



EMBRACING INNOVATION: How Technology Is Shaping New Jersey's Parks And Golf Courses

Zack Karvelas, Assistant Public Information Officer

New Jersey's park areas and golf courses are stepping into the future by embracing technology that enhances environmental stewardship, boosts efficiency, and improves the overall visitor experience. With the integration of innovative tools like drones, GPS mapping, electric landscaping equipment, and solar infrastructure, these public spaces are becoming models of sustainable management and forward-thinking practices. These advancements not only streamline park operations but also align with the state and county's broader environmental goals, particularly in areas prone to flooding and those focused on conserving resources (and money).

Drones are revolutionizing the management of large park landscapes and open spaces. Take the New Jersey Sports and Exposition Authority's (NJSEA) Meadowlands District, for example. They use drones for everything from structural inspections and flood management to monitoring the health of wetlands. The Meadowlands Research and Restoration Institute's (MRRI) municipal drone program has been vital in assessing how wetlands handle stormwater, which is especially important given the state's vulnerability to flooding. With aerial views provided by drones, park and golf course managers can monitor vegetation health, track erosion, and plan maintenance without disturbing habitats. Drones equipped with thermal imaging technology also enhance safety, making it easier to locate lost visitors and inspect remote areas. Currently, the Monmouth County Park System uses thermal imaging cameras on drones for reviewing heat loss within buildings, deer population monitoring, and possible search and rescue. There are a growing number of applications and benefits, so we have only begun to scratch the surface.



Board of County Commissioners
 Thomas A. Arnone, Director
 Ross F. Licitra, Deputy Director,
 Liaison to the Parks
 Nick DiRocco
 Susan M. Kiley
 Erik Anderson

Board of Recreation Commissioners
 Kevin Mandeville, Chair
 Anthony Fiore, Vice Chair
 Michael G. Harmon
 Thomas E. Hennessy, Jr.
 David W. Horsnall
 Patricia M. Butch
 Thomas W. Adcock
 Lori Ann Davidson
 Brian Foster

Andrew J. Spears, Park System Director

Green Heritage Staff
 Editor/Writer: Zack Karvelas
 Photographer: Maribeth Gardner
 Graphics: Michelle Scolletta
 Questions/Subscriptions:
 732-842-4000, ext. 4312;
 info@monmouthcountyparks.com

GPS-enabled trails and mapping systems are changing how visitors navigate parks. The Monmouth County Park System has been using GPS-mapped trails that offer near real-time updates on conditions, closures, and points of interest. Using ArcGIS, an interactive web-based mapping software, park goers can track their routes and review the trails of the Park System. Trails have been color-coded by difficulty (paved, easy, moderate, and challenging) while also being able to see parking information and park boundaries, along with acreage, address, and our website for more information.

For golf courses, GPS-enabled carts can enhance the playing experience by providing real-time layouts of the course, hazard information, and route guidance. Managers can also utilize GPS data to monitor cart paths and manage visitor flow, ensuring sensitive areas are preserved. Whilst this may not be integrated into Monmouth County's golf carts or courses in this way just yet, we are constantly looking for opportunities for expansion, improvement, and innovation.

Lost in the Parks?
 There's an app for that

Download the **FREE** ArcGIS Field Maps Smartphone App to Navigate Park Trails

NOTE: These are instructions for the iPhone. This app is also available for Android (not pictured). Type 'Field Maps' into the search bar of the App Store. Download the ArcGIS Field Maps app by clicking on the 'GET' button, right.

Getting Started:
 Go to the app store

Step 1: Tap the new Field Maps app on your home screen to launch the program.

Step 2: Select the "Sign In" button on the welcome screen to enter without an account.

Step 3: Type "MCP's trails" into the search bar of the Maps screen and tap the topmost map to show the existing parks and trails outlined in white in the county.

Step 4: To orient yourself on the map, click the directional arrow in the top right-hand corner.

Step 5: The app will zoom in to your location. The blue dot will move on the map as you walk to your current location. Trails will appear as dashed lines: green trails are EASY, blue trails are MODERATE, and black trails are the most CHALLENGING. Black solid lines on the map are paved trails. Click on the trail itself for more info.

Legend
 --- Easy Trail
 --- Moderate Trail
 --- Challenging Trail
 --- Paved Trail



The move towards electric and battery-powered landscaping tools is transforming maintenance practices across our parks and beyond. Electric mowers, trimmers, and other equipment are being tested and rolled out in parks and golf courses alike. Some of these tools produce zero emissions, helping the state and county meet its greenhouse gas reduction goals, and they're quieter than gas-powered equipment, enhancing the overall visitor experience.



Robotic mowers are a prime example of how automation supports sustainability, reducing fuel usage by 25% and labor needs by 15%. Golf courses are also using GPS-enabled mowers that adapt to specific terrains and weather conditions, optimizing efficiency and minimizing fuel consumption.

Water conservation is increasingly crucial for parks and golf courses, especially during dry spells. Many parks in New Jersey are adopting smart irrigation systems that adjust watering schedules based on real-time weather and soil data, helping to cut water waste by up to 30%. Many golf courses are implementing similar systems to monitor soil moisture levels and avoid overwatering, which is vital for keeping fairways and greens healthy.

Additionally, rain gardens and bioswales are being utilized to manage stormwater effectively. Rain gardens use native plants to filter and capture rainwater, while bioswales redirect excess water away from high-traffic areas. Together, these strategies not only conserve water but also reduce flooding risks in vulnerable areas.

Solar infrastructure is making a big difference in parks by significantly reducing energy consumption. Certain facilities and buildings, parking lots, and other areas are now outfitted with solar-powered lighting helping to cut down on our reliance of traditional power sources. Somerset County parks are utilizing solar-powered benches that come equipped with USB charging ports, allowing visitors to recharge their devices. From a brief walk around several our park areas, you'll notice the Park System has implemented solar panels on several facilities, vehicles, and emergency phones and stations along our trails. Inside our buildings, sinks, faucets, toilets and light fixtures have been retrofitted with high efficiency and solar varieties to contribute to reducing electricity costs and supporting broader environmental initiatives.



Monmouth County parks and golf courses are setting a new standard for sustainable public spaces. The integration of drones, electric equipment, water-saving irrigation, and solar lighting represents a strong commitment to environmental stewardship and visitor satisfaction. As New Jersey continues to innovate, it offers a vision of parks that serve not only as recreational spaces but also as examples of sustainability and education.

The infusion of technology into our park systems is transforming how these essential spaces operate and engage with the community. From smart management tools that optimize resources to cutting-edge visitor engagement applications that enhance experiences, technology is making parks more efficient, accessible, and enjoyable for everyone. By embracing these advancements, park systems can ensure they remain responsive to the demands of modern society while fostering a deeper connection between visitors and the natural world. As these innovations continue to evolve, they promise to create vibrant recreational spaces that meet the needs of growing urban populations and enhance the quality of life for all community members.

Works Cited

1. California Air Resources Board. (2022). Reducing Greenhouse Gases from Gas-Powered Landscaping Equipment. California Environmental Protection Agency.
2. Environmental Protection Agency WaterSense Program. (2023). Smart Irrigation Saves Water in Public Spaces.
3. National Recreation and Park Association. (2022). The Impact of Digital Wayfinding in U.S. Parks. NRPA Research Reports.
4. National Recreation and Park Association. (2023). Adoption of Visitor Data Technology in Public Parks. NRPA.
5. New Jersey Sports and Exposition Authority. "NJSEA Municipal Drone Program." NJSEA. [njsea.com/municipal-drone-program/](https://www.njsea.com/municipal-drone-program/).
6. Somerset County Park Commission. "Unmanned Aerial Systems (Drones)." Somerset County Parks. [somersetcountyparks.org/special-use-permits/pages/unmanned-aerial-systems-drones](https://www.somersetcountyparks.org/special-use-permits/pages/unmanned-aerial-systems-drones).
7. U.S. Department of Energy. (2021). Outdoor Lighting in Parks: Solar-Powered and LED Solutions.

Navigating Monmouth County Park System Trails: A Guide For Every Adventurer

Zack Karvelas, Assistant Public Information Officer

Exploring the great outdoors can be an exhilarating experience, whether you're strolling through a serene forest, biking a challenging path, or hiking rugged terrain. Your choice of trail often depends on your skill level, the risks you're willing to take, and the type of adventure you're seeking. To help visitors find the perfect trail, the Monmouth County Park System has implemented an easy-to-follow Trail Classification System.



This system uses internationally recognized symbols—green circles, blue squares, and black diamonds—to guide hikers, bikers, and walkers through over 145 miles of trails within over 20 park areas. Inspired by a similar system used for ski slopes and mountain biking, these classifications help visitors make informed decisions about which trails best suit their abilities. Whether you're a casual stroller or an experienced adventurer, Monmouth County's trails have something for everyone.

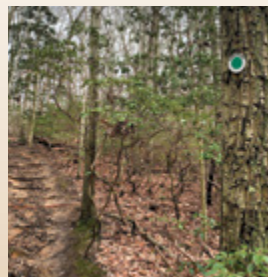
The Trail Classification System Explained

● Easy Trails (Green Circle)

Easy trails are ideal for beginners, families, and those looking for a relaxing outdoor experience. These paths are generally less than two miles long, feature gentle grades, and have wide, accessible surfaces.

What to Expect:

- Minimal obstacles, such as small tree roots or natural debris like leaves and pinecones
- A well-maintained path inspected regularly for downed trees and erosion
- Accessibility features that make them suitable for seniors, children, and some with mobility challenges



If you're new to hiking or just want a short, enjoyable outing, trails marked by a green circle are the perfect choice.

Popular examples include trails at Holmdel Park and Thompson Park, where families can enjoy an easy walk surrounded by beautiful scenery.

■ Moderate Trails (Blue Square)

Blue-square trails offer a more challenging experience while remaining accessible to most visitors. These trails often range from 1 to 4 miles in length and may include steeper grades, narrower paths, and a more rugged terrain.

What to Expect:

- Moderate obstacles, such as tree roots, small logs, and occasional uneven surfaces
- Less frequent grooming compared to easy trails, though still maintained for public access and safety
- An immersive experience for those seeking adventure without overwhelming difficulty
- Most trails in the Monmouth County Park System fall into this category, providing a balanced experience for intermediate hikers, bikers, and walkers. For example, the Laurel Ridge Trail at Hartshorne Woods Park showcases the beauty of seasonal mountain laurels while offering a moderate level of difficulty.

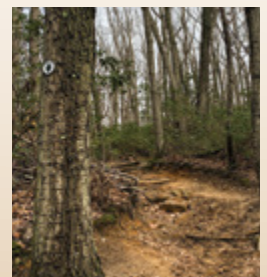


◆ Challenging Trails (Black Diamond)

For experienced adventurers, black-diamond trails provide the ultimate test of skill and endurance. These trails feature steep grades, narrow paths, and significant natural obstacles, such as large tree roots, logs, or washed-out areas.

What to Expect:

- Obstructions that require climbing or navigation, such as fallen trees or rocky areas
- Limited grooming to preserve the natural environment and provide a rugged experience
- Longer distances, often exceeding two miles, with sections of difficult terrain
- Black-diamond trails demand physical fitness and confidence. Trails like Many Log Run at Huber Woods Park and Rivers Edge Trail at Shark River Park are prime examples, challenging hikers to tackle logs, washed-out sections, and other obstacles.





Trail Design Philosophy

Monmouth County’s trail system is designed with variety in mind, reflecting the diverse population and landscapes of New Jersey. From accessible trails for families and seniors to rugged paths for experienced explorers, the goal is to provide experiences that cater to every type of trail user.

When planning new trails, Park System planners prioritize existing paths, such as service roads, farm tracks, or informal trails created by previous visitors. This approach minimizes environmental impact while maximizing usability. For example, Hartshorne Woods Park retained several existing trails when it was developed, while others were restored to natural conditions to protect the habitat and maintain environmental balance.

The Story Behind Trail Names

Trail names in the Monmouth County Park System often offer clues about the trail’s features or history. These names add character and intrigue, helping visitors connect with the park’s natural or cultural heritage.

- Laurel Ridge Trail at Hartshorne Woods is named for the mountain laurel shrub that blooms seasonally along the path.
- Hidden Creek Trail at Shark River Park gets its name from the lush vegetation surrounding the waterway.
- Historical references also influence names, such as Battery Loop at Hartshorne Woods, which includes a World War II gun battery, or Steeplechase Trail at Holmdel Park, a nod to its past use as a horse run.
- While these names provide charm and context, they don’t indicate the trail’s difficulty or conditions—that’s where the classification system becomes essential.



Specialty Trails for Unique Experiences

Beyond the standard trail classifications, the Monmouth County Park System boasts specialty trails designed for specific purposes.

Paved Trails

For those seeking a smooth, accessible surface, the Park System features more than 30 miles of paved trails. These are ideal for walkers, bikers, and stroller users who prefer a polished, easy-to-navigate path.



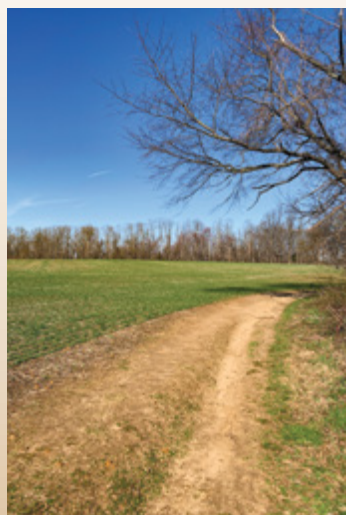
Crushed Rock Trails

Some trails feature compacted surfaces covered with crushed rock, providing a finished look and feel while maintaining a natural aesthetic. These trails balance accessibility and outdoor charm, making them popular among walkers and casual bikers.



Field Edge Trails

Mowed field edges, found at parks like Holmdel, Huber, and Thompson, offer a unique experience. Though not officially marked as trails, these paths provide exceptional opportunities for birding and passive exploration. They also serve as “buffer trails” around agricultural leases, supporting public access and environmental stewardship under state Green Acres funding.



CAMELIAS & GARDENIAS FOR THE ZONE 7 GARDEN

Kate B. Lepis, Ph.D., Horticulturist

The climate you live in dictates which plant species can survive in your yard year after year. Here in New Jersey, we live within a temperate climate – cold winters, warm humid summers, and an average of 50” of rain/snow per year. Assuming each plant receives the proper light/water regime, the limiting factor for long term success in our region is usually how cold it gets in the winter. The USDA Hardiness Zone Map is a useful tool to determine if plants you’re considering are winter hardy in our zone 7a/7b region.

One way of getting around the limitations winter temperatures create is to bring cold sensitive plants inside for the winter. This is usually only possible if you are lucky enough to have high light levels provided by a greenhouse or a heated sunroom with southern exposure. Supplementing with artificial grow lights is another option, but electrical bills may be prohibitive. For many gardeners the idea of overwintering tropical plants in your house is an effort deemed worthy only for the most beloved or unique specimens. Often, the name of the game is simply keeping the plant alive (not thriving) until outside temperatures warm back up. Insect pests, like mealy bug and scale, can be an issue in these scenarios. Cleaning leaves with a mixture of dish soap and water can keep these critters under control.

Historically most of Monmouth County was in hardiness zone 6, but as our climate warms zone 7 is the new reality.

One positive outcome for gardening in this warmer zone is that some plants previously associated with more sub-tropical climates are now a possibility here. Camellias and gardenias instill visions of the warm south. Luckily there are species and varieties within each of these groups that are hardy to zone 7 and sometime even zone 6.

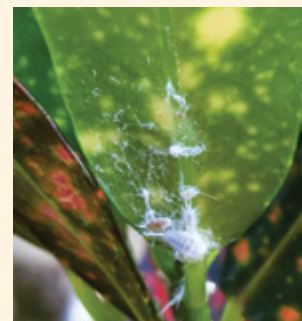
Camellias

Camellia is a genus in the Tea Family (*Theaceae*). Other closely related genera include hardy small trees like our native *Franklinia* and the ornamental Japanese *Stewartia*.²

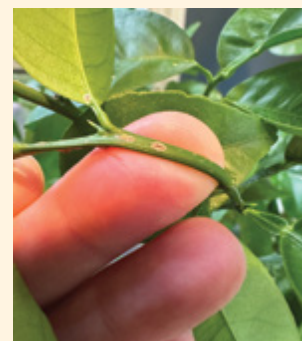
Camellias are native to Eastern and Southern Asia. Two commercially important species include *Camellia sinensis* for tea (including green and black) and *C. oleifera* for cooking oil. These species have been in cultivation for thousands of years.² When camellia plants were first grown in Europe and North America (early 1700s) it wasn’t for their ornamental value, but for tea.



USDA Hardiness Zone Map of New Jersey.¹



Mealy bugs and their cottony egg cases on croton leaves.



Scale insects on citrus stems.



QR Code to article:
Gardening with Climate Change



Franklinia alatamaha flowering at Deep Cut in August.



Stewartia pseudocamellia flowering at Deep Cut in June.

In fact, the popularity of drinking tea (*C. sinensis*) in the Americas resulted in a tax on the commodity that led to the American Revolution.

Breeding camellias was popular in the 18th and 19th centuries as greenhouse stock for the florist trade in the North and as outdoor plantings in the South. For reasons unknown, this activity fell out of favor and was not revived until the mid-20th century. Collaborative work of breeders from botanical gardens throughout the U.S. kicked back into gear in the early 1960s with the goal of developing cold hardy camellias.² The agricultural value of *Camellia oleifera* for cooking oil meant that for thousands of years humans in Asia have been breeding to push the northern limits of this species. Although floral beauty was not necessarily a goal of those endeavors, it provided parental stock with hardiness that could be bred with more decorative tender species.²



Camellia (C. oleifera 'Winter's Star') with a single row of petals and many yellow stamen in the center).

There are over 20,000 cultivars and countless camellia hybrids with flower petals in shades of white, pink, to red; petals may be arranged as a single row or doubled to varying degrees.² Some have been bred to be hardy to Zone 6. At Deep Cut Gardens you can enjoy oil camellia (*Camellia oleifera*) 'Winter's Star' and *C. sasanqua* 'Kanjiro' – both providing a lovely surprise of colorful blossoms in November.



Camellia sasanqua 'Kanjiro'!



A red variety of Japanese camellia growing against the southeastern side of a house. The flowers are described as rose form double with its layers of overlapping petals that display the yellow stamens in the center only when fully opened. Photo by David Nass.

Hardy varieties of Japanese camellia (*Camellia japonica*) are another option that are often hardy to zone 6. They provide a similar array of floral choices, but bloom from April into May. With their evergreen dark green glossy leaves, all hardy camellia provide beauty year-round.

Plant your camellia in well-drained soil high in organic matter and low in pH (5.5-6.5). Planting them in partial shade where they are protected from the hottest summer afternoon sun and the drying winds of winter will provide the best results.

Gardenias

The genus *Gardenia* is in the Coffee Family (*Rubiaceae*) and consists of about 200 species³. Common gardenia (*Gardenia jasminoides*) is probably the most familiar and is typically hardy from zones 8-11. The average gardenia will need to be overwintered inside the house. Growing common gardenia in the home requires a very bright space, but best to avoid direct sunlight during the summer months when the sun's energy is more intense. Moving your gardenia outside during the growing season to a space that gets morning sun but is protected from the strongest rays in the afternoon works best. Don't keep the plant soggy, but do not let it dry out. Bring all houseplants back in the house in September so they can acclimate to the dryer indoor setting before the heat turns on and the humidity drops further. The strong perfume scent of the white blossoms can be enjoyed in Deep Cut's Display Greenhouse from mid-April through May.



Gardenia jasminoides in the Display Greenhouse at Deep Cut

Last fall the staff at Deep Cut Gardens decided to give a hardy variety of common gardenia a try by planting two shrubs of *Gardenia jasminoides* 'Frostproof'. This variety is supposed to be hardy to zone 7 meaning it can withstand temperatures to 0°F. We planted them along the back edge of the gazebo near the parking lot. This location will provide easy access for those wishing to inhale the sweet aroma when in flower and there they will receive sun all morning but shade in the afternoon.



The new planting of gardenia 'Frostproof' with a dwarf variety of the native American holly (Ilex opaca 'Maryland Dwarf').

Ample amounts of organic matter were used to amend the heavy clay soil as gardenias enjoy well-drained soils. Like camellias, they prefer more acidic soil. When it's time to fertilize either type of shrub, use a fertilizer formulated for acid loving plants. After planting, the shrubs were mulched in well (two inches deep) to protect the roots from the coldest winter days. Their location at the top of the hill felt a little too exposed to winter winds, so in November stakes and burlap were used to create an open top box around both shrubs. Gardenias are evergreen in zones 8-11, but the leaves are known to suffer from winter damage in zone 7. Hopefully they will survive the winter and come June will provide visitors in the gazebo the nurturing sensation of their lovely scent. One account from an online gardener in zone 7 said that they survive winter but come out looking pretty beat up and require time to regrow and bounce back. When you visit next summer be sure to ask one of our gardeners how the 'Frostproof' gardenias performed.



Gardenia jasminoides 'Aimee' is another variety listed as hardy to zone 7. This one has been growing in Middletown for eight years. It was planted against a brick wall facing south. Notice its placement near a window where the aroma can be more fully enjoyed. Photo by David Nass.

Any time you plant a species that is on the edge of their northern limit the best location is in a protected spot. Usually that means against the house or along a wall that is facing southeast, south, or southwest. This allows for the greatest amount of sunlight on those cold winter days. During the day these structures will absorb the solar energy and at night radiate it back out as heat. This creates a warmer microclimate than would be found out in the open yard or on the north side of the house, increasing the chances for success.

References

¹Wikimedia Commons.

²Ackerman, W. 2007. Beyond the Camellia Belt. Ball Publishing Batavia, IL.

³Simpson, M. 2006. Plant Systematics. Elsevier Academic Press, NY, NY.

Beech Leaf Disease: Symptoms, Causes, And What We Are Still Discovering

Stephanie Horton, Recreation Leader

In winter, the tender flowers of the garden die back while our trees stand tall and shelter overwintering wildlife. Fallen leaves of deciduous trees provide the perfect place for insects to wait out the cold winter months. Luna moths' cocoons, bumble bee queens, and red-banded hairstreak larvae are just a few examples of insects that use leaf litter for winter protection from predators and the harsh, cold weather. Fallen leaves also help plants during the freeze-thaw cycles by providing extra insulation for their root systems¹.



Leaf litter protects overwintering insects and larvae, which become crucial food sources for vertebrates in the forest ecosystem.

Leaf litter provides crucial habitat for beneficial insects during the winter months, but it isn't the only place small invertebrates can be found flourishing in the winter. Some nematodes found overwintering in beech tree buds may be the cause of a newly discovered disease threatening native beech trees. Before we discuss the potential cause of this issue, let's talk about what we know.

American beech trees (*Fagus grandifolia*) are a common species of hardwood tree, occurring from Nova Scotia and Southern Ontario to Northern Florida and Eastern Texas. These trees are foundational to our North American forest ecosystems. Their trunks and canopies provide nesting sites and shelter, and their beech nuts provide a vital food source essential to many forest vertebrates². American beech trees have dealt with large scale diseases in the past century including beech bark disease which dramatically altered the composition of forests containing this tree species³. Now, a recently detected invasive disease called beech leaf disease (BLD) threatens beech forests. BLD was first discovered in Lake County, Ohio back in 2012². Since the disease's discovery in 2012, it is now present in nine states

including New Jersey. In 2020 BLD was confirmed in 10 New Jersey counties including: Bergen, Essex, Hunterdon, Mercer, Monmouth, Morris, Passaic, Somerset, Sussex, and Union⁴. Since this is a newly emerging and rapidly spreading disease, it is crucial to know how to detect it, what causes it, and how it can be treated.



Infected beech leaves start showing symptoms through dark green interveinal banding. Photo by Nicholas J. Brazeo.



Banding, cupping, and distortion along with brown intraveinal blotches indicate beech leaf disease on American beech. Photo by Nicholas J. Brazeo

Identifying BLD can be done by examining the leaves of the beech tree. Initial symptoms of the disease appear as a dark green, interveinal banding pattern on foliage located in the lower canopy⁵. The dark bands on the leaves are more easily viewed from below, especially if a light source is shining through them. More advanced symptoms include leaves that are dark, shrunk, and crinkled. Where the disease has been present the longest will show a reduction in buds and foliage. The advanced stage of the disease is characterized

by canopy thinning, branch dieback, and mortality for mature trees within seven years and sooner for saplings. In some dense clusters of saplings, a mortality rate as high as 90% has been observed².

Researchers have been scrambling to find the cause of this disease. In 2019, there was a breakthrough when nematodes less than 0.1mm in length were extracted from the buds of an infected American and European beech trees. These nematodes, no larger than the width of a piece of paper, were found to be genetically similar to *Litylenchus crenatae*, which is a species known to cause leaf gall symptoms in Japanese beech trees. Scientists believe the nematodes invade the beech tree buds from mid-summer to autumn where they feed and overwinter⁶. Researchers found eggs, juveniles, and adult females living inside infected buds during the winter months². After bud break, the life cycle of the nematode continues in the leaf tissue. Rarely are the nematodes found on dead symptomatic leaves retained on the tree, but researchers found these tiny creatures in the leaf litter of the beech tree, presumably protected from the winter elements.



Researchers found eggs, juveniles, and adult female nematodes overwintering in infected tree buds.

The difference in bacterial communities between symptomatic and asymptomatic leaves suggest that these nematodes may be altering the microbiome of the infected beech tree leaves⁷. Because the disease is new and rapidly infecting native beech tree populations, options for mitigating it are limited but necessary. For land resource managers, nematicide sprays exist for some level of control. However, given the limited information available, the optimal time for application is still unknown. More research on this disease is going to be crucial for the preservation of beech tree populations.

Literature Cited:

- 1 Foltz Jordan, S., Hopwood, J., & Morris, S. (2020). Nesting & Overwintering Habitat for Pollinators & other Beneficial Insects. The Xerces Society for Invertebrate Conservation. <https://xerces.org/sites/default/files/publications/18-014.pdf>
- 2 Marra, R. (2020). An Overview of Beech Leaf Disease. New England Society of American Foresters, 81(4), 4–7. https://ctpa.org/wp-content/uploads/BLD_2020_October_SAF-NE.pdf
- 3 Reed, S. E., Volk, D., Martin, D. K. H., Hausman, C. E., Macy, T., Tomon, T., & Cousins, S. (2022). The distribution of beech leaf disease and the causal agents of beech bark disease (*Cryptococcus fagisuga*, *Neonectria faginata*, *N. ditissima*) in forests surrounding Lake Erie and future implications. *Forest Ecology and Management*, 503, 119753. <https://doi.org/10.1016/j.foreco.2021.119753>
- 4 Buckley, R. (2021, December 22). Beech Leaf Disease in New Jersey. Plant & Pest Advisory. <https://plant-pest-advisory.rutgers.edu/beech-leaf-disease-in-new-jersey/>
- 5 Ewing, C. J., Hausman, C. E., Pogacnik, J., Slot, J., & Bonello, P. (2018). Beech leaf disease: An emerging forest epidemic. *Forest Pathology*, 49(2), e12488. <https://doi.org/10.1111/efp.12488>
- 6 Brazeo, N. J. (2023, June 21). Beech Leaf Disease. Center for Agriculture, Food, and the Environment. <https://ag.umass.edu/landscape/fact-sheets/beech-leaf-disease#:~:text=Lcm%20invades%20beech%20buds%20from>
- 7 Burke, D. J., Hoke, A. J., & Koch, J. (2020). The emergence of beech leaf disease in Ohio: Probing the plant microbiome in search of the cause. *Forest Pathology*, 50(2). <https://doi.org/10.1111/efp.12579>

PHOTO 1: Fallen beech leaves in Alice Holt Forest by Mike Pennington, CC BY-SA 2.0 <<https://creativecommons.org/licenses/by-sa/2.0/>>, via Wikimedia Commons

PHOTO 2: Nicholas J. Brazeo, University of Massachusetts Amherst, Extension Plant Pathologist

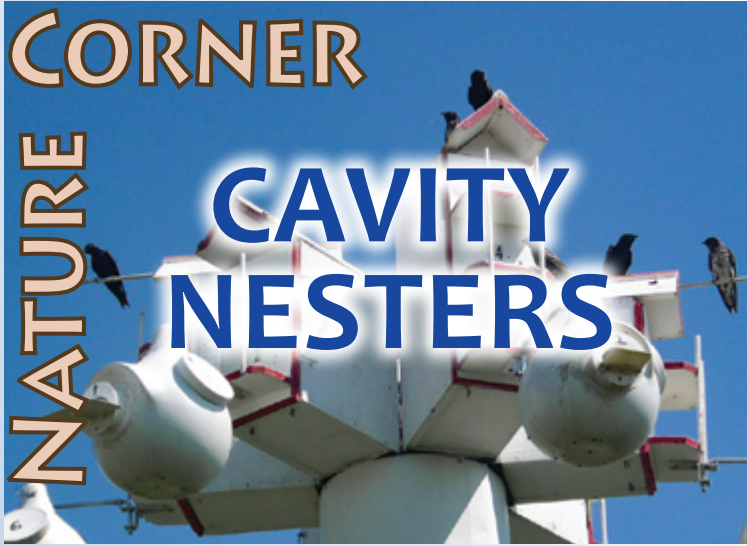
PHOTO 3: Nicholas J. Brazeo, University of Massachusetts Amherst, Extension Plant Pathologist

PHOTO 4: Plant Image Library, CC BY-SA 2.0 <<https://creativecommons.org/licenses/by-sa/2.0/>>, via Wikimedia Commons

CORNER

NATURE

CAVITY NESTERS



Paul Mandala, Park Naturalist



Cavity Nesters

Like humans, birds use many different strategies to build their homes. We will look at bird species found in Monmouth County that utilize cavity nesting. Cavity nesters are birds that build a nest, lay eggs, and raise young inside a cavity. There are two types of cavity nesters; primary cavity nesters, birds that excavate their own nesting holes, and secondary cavity nesters, birds that rely on abandoned cavities created by primary cavity nesters. The most recognizable primary cavity nesters are woodpeckers but also include certain species of swallows, chickadees, nuthatches, and kingfishers. Populations of secondary cavity nesters rely heavily on the availability of usable cavities in the appropriate habitat and can vary depending upon the amount of competition for this limited resource. Additionally, the introduction of invasive species and habitat loss due to human expansion has only exacerbated the housing crisis. It is no surprise that many of the cavity nesting species populations have declined.

Songbirds

One of the most famous examples of successful conservation for cavity nesters is the creation of nest boxes to help the Eastern Bluebird population by the North American Bluebird Society. It was a simple idea to provide birds with suitable artificial nesting locations within the proper habitat. This effort also includes monitoring those boxes to prevent invasive pests such as House Sparrows and European Starlings from commandeering those cavities. Bluebird box trails were a huge success and were implemented all over the United States and beyond by conservation-minded citizens. Boxes have also had the added benefit of helping other native species such as, Tree Swallow, House Wren, Carolina Chickadee, Carolina Wren, White-Breasted Nuthatch, and Tufted Titmouse.



Male Eastern Bluebird perched on the outside of a bluebird box. Photo taken by Kevin Munro Smith.



A view into the inside of a bluebird nest box showing young Eastern Bluebirds.



Purple Martins perched above a colony nesting in plastic gourds. Photo taken by Celeste Echlin.



A male Purple Martin hanging from a gourds front porch greeting a female Purple Martin sitting in the cavities hole.

The next most recognizable cavity nesters helped by humans are Purple Martins. The relationship between humans and Purple Martins predates the colonization of the Americas. Native Americans hung natural hollowed-out gourds around their crops to help control pests with these fantastic aerial insectivores. Today, Purple Martins on the East Coast are fully dependent on humans for providing nesting cavities as well as almost all the nesting materials, unlike Purple Martins on the West Coast that still nest naturally on their own. These large iconic colonies can either be large wooden houses with multiple nesting cavities or multiple plastic gourds all hanging from a central pole that can be raised or lowered.

These colonies can usually be found near water not far from a building or human activity. Housing must have an open clear flight path and perches for the birds to rest. Even today a favorite place for Purple Martin colonies to be set up is on local farms, as they continue to help reduce crop pests.



A female Wood Duck perched on the entrance hole of its nesting box. Photo taken by Mei Hsiao.



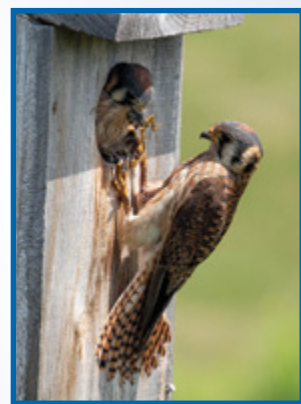
A male Wood Duck swimming.

with a soft bounce and a moment to recover, the chicks then fall in line behind the parents to be led to the safety of the water's edge. These shy ducks prefer smaller more secluded bodies of water with less human disturbance for nesting sites. Although it is harder to get to the appropriate sites to monitor these boxes, the Wood Duck population certainly is helped by providing these artificial cavities.

Ducks

Small songbirds are not the only birds helped by artificial cavities of nest boxes. A surprising cavity nester to some are Wood Ducks.

Naturally nesting in tree cavities as high up as 40 feet or more, Wood Ducks always select a location near a water source. Wood Ducks are famous for the "leap of faith" performed by young chicks, as young as 24 hours old and incapable of flying. Ducklings jump from nest cavities, free falling to the ground below,



An American Kestrel perched on the entrance hole of its nesting box feeding a chick. Photo taken by Kshanti Greene.

Raptors

The American Kestrel is a small predatory raptor species that is considered threatened in New Jersey, due in part to its preference to nest in tree cavities, which are limited near open field habitat. Kestrel boxes are mounted on tall poles out in large fields or meadows.

The same sized box can be used by Screech Owls

as well. Screech Owls, however, prefer forested areas. These nocturnal nesters can be challenging to detect but sometimes vocal cues can be the first sign to listen for at dawn and dusk, as they can be vocal as they call out to mates.



An Eastern Screech Owl posing at the entrance hole of its nesting box. Photo taken by Kevin Munro Smith.



A Barn Owl roosting on its nest box porch. Photo taken by Alfonso Rodrigo.



A young barred owl resting in the entranceway of its nesting box. Photo taken by Kathy Hicks.

Surprisingly, large raptors are sometimes cavity nesters as well. Barn Owls and Barred Owls are greatly helped by extra-large cavity boxes in the appropriate habitat. Barn Owls are known for hunting in fields and meadows and have historically benefited from inhabiting farmland. They have even been known to use old farm buildings such as barns to provide suitable nesting habitat, hence the name Barn Owl. As farmland is being converted more and more into housing, warehouses, and commercial developments, Barn Owls face an ever-growing threat of loss of habitat and vanishing nesting sites. Barn Owl boxes can be mounted on poles or even directly to buildings close to open field habitat.

Barred Owls prefer wet lowland sections of mature hardwood forests. Unfortunately, this too is another habitat that is dwindling because of development. Boxes for this species needs to be placed away from clearings, as these birds prefer the camouflage of the forest as they hunt. Entrance holes still need to be clear from any branches and are usually found within 200 feet of a water source and at least 20 feet up from the ground in a tree. Although detection of these species using boxes can be difficult to verify, as the chicks get ready to fledge, they often like to perch on the edge of the box or ledges provided.

Many cavity nesters call our county parks home, as we are a welcome refuge of protected acreage. Man-made cavities may be easier to find and can, in fact, be found at many of our local parks by the way of the many bluebird trails or Purple Martin colonies. Other cavities are more difficult to see and take a bit of a keen eye to discover. Our park staff and park patrons can make a world of difference by getting involved in these conservation projects through volunteering to construct, monitor, or maintain boxes, colonies, or trails.



GREEN HERITAGE

805 Newman Springs Road, Lincroft, NJ 07738-1695



Volume 58, No. 4 winter 2024-25

24534 12/24

*As winter's chill embraces the skies,
The park sleeps under soft, frosty sighs.
Snowflakes dance in the morning light,
Blanketing trails in shimmering white.*

*The year has passed, yet nature's grace
Awaits your footprints in this peaceful place.
Though the holidays have come and gone,
The beauty of winter lingers on.*

*So step outside, take a quiet stroll,
And let the season refresh your soul.*



In This Issue:

Embracing Innovation:
How Technology Is
Shaping New Jersey's
Parks And Golf Courses

Navigating Monmouth
County Park System
Trails: A Guide For
Every Adventurer

Camelias & Gardenias
For The Zone 7 Garden

Beech Leaf Disease:
Symptoms, Causes,
And What We Are Still
Discovering

Cavity Nesters

