea of Green:
## "Plant Blindness" as the Default Human Condition

By Eva Popp

On a walk in the woods, what do you notice? The sounds of birds calling overhead and chipmunks scurrying through the brush, or the quick flash of a retreating white-tailed deer? What about the variety of leaf shapes and branching patterns that comprise the forest canopy? Or the reproductive stage of the moss growing on a decayed log, the peeling bark of the grapevines hanging in the branches, the network of mycelia that appears after scraping away the leaf litter with your shoe? How can we be so quick to disregard plants when they provide not just the backdrop, but the foundation for life on earth?

As far back as antiquity, plants have been disregarded as inferior to animals. Aristotle places plants at the lowest level of the "Scala Naturae," and Linnaeus was quoted that "minerals grow, plants live and grow, animals grow, live, and feel." Since the 19th century, biologists have identified "plant neglect" and called for better botanical education to combat the condition in academia and amongst the general public.

People enjoying the outdoors blind to the trees and plants that surround them.
**Illustration**: Danielle Lamberson Philipp/UW-Madison CALS

Almost all American high schoolers at the turn of the 19th century completed a botany course before graduation. Suffering from irrelevant course material, inefficient teaching strategies, and unqualified instructors, botany course enrollment plummeted and an all-encompassing general biology course replaced most separate botany and zoology classes by the 1930s. Biology teachers more often specialized in zoology, so instruction tended to be one-sided with biological concepts taught using animal-centric examples. This inadequate botany instruction established a repeating cycle of students disinterested in plants and botanically illiterate teachers. As botany education programs continued to suffer and decline throughout the century, "zoo-chauvinism," the concept of plants as inferior to animals, remained the main blame for plant neglect through the 1990s.

By 1999, J. Wandersee and E. Schussler rebranded the term "plant neglect" to "plant blindness," defined as both a failure to notice plants in our surrounding environment and the misperception of the importance of plants in our daily life. This new definition came along with an explanation that revolutionized our understanding of the concept. Instead of a cultural attitude of zoo-chauvinism, J. Wandersee and E. Schussler attribute plant blindness to an innate cognitive bias so powerful that they refer to it as the "default human condition."

Physiologically, human attention is not focused on plants in our environment because of how our brains process and categorize visual information. Although we perceive millions of bits of visual information every second our brain cannot possibly attend to all of it, so to increase efficiency similar visual stimuli are processed together in chunks.

To the human brain, plants can appear so homogenous in color and spatial distribution that the tree canopies overhead or small weedy plants underfoot blend together as a singular mass. Once the brain categorizes this visual information as "plants" it fails to differentiate within it and a majority of the information is discarded. We are more likely to notice and remember plants flaunting showy flowers or colorful fall foliage that break up the "sea of green."

Plants are also generally unthreatening and lack movement on a timescale perceivable to humans. When plants do pose a threat, such as poison ivy, we suddenly become much more attentive to differentiating the plants in our surroundings. Because of the visual similarity and unthreatening nature of plants, our brains have developed an "inattentional blindness" to their presence in our everyday lives. This inattentional blindness contributes to and compounds with the culture of zoo-chauvinism to dictate our attitude, knowledge, and interest in plants. Cultures that hold plants in higher significance and whose members regularly interact with plants are less likely to experience plant blindness.

*This trail through the woods looks like it runs through a "sea of green," but there are more than 20 different plant species here.*

In the midst of today's climate crisis, battling plant blindness is more important than ever. Plant blindness contributes to a culture of botanical illiteracy resulting in gaps in environmental knowledge amongst the general public and educated professionals alike, influencing the way our country's land and resources are managed. Experts in the field are demanding increased quality and quantity of botanical education not only to combat plant blindness but to serve as a powerful investment in climate resiliency.

The desperately needed solutions for climate change mitigation, renewable energy, and sustainable food systems will be discovered through innovations in plant science. Applications for botanical science span a diverse range of industries beyond environmental health, including agriculture, nutrition, medicine, biofuels, bioengineering, textiles, and building materials. In addition to environmental knowledge, the critical thinking and problem-solving skills reinforced through environmental education turn students into scientifically literate leaders and citizens capable of making informed decisions. Quality environmental education, including comprehensive plant science content, will inspire future government officials, scientists, and entrepreneurs with the awareness and skills to develop sustainable solutions for our mounting climate challenges.

When 50 acres of asphalt was removed on the Trust's Petty's Island Preserve, the direction was to plant a lawn. Based on botanical literacy, the Trust persuaded officials to restore with a warm season grass meadow, which requires no watering or mowing, and is more climate resilient.

**Making plants fun**

--

Fiddlehead ferns are fun to find, sweet tasting, and fantasically healthy.

Even in a sea of green, rose pogonia (*Pogonia ophioglossoides)* demands to be seen.


SOURCES

Adams, C. T. (2016). On the nature of teaching and the next generation of Plant Scientists. American Journal of Botany, 103(9), 1544–1545. https://doi.org/10.3732/ajb.1600228

Hershey, D. R. (1996). A historical perspective on problems in botany teaching. The American Biology Teacher, 58(6), 340–347. https://doi.org/10.2307/4450174

Knapp, S. (2019). Are humans really blind to plants? Plants, People, Planet, 1(3), 164–168. https://doi.org/10.1002/ppp3.36

Wandersee, J. H., and Schussler, E. E. (1999). Preventing plant blindness. The American Biology Teacher, 61(2), 82–86. https://doi.org/10.2307/4450624

# Inventories and Surveys Help Protect Biodiversity

Schweitzer's buckmoth
(*Hemileuca nevadensis ssp. 2*)
**Photo**: Jill Dodds

Invasive watercress
(*Nasturtium officinale*)
**Photo**: Wikimedia.org

The Trust's mission is to preserve land in its natural state for enjoyment by the public and to protect natural diversity through the acquisition of open space. Most of our public-facing work is on the public use side, but the Trust takes its biodiversity protection responsibility very seriously. Therefore, each year the Trust conducts species inventory work on its preserves so that it can better manage and conserve the habitat required for plant and animal species. In 2021, the Trust conducted four inventories or surveys: a sitewide inventory at the First Time Fen Preserve; a butterfly and dragonfly survey at Mackenzie's Bog Preserve; and targeted surveys for Schweitzer's buckmoth (*Hemileuca nevadensis ssp. 2*) and northern metalmark (*Calephelis borealis*) on additional preserves.

First Time Fen originally consisted of a 54-acre tract acquired in 2009, but in 2020 it grew by 27 acres. To better understand the ecological significance of the new addition, the Trust hired Biostar Associates, Inc. (Biostar) to conduct a limited-scope inventory. Biostar designed a two-day survey to provide an overview of the preserve's characteristic flora and fauna. Much of the parcel is composed of forested, shrub, and herbaceous wetlands that are bordered by uplands. Biostar observed two distinct herbaceous communities, roughly separated by a Category 1 (high quality) stream that is a tributary to the Pequest River. To the west of the stream was a calcareous fen featuring a patchwork of herb- and shrub-dominated habitat with a variety of sedges in the open area of the fen. To the east of the spring-fed stream, the herbaceous community was less diverse and dominated by sensitive fern (*Onoclea sensibilis*) and sweetflag (*Acorus calamus*).

The First Time Fen survey underscored the value of the addition and its inclusion in the developing greenway between the original parcel and the nearby Whittingham Wildlife Management Area. The addition is botanically rich and supports at least a dozen wildlife species of conservation concern. The majority (81 percent) of plants identified during the survey were native. The 19 percent of the flora that was classified as invasive was confined to the upland portion of the site. Although non-native plants had a limited presence in the wetlands, one, watercress (*Nasturtium officinale*), is particularly concerning. Elimination of the watercress before it has an opportunity to expand into other parts of the stream and its side channels is a Trust priority, as is removal of autumn olive (*Elaeagnus umbellata*) and other invasive shrubs to maintain an open habitat favored by rare plants that occur on the site.

Mackenzie's Bog is one of the Trust's newer preserves and consists of 270 acres spanning the border of Andover Township and the Borough of Newton in Sussex County. The Trust hired Biostar in the past for past survey work on the preserve. Although some uncommon species were observed during the previous survey, no endangered plant species or plant species of concern were documented. The Trust commissioned additional survey work in 2021, focusing on two fens located on the preserve. The 2021 survey time was increased to four days, and the scope of the survey was expanded to include dragonflies as well as butterflies. Target species included several that were historically known from the site, such as Mitchell's satyr (*Neonympha mitchellii*), bronze copper (*Lycaena hyllus*), and northern metalmark (*Calephelis borealis*), as well as several identified as potentially present based on habitat or unconfirmed observations, including silver-bordered fritillary (*Boloria selene myrina*), Kennedy's emerald (*Somatochlora kennedyi*), and brook snaketail (*Omphigomphus aspersus*). While the Mitchell's satyr butterfly has not been documented in New Jersey since the 1980s, the possibility exists that it could still turn up. On the other hand, the lack of preferred foodplants for other target species may provide an explanation for its absence. Even though rare butterflies or dragonflies were not found on the preserve, there was an abundance of Baltimore checkerspot (*Euphydryas phaeton*) butterflies worthy of mention.

**Left**: Kennedy's emerald
(*Somatochlora kennedyi*)

**Right**: Brook snaketail
(*Omphigomphus aspersus*)

At the Trust's Strader's Pond Preserve in Andover Township, Sussex County, Biostar surveyed for Schweitzer's buckmoth (*Hemileuca nevadensis ssp. 2*). There are two types of buckmoths found in New Jersey and they can be separated by habitat, larval foodplants, and adult flight periods. The common buckmoth (*Hemileuca maiais*) is primarily an oak feeder, preferring dry woodlands or scrub habitat. Schweitzer's buckmoth resides in calcareous fens, where the larvae feed on bog birch (*Betula pumila*), shrub cinquefoil (*Dasiphora fruiticosa*), or shrub willows (*Salix spp.*). Biostar found Schweitzer's buckmoth in abundance throughout the fens at Strader's Pond although the moth's "constant activity and long, looping flight patterns made it difficult to obtain an accurate count," according to Jill Dodds of Biostar. A good problem to have.

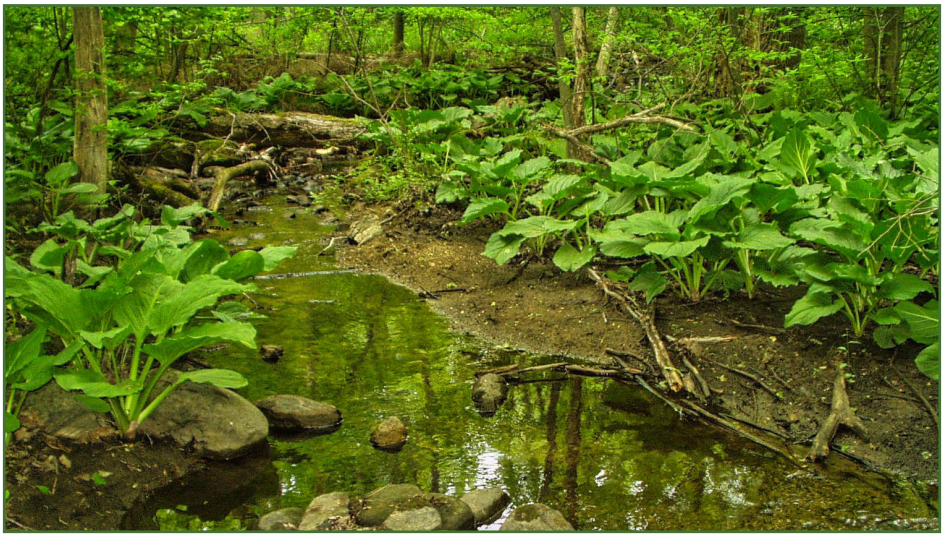
Baltimore checkerspot (*Euphydryas phaeton*) is abundant at Mackenzie's Bog Preserve.

Northern metalmark (*Calephelis borealis*) is a butterfly that is globally vulnerable and listed as a New Jersey Special Concern species. The largest northern metalmark population in New Jersey occurs on one of the Trust's preserves (not named to protect the very rare species from collection). The Trust has had Biostar monitoring it since 2018. Counting techniques utilized from 2018 through 2020 were replicated for the 2021 survey. Metalmark numbers in 2021 were lower than they had been during the past three years. Despite the lower numbers, the population was still considered an excellent occurrence of the species.

Northern Metalmark
(*Calephelis borealis*)

Given that the survey methodology has remained consistent over the past four years, there are questions regarding what may have contributed to the lower numbers this year. Potential factors include the spread of invasive species and extreme weather events. Habitat management efforts in recent years have focused on the removal of autumn olive (*Elaeagnus umbellata*) and other non-native woody species. Unfortunately, other highly-invasive plants are becoming more prevalent on the preserve including Japanese honeysuckle (*Lonicera japonica*), wineberry (*Rubus phoenicolasius*), and stiltgrass (*Microstegium vimineum*). Those plants are problematic because they grow profusely, concealing or crowding out patches of the metalmark's larval host plant (round-leaf ragwort (*Packera obovata*)). As they spread, they also replace some of the nectar plants favored by the butterflies such as orange milkweed (*Asclepias tuberosa*), black-eyed susan (*Rudbeckia hirta*), oxeye daisy (*Leucanthemum vulgare*), and fleabanes (*Erigeron* spp.). Extreme weather conditions of the preceding winter may have affected metalmark numbers in 2021. Northern New Jersey experienced its snowiest February on record, with accumulated snow remaining in place well into the following month. Northern metalmarks hibernate as half-grown larvae, and it is possible that the weather had an impact on their survival rate. Likewise, the increased number of high heat days this spring and summer may also have had an impact on butterfly activity and the timing of life events, with unknown consequences for future population numbers.

Annual inventories and surveys are valuable tools to help the Trust determine and prioritize management and restoration efforts to better protect New Jersey's amazing plant and wildlife diversity.



Skunk cabbage galore at Straders Pond Preserve.

# Plant Propagation:
## A Conservation Tool to Consider with Caution

By Elizabeth K. Olson

The Office of Natural Lands Management (ONLM), NJ Department of Environmental Protection, is charged with monitoring, managing, and protecting rare plant species in New Jersey. With approximately 39 percent of the state's native flora listed as endangered or rare, this responsibility is a daunting one. Conservation strategies are complex and varied, but can be separated into two broad categories: in situ (on site, or at the same place) and ex situ (off site) conservation. In situ conservation methods focus on protecting the species on the sites where they live, and this necessarily also protects the site itself. Ex situ conservation conserves plants away from the species' natural habitat, and includes botanical gardens, seed banks, laboratories and nurseries, which may serve as sources for future propagation and reintroduction to a site that the species occupies or historically occupied.

Experts suggest starting propagation efforts with a common species like turkeybeard (*Xerophyllum asphodeloides*) rather than a rare species.

Both methods have proven important for plant conservation worldwide. However, professionals agree that the most reliable way to save species is to practice in situ conservation to the fullest extent possible. This also guarantees that the species' habitat or ecosystem is restored and protected, assuring that multiple other associated species benefit as well. For these reasons, the ONLM has a strong preference for in situ conservation methods. Over the years, however, they have been approached with proposals to consider ex situ propagation and reintroduction as a conservation technique to save or enhance some of our rare plant species. They have also had to field questions about moving rare plants as a mitigation technique in response to development proposals. These inquiries made it clear that there was a need to better understand the science of rare plant reintroductions, and to better evaluate these questions or proposals as they come in, whether as a way to mitigate land conversion or for more conservation-focused reasons.

To meet this need, in 2021 ONLM published the results of its research on the benefits, risks, and challenges of propagating and reintroducing rare plant species. The report, *Rare Plant Propagation and Reintroduction: Questions and Considerations for Natural and Historic Resources Lands in New Jersey*, is based on relevant research and experimental findings, and summarizes some of the major concerns and considerations identified in the scientific literature. Most importantly, this report provides guidelines for deciding if reintroduction is the appropriate strategy for a species under consideration.


The bog asphodel (*Narthecium americanum*) is only found in New Jersey.

Reintroductions can be a useful tool for the recovery of rare species. The goals of reintroduction projects are to prevent rare plant species from extinction or local extirpation by establishing resilient and self-sustaining populations that contain the appropriate amount of genetic diversity needed to adapt to changing environmental conditions, including climate change. Certainly, for some species that are on the brink of extirpation or extinction, a reintroduction project may be the only option left. However, many experts have cautioned that there are also significant concerns about the potential negative consequences of conducting reintroductions. First, it doesn't address the root cause of a species' decline, which is often habitat degradation

or destruction. It may divert resources away from in situ habitat management. Reintroduction projects could be used used to rationalize the destruction of natural habitat. Finally, if introductions temporarily increase the number of populations, the species could abruptly lose any legal protections it may have had even though the long-term survival of the newly established populations is very uncertain.

The risks and challenges inherent to reintroduction projects are well documented. The process of collecting rare plants can be harmful to the source population because removing any plant parts can cause reductions to its abundance, or reduce the genetic variability of that population. At each stage in the reintroduction process, there is the potential to lose genetic diversity or negatively change the genetic structure of a population, making it less well adapted to the site. Damage to the outplanting site can occur through trampling, soil disturbance, and the possible introduction of invasive plant seeds or plant pathogens that could be transferred to the new site during the outplanting process.

Rare plant reintroductions also experience high failure rates. Many of the reported reasons for failure are due to lacking a full understanding of the species' biology and specific microhabitat needs. Other challenges include the fact that reintroduction projects are time consuming, taking many years of planning and preparation to ensure a well-designed project. The outplanted populations may take years, or even decades, to stabilize after initial establishment, and the plants and the entire site often require regular long-term maintenance. Yet, even with all of that effort, success is still not guaranteed. Their long-term nature means that reintroduction projects can be quite expensive.

Propagation and reintroduction of Table Mt. pine (*Pinus pungens*) at the Abraity's Pine Stand Preserve involved much collaboration and use of innovative measures but still was not successful.

Despite all of the risks and challenges, there are plenty of cases where reintroductions are necessary to the recovery of a species. The Center for Plant Conservation (CPC) has published excellent guidelines for determining whether a proposed reintroduction should or should not proceed. They advise that a reintroduction is not justified if it will undermine the imperative to protect existing sites, if existing threats have not been minimized or managed, if suitable habitat is not available or sufficiently understood, if the source population can't sustain removal of individuals or propagules, or if the species has not been thoroughly researched. The CPC sets a high bar for determining if a reintroduction may be justified. Their recommendations state that if there are only a few small populations, abundance has been declining, there is substantial risk of extinction or local extirpation, and habitat management has not been able to increase the population size, then a reintroduction may be warranted.

While it should never be the initial strategy, propagation and reintroduction is appropriate in some cases. The ONLM report provides extensive evidence and examples that rare plant propagation is a complicated endeavor that should not be undertaken without a lot of consideration and planning. There are many elements that need to be addressed in planning a reintroduction project. The report goes into detail about the diverse topics that should be addressed, from the early planning stages to developing long-term monitoring protocols and disseminating the project results, even when unsuccessful. Additionally, collaboration and

communication among experts and with the NJ Natural Heritage Program is key because the most successful reintroduction projects are the ones with a multitude of experts in various relevant fields working together.


Limestone glade milkvetch (*Astragalus bibullatus*) is an example of an ongoing reintroduction attempt in Tennessee that initially failed. It is a federally endangered, slow-growing, perennial forb that occurs on limestone cedar glades. Researchers experimentally reintroduced seedlings, but despite apparent success in the early years, all individuals ultimately died. Possible causes were poor habitat suitability, herbivores, or other factors. Building upon the information learned from the first reintroduction attempts, they designed a second experiment and included additional experimental parameters to test new hypotheses. Throughout the process they learned the species did best when outplanted in the fall in the very dry soils on glade margins, and that protection from herbivores was crucial to survival. Survival rates and fruit production improved with the second outplanting, and this reintroduction attempt is still being monitored. This project is exemplary in that it used well-planned experimental designs and tested hypotheses to learn about the species' requirements, was monitored long-term, used adaptive management (built upon information learned from previous reintroduction attempts), and the researchers thoroughly reported on the first attempt even though it resulted in failure.

American Chaffseed
(*Schwalbea americana*)

Limestone glade milkvetch
(*Astragalus bibullatus*)

The example of American chaffseed (*Schwalbea americana*) in New Jersey illustrates how decades of persistence and dedication are often necessary to eke out a modicum of success in a reintroduction project. It is a federally endangered perennial plant that was once known from approximately 19 sites in New Jersey but is now reduced to one site in our state. From 1993 to 2000, this last New Jersey population of chaffseed numbered only 58 to 144 individuals.

Extensive field and greenhouse propagation efforts were conducted, yet these efforts were ultimately unsuccessful at producing viable plants for reintroduction. Although the seeds germinated readily, most seedlings grew no more than a few centimeters in height, and few survived beyond their first growing season.

Researchers experimented with a variety of potential host species (as a hemiparasite, chaffseed needs to parasitize particular host plant roots for survival), soil types, seed storage conditions, and other treatments. In the largest of the seed addition experiments, 9,000 seeds were planted adjacent to an existing chaffseed colony but only 35 germinated, and none of these survived. Similarly, no germination was observed in two other experiments at this location, in seed plots placed adjacent to existing colonies, or at two other historic chaffseed sites in Wharton State Forest, where a total of 800 seeds were planted. In another case, only five of 155 seedlings potted with and without little bluestem (*Schizachyrium scoparium*) host plants in the field survived until the end of the growing season and none returned the following year.

In 2001, however, the chaffseed population suddenly increased to over 600 individuals, likely due to a delayed response to prescribed burning which took place in 1999. Although the increase was short-lived, it offered a unique opportunity to identify favorable habitat conditions. After the increase, the population exhibited a distinctly clustered distribution. Subsequent experiments found that soil outside the clusters inhibited chaffseed germination, and certain herbaceous plant species in the aster family, especially Maryland golden aster (*Chrysopsis mariana*), were found to be preferred hosts for chaffseed to parasitize. This new knowledge allowed researchers to successfully grow the plant and was useful to help identify suitable outplanting sites. These efforts, conducted in 2006 and 2008, resulted in approximately 50 percent survival of initial plantings after 10 years, as well as successful growth, flowering, and seedling recruitment at two out of three colonies. Efforts are underway to establish additional populations at other sites across its historic range in New Jersey, although a challenge is the lack of sites available with good habitat, and research is needed to restore, create, or enhance them. American chaffseed represents another reintroduction project that has involved continual experimentation, adaptive management, long-term monitoring, and the dedication of experts for over 25 years. Despite the progress made, complications and challenges abound, and the species remains endangered.

The propagation and reintroduction report concludes with a list of resources for researchers to consult for more information and guidance. One of the resources included is a checklist for those who may want to design a reintroduction project or who need to review a reintroduction proposal. Using this checklist as a guide should help researchers to think more broadly and consider details they may not have otherwise considered.

Rare plant reintroductions are a valuable tool for conservation. It's important to recognize that they are tricky, challenging, and they often fail, but they are sometimes necessary and appropriate. The ONLM report is a resource for practitioners, land managers, and decision makers to have a better understanding of rare plant reintroduction science so they can have the information they need to make decisions on these types of projects.

Maryland golden aster
(*Chrysopsis mariana*)
**Photo**: Wikimedia.org

# *Trollius* and the Trust – Update

By Roman Senyk

One of the Trust's North Jersey preserves is home to the world's largest population of a stunning and globally rare plant species, the spreading globeflower (*Trollius laxus* ssp. *laxus*). To accurately document the extent and health of the *Trollius* population on the preserve, Biostar Associates, Inc. (Biostar) performed a survey in 2018 and recommended best management practices, which included opening the canopy from encroaching woody succession, especially invasive plant species.

Before undertaking any habitat management, the Trust reviewed in-house aerial imagery dating back to 1991 to understand recent changes. To support the Trust's work, Department of Environmental Protection's Office of Natural Lands Management (ONLM) staff (Roman Senyk and Mark Wong) created a customized version of a phone application called ArcGIS Collector to map the work in real-time using GIS (geographic information system) data, which could be used for reference during future site visits. ONLM staff also created a StoryMap in 2019 called *Trollius* and the Trust.

To target the invasive plants encroaching into the *Trollius* habitat some decisions had to be made. Should we use mechanical controls (pulling, mowing, cutting, or girdling), chemical controls (use of herbicides), or a combination of both. A combination involves cutting a plant to the stump and then applying herbicide to prevent future growth.

Martin Rapp and Mark Wong using mechanical controls.

Jill Dodds and Liz Johnson of Biostar Associates.

This strategy is also known as "cut-stump." The Trust decided to cut-stump autumn olive (*Elaeagnus umbellata*) and remove other invasive plants and shrubs by mechanical control only. The management work was done during the winter months when the ground was hard and snow-covered to limit impacts to the *Trollius*. The snow-covered ground also provided a glimpse into how wildlife was navigating the landscape, which led the Trust to take additional management steps to provide better wildlife habitat on the preserve.

In the Spring of 2019, the Trust visited the preserve during the peak of the blooming season to perform a visual assessment and note significant changes. We photo-documented the immediate habitat, as well as pollinators such as flower flies and bee flies which were frequenting the spreading globeflower flowers. This information was used by ONLM staff to create an online and interactive StoryMap named "*Trollius* and the Trust" which highlighted the rare plant and Trust preservation efforts as part of the Trust's 50-year anniversary celebration.

In 2021, prior to the retirement of the Trust's long-standing preserve manager, Martin Rapp, ONLM staff offered to continue the *Trollius* management

efforts. They visited the preserve in the spring to conduct a follow-up *Trollius* survey during the near-peak of the blooming cycle, applying the 2018 and 2019 survey methodology to produce an accurate assessment of the population trend. They found that although the beautiful yellow blooms of the *Trollius* looked healthy, especially the ones in the sun where the canopy had been opened, there appeared to be a slow but steady decline in the numbers compared to earlier surveys. One encouraging observation was that the plant's habitat now extends beyond the endpoints of the original survey transects, possibly due to the first round of habitat management that focused on invasive species management controls along the population's perimeter.

With another round of mechanical controls completed, ONLM staff hopes to determine whether the management efforts are providing the *Trollius* with the preferred conditions it needs to continue to flourish on the Trust's preserve.

Spreading globeflower
(*Trollius laxus ssp. laxus*)

David Snyder, Natural Heritage Program botanist, sitting among the *Trollius*.

# Hunting News

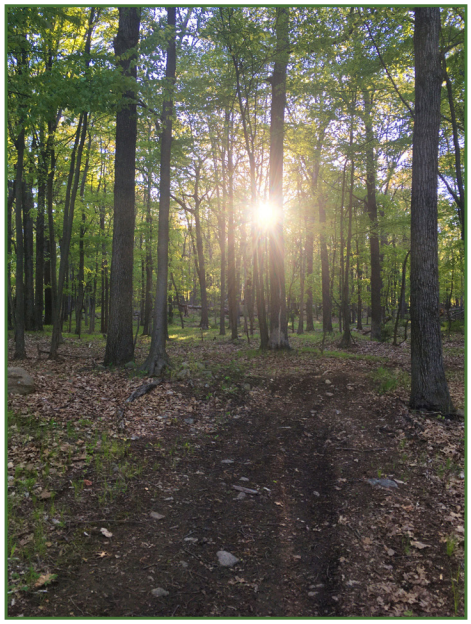
During the 2021-2022 hunting season, 4,258 hunters registered at Trust preserves through its website: www.njnlt.org. The Trust allows hunting for deer only at many of its preserves to maintain biodiversity. The deer population in New Jersey is far greater than the ecosystem can sustain. Over browsing by deer depletes native vegetation resulting in impacts to animal and plant habitat, such as decreased food sources and increased invasive plants.

To hunt deer at selected Trust preserves, hunters access the Trust's website, electronically submit information to the Trust, and print their own hunter registration letter with the required accompanying preserve map. The Trust can use this information to sort hunter registrations by preserve. Trust staff may reach out to hunters registered at a specific preserve to determine their interest in volunteering for clean-ups and maintenance projects.

It is important to note that the Trust does not allow hunting for waterfowl, small game, turkey, or bear, as it maintains that only over browsing by deer poses a threat to biodiversity. In addition, Sunday bow hunting is not authorized on Trust preserves as it is on state wildlife management areas and private property during deer season.

While hunting on Trust preserves, all rules and regulations in the New Jersey Division of Fish and Wildlife game code must be followed. Hunting deer by bow and arrow, shotgun or muzzleloader are acceptable, depending on the preserve. No target shooting or discharge of weapons other than for deer hunting purposes is permitted. Permanent deer stands are not allowed, and portable deer stands, while permitted, must be removed after the hunting season is completed or are subject to confiscation by the Trust.

> *Impacts of deer abundance are not limited to plant species, but cascade throughout the food web.**

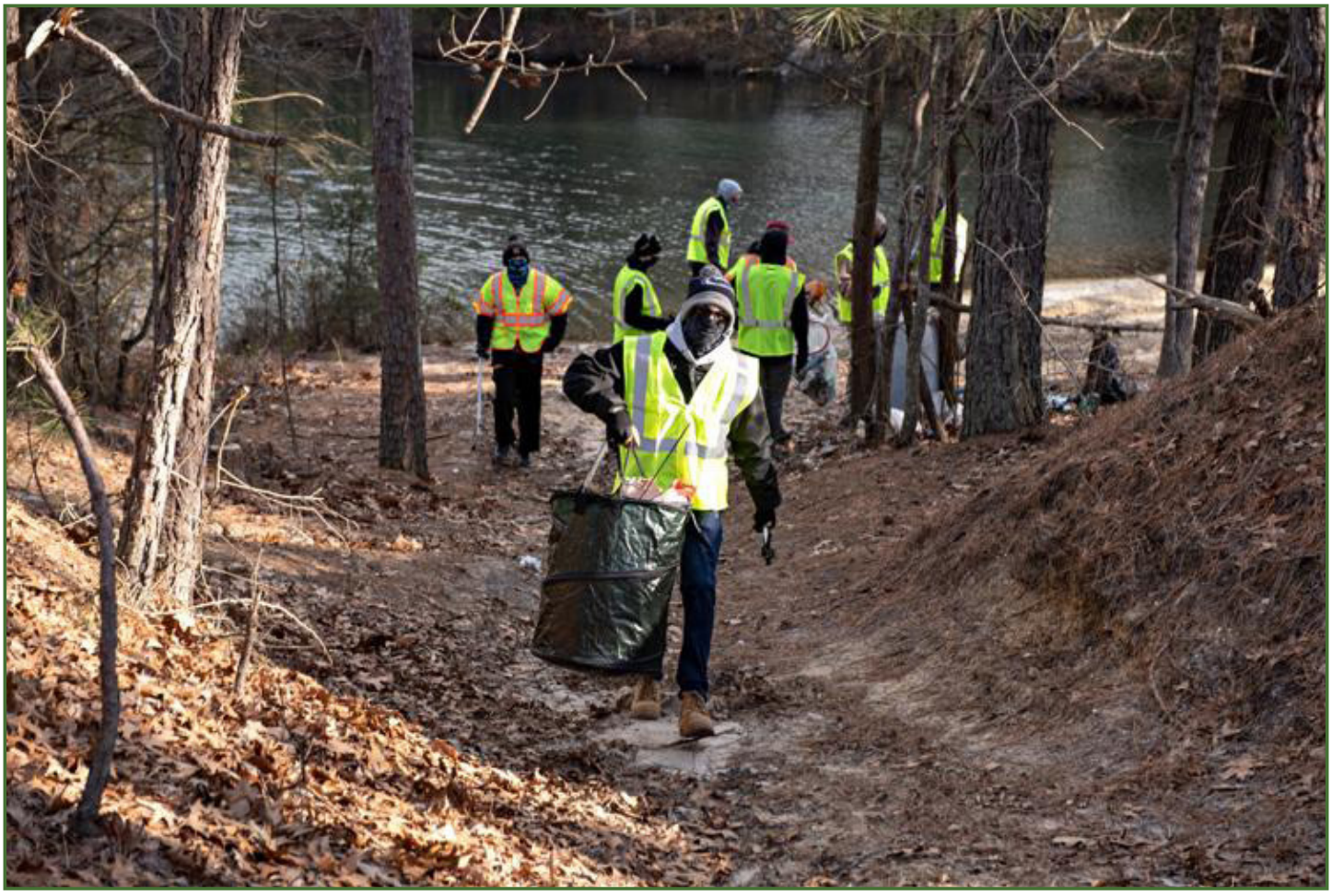


Deer hunting with bow is permitted at the Hagedorn Preserve.

*Kelly, J.F. 2018. Results of white-tailed deer (*Odocoileus virginiana*) surveys in Watchung Borough in April 2018. Raritan Valley Community College.

# Thanks to Our Volunteers

*The Trust would like to acknowledge and thank its many volunteers for their invaluable contributions to the maintenance of Trust preserves.*



Volunteers at a clean-up at the Hamilton Preserve.

# Contribute to the Delaware Bay Shorebird Fund

Each spring in Delaware Bay, from about the first week in May to the second week in June, the largest concentration of horseshoe crabs in the world comes onshore to spawn. At the same time, tens of thousands of shorebirds arrive at the Bay en route from southern wintering grounds to Arctic breeding territory, and Delaware Bay is their most critical stopover. The shorebirds need to quickly double their weight to complete their migration north and breed successfully. To refuel at such capacities and in only a 10-day window, high-energy horseshoe crab eggs provide essential nourishment. But since the early 1990s, there have been major declines in both the number of adult horseshoe crabs and their eggs. With the decline of their critical food source, shorebird numbers also plummeted. For the past 35 years, the Trust has funded scientific research and conservation efforts through the Delaware Bay Shorebird Fund with the goal that someday Delaware Bay's skies will be once again filled with shorebirds.

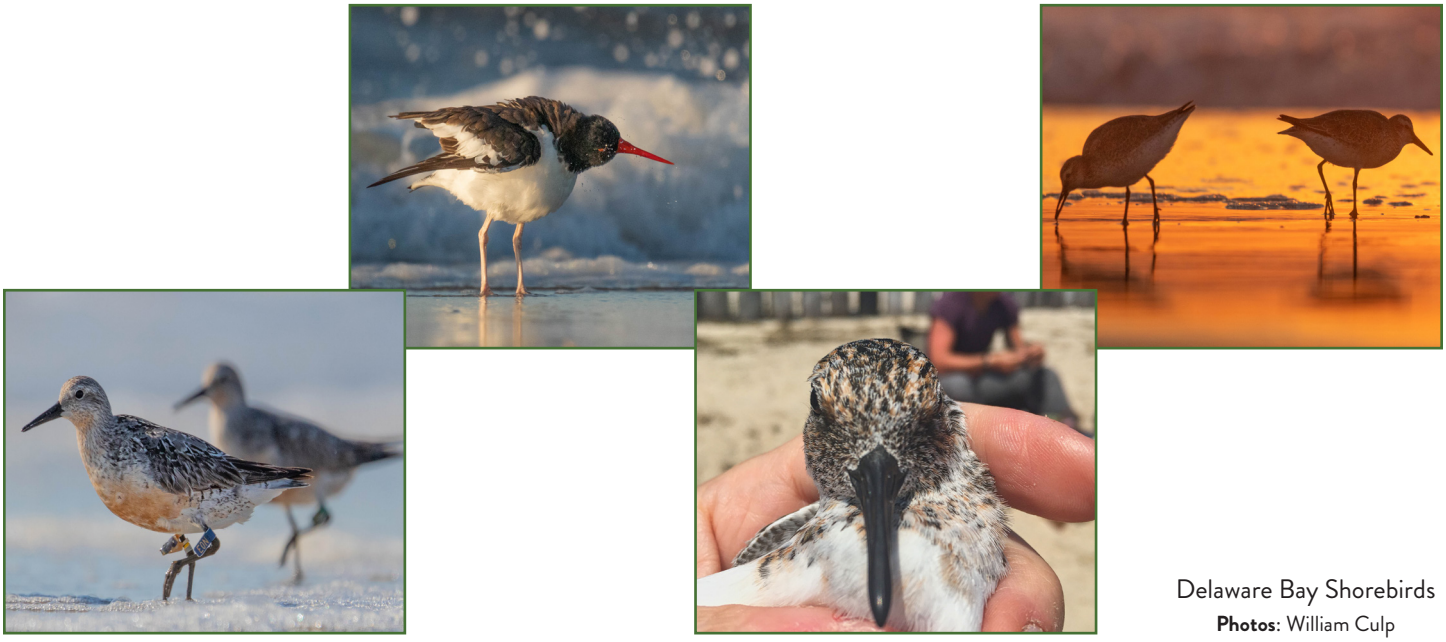
The Delaware Bay Shorebird Fund was initially created in 1985 through an agreement between the Department of Environmental Protection and Public Service Electric and Gas Company (PSEG). The agreement provided that $600,000 would be transferred to the Trust, as a fiduciary, to invest and administer solely for protection and management of shorebird habitat. After funding critical shorebird research for the past 35 years, the Delaware Bay Shorebird Fund is now nearing depletion. With contributions, the Delaware Bay Shorebird Fund could continue critical long-term shorebird and horseshoe crab research.

In order to protect these shorebirds, please consider making a donation to the Trust's Delaware Bay Shorebird Fund. Donations can be made online through PayPal:

Donate with PayPal button:

PayPal Donate Now

Please indicate that the donation is being made to the Delaware Bay Shorebird Fund.



Delaware Bay Shorebirds
**Photos:** William Culp

# Donations

Duke Farms

William Penn Foundation

New Jersey Conservation Foundation

The Nature Conservancy

The Center for Aquatic Sciences

Urban Promise

New Jersey Audubon Society

CITGO Petroleum Corporation

Covanta Camden Energy Recovery Center

Stewards of Open Space Camden County/South Jersey Land and Water Trust

AmeriCorps/PowerCorps Camden

Joyce Cloughy

NJDEP Endangered and Nongame Species Program

Dr. Jay F. Kelly/Raritan Valley Community College

William Culp

Pinelands Preservation Alliance

Bruce Bieber

Keith Seager

Robert Jonas

Stanley Ciurczak

National Fish & Wildlife Federation

Barnegat Bay Sportsmen's Club

Upstream Alliance

Wayne Township

Wildlife Preserves, Inc.

The Mr. and Mrs. Beavers Corporation/Scott Allen

*For more information about how you can donate to further the Trust's mission to acquire, preserve and manage natural lands for the protection of natural diversity, please visit the Trust's website.*

# Board of Trustees

The Trust is governed by an eleven-member Board of Trustees. The Board is comprised of six representatives from the private sector and five representatives from State government. The State government members include the Commissioner of DEP and two DEP staff members designated by the Commissioner; the State Treasurer; and a member of the State House Commission. Employees of the Office of Natural Lands Management, Division of Parks & Forestry, serve as staff to the Trust and implement the policy set by the Board.

**Michael Catania**
*(Chair), Former Executive Director, Duke Farms*

**Anne Heasly**
*(Vice Chair), Program Manager of Policy and Planning, Sustainable Jersey*

**Theresa Lettman**
*(Secretary/Treasurer), Pinelands Preservation Alliance*

**Ray Bukowski**
*Assistant Commissioner, Natural and Historic Resources, Department of Environmental Protection. Representing the DEP Commissioner*

**Emile DeVito**
*Director of Conservation Biology, New Jersey Conservation Foundation*

**Steve Eisenhauer**
*Natural Lands Trust, Inc.*

**Hannah Good**
*NJ Department of the Treasury. Representing the State Treasurer*

**Robert Jackson**
*New Jersey Natural Areas Council*

**Honorable Bob Smith**
*Senator, New Jersey Legislature, Representing the State House Commission*

**Larry Torok**
*Division of Land Resource Protection, Department of Environmental Protection*

**Judeth Yeany**
*Green Acres Program, Department of Environmental Protection*

# Staff

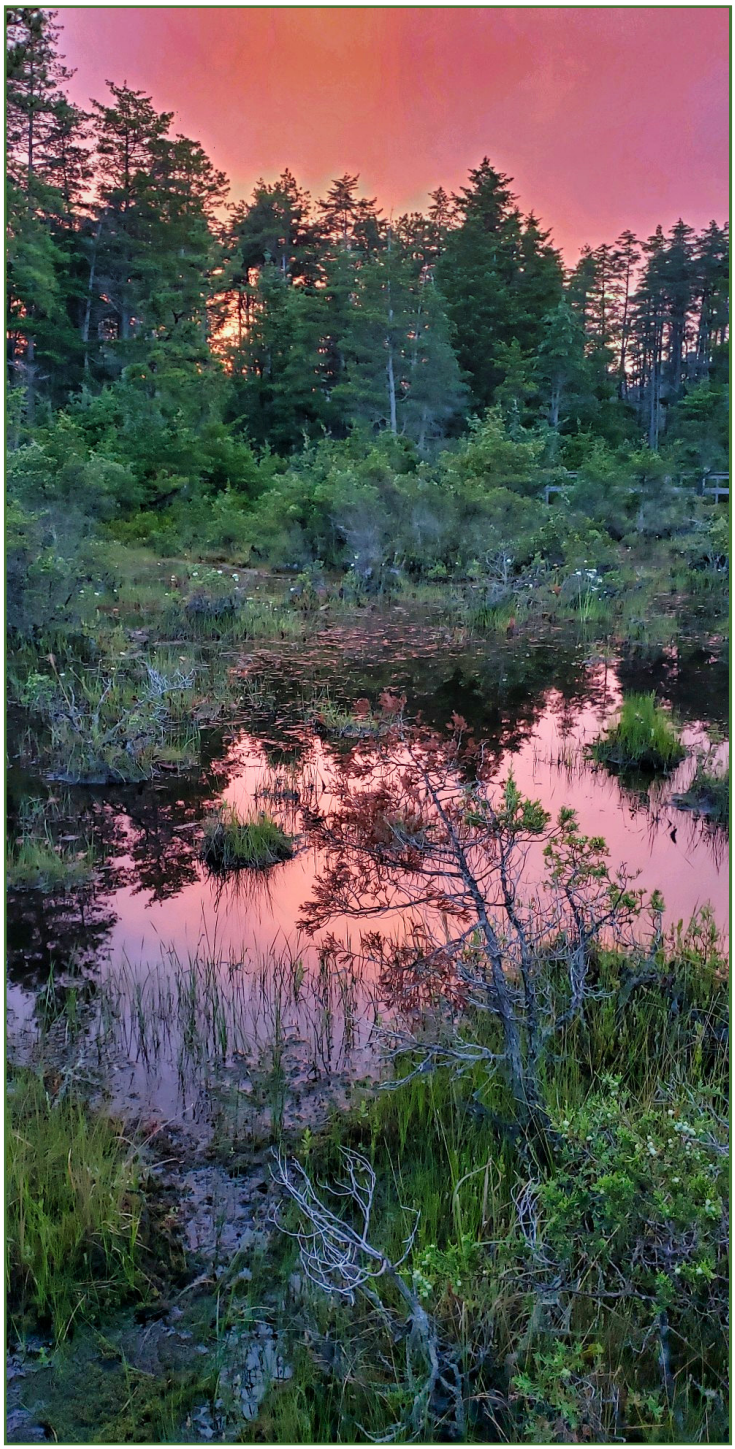
**Robert J. Cartica**
*Executive Director*

**Martin Rapp**
*Preserve Manager*

**Terry Schmidt**
*South Jersey Preserve Manager*

**Cari Wild**
*Real Estate Coordinator*

***In the spirit of healing, the New Jersey Natural Lands Trust acknowledges and honors the Lenni-Lenape, Munsee Lenape, and Nanticoke Tribes, the original people of the lands that we manage as Trust preserves.***



Sunset in the New Jersey Pinelands

**Photo**: Kathleen S. Walz

New Jersey
NATURAL LANDS TRUST