



MONMOUTH COUNTY PARK SYSTEM GREEN HERITAGE

The Newsletter of Monmouth County's Open Space, Parks & Recreation Agency

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POCKET RANGERS: TOP APPS FOR THE OUTDOOR EXPLORER



Zack Karvelas, Assistant Public Information Officer

Smartphones often get a bad reputation when it comes to outdoor experiences. In the Fall 2024 issue of the Green Heritage, we explored the practice of “silent walking,” highlighting the importance of disconnecting from devices and immersing fully in the natural world. That reflection on presence and stillness remains important—but so does the acknowledgment that, when used thoughtfully, technology can also help us engage more deeply with nature rather than distract from it.

Like much in life, it isn't black and white. The outdoors offer space for silence and solitude, but it also offers opportunity for learning, tracking, navigating, and discovery. Mobile apps and digital tools, when used intentionally, can become powerful companions on the trail, enhancing everything from safety and fitness to curiosity and ecological awareness.

Whether you're identifying a bird call, navigating a new trail, or capturing the night sky, there are tools that support a more informed and mindful experience. And with several of them integrating directly with public land systems, including ours here in Monmouth County, there's never been a better time to blend technology with the outdoors in a way that respects and uplifts both.

Smartphones as Outdoor Tools

Think of your mobile device as a digital compass, field guide, fitness tracker, and camera all in one. It helps you see more, learn more, and share your experiences with others. In recent years, apps have become essential companions for park visitors, especially those who want to be better informed about what they're seeing, how to get where they're going, and how to enjoy the outdoors more responsibly.

Some apps help you plan before you even arrive. Others work in real time to identify a flower or bird, track your fitness, or capture the night sky. And many, including some used internally by the Monmouth County Park System, are now publicly available to assist with navigation and trail awareness.

Trail Mapping and Navigation

Planning a hike or bike ride used to involve paper maps and guesswork. Now, with GPS-enabled trail apps, you can find routes suited to your skill level and time window, see elevation changes, and even track your movement in real time.

AllTrails is one of the most popular options, offering thousands of trails with reviews, difficulty ratings, and filters for activities like dog walking or stroller access. Many Monmouth County trails are listed, and the community-driven content means you can read comments on recent trail conditions or closures.

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Gaia GPS takes things a step further for more advanced users, with topographic overlays, offline downloads, and backcountry route planning.

ArcGIS Field Maps, built on the same system our staff uses, is also available to the public with select map layers. It's especially useful in your Monmouth County parks for locating trailheads, facilities, and other key amenities.

Trail apps like AllTrails provide comprehensive information, from route maps and elevation gains to points of interest, helping outdoor enthusiasts discover and navigate the perfect hiking routes.



Tools like ArcGIS Field Maps allow park systems to access and collect field data, integrating with cloud-based mapping services to create and manage detailed digital maps of trails, park boundaries, and other key features for public access and park management.

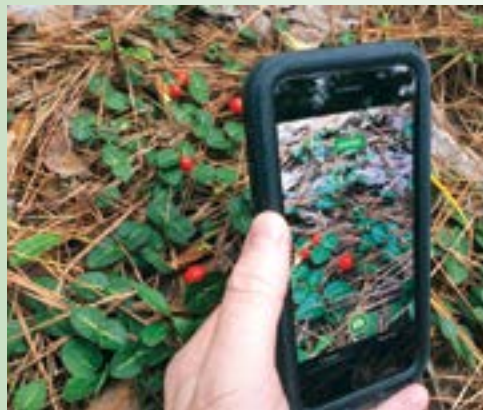
Identifying the Natural World

There's something powerful about being able to name the species around you. Apps that offer image recognition or audio recording help bridge the gap between curiosity and understanding.

Seek by iNaturalist uses your phone's camera to identify plants, animals, and fungi. Just snap a photo and let the app generate results, backed by the extensive iNaturalist database. It's ideal for parks like Deep Cut Gardens or Holmdel Park.

Merlin Bird ID, developed by the Cornell Lab of Ornithology, specializes in bird identification. Upload a photo or record a song, and the app will match it using AI and expert-sourced data.

PictureThis is another plant ID app that includes care information, toxicity warnings, and regional data. It's popular among gardeners and educators alike.



Apps like Seek by iNaturalist allow users to identify plants and wildlife on the go, enhancing their connection with nature.



The Merlin Bird ID app by Cornell Lab helps users identify bird species, often leveraging photos or sounds for quick recognition.

Stargazing and Celestial Planning

Nighttime in the parks offers a different kind of magic. If you've ever looked up and wondered what exactly you're seeing, astronomy apps are a great place to start.

Sky Guide and Sky Tonight both allow users to point their phones at the night sky to view labeled constellations, planets, and satellites. These tools make stargazing at Mount Mitchell Scenic Overlook or Dorbrook Recreation Area more interactive and educational.

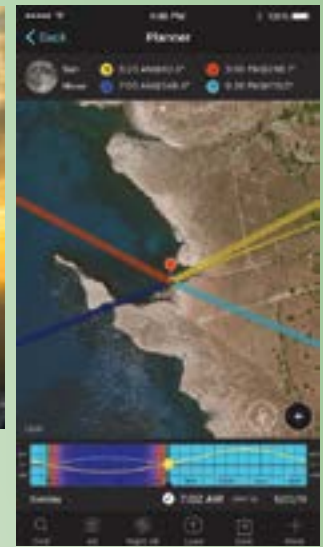
For photographers, PhotoPills offers precision planning for capturing sunrise, sunset, and moonlight. You can align shots down to the minute and angle which is perfect for documenting golden hour over the Manasquan Reservoir.



Stargazing apps like Sky Tonight by Star Walk allow users to explore the night sky, identifying constellations, planets, and celestial events in real-time.



Showcasing PhotoPills' advanced "Planner," these images illustrate how the app visualizes precise sun, moon, and star positions. This empowers photographers to accurately pre-visualize and schedule shots for optimal light and alignment.



Fitness, Safety, and Smart Planning

For those looking to stay active, apps like Strava, Runkeeper, and MapMyRun provide easy ways to log hikes, walks, and trail runs. These apps track pace, distance, elevation, and offer progress sharing with friends or fitness communities.

Cairn is a safety tool that shares your location with a trusted contact and notifies them if you go off-grid or miss a check-in. It also maps cell signal zones based on real user data.

NOAA Weather Radar and Windy are reliable resources for checking conditions before heading out. Accurate forecasts help hikers avoid stormy surprises and better plan their gear and route.

The First Aid – American Red Cross app is a critical resource for outdoor recreation. Offering offline access to emergency care instructions, from heat stroke to tick bites.



Strava, a popular fitness tracking app, allows users to record and share their runs, rides, and other outdoor activities, often including route maps and performance data.



Weather apps, often leveraging NOAA data, provide real-time radar, forecasts, and severe weather alerts to keep users informed about changing conditions.

Technology That Enhances, Not Distracts

Used intentionally, mobile apps are not a replacement for nature. They're a way to better understand it. These tools encourage us to slow down, observe more closely, and learn more deeply. For families, educators, nature lovers, or first-time visitors, they turn a walk in the woods into a memorable learning experience.

As technology and conservation continue to intersect, we hope tools like these support your journey, not just into the park, but into a more thoughtful relationship with the natural world.

Featured Apps (as discussed above)

- AllTrails
- Gaia GPS
- ArcGIS Field Maps
- Seek by iNaturalist
- Merlin Bird ID
- PictureThis
- Sky Guide
- Sky Tonight
- PhotoPills
- Strava
- Runkeeper
- MapMyRun
- Cairn
- NOAA Weather Radar
- Windy
- First Aid – American Red Cross

THE ECHO OF THUNDERING HOOFBEATS; A History Of Racing At Thompson Park

Kristen T. Hohn, MA RPA, Senior Historic Preservation Specialist

If you were to travel back in time 100 years to the Thompson Estate in Lincroft, you'd find yourself at one of the most prestigious thoroughbred training facilities in the United States, known as Brookdale Farm. This site was home to champion horses and some of the most celebrated trainers in American Thoroughbred Racing history.

Starting promptly at 4 a.m., the farm bustled with early morning activity. Grooms and exercise boys as young as seven made their way to the stables before dawn to prepare the animals' breakfast and start their chores. By the time the sun rose over the Swimming River, an elite string of racehorses was already saddled and making their way to the track for their first workout of the day. Each lap brought the horses



Young exercisers tested the mettle of racing hopefuls and champions alike on Brookdale's prized grounds.

closer to victory at the country's biggest stakes races including the Belmont, the Preakness, and of course, the Kentucky Derby. But why was such a world-class racing establishment built here in Monmouth County?

In the years before the Civil War, most American thoroughbred stud farms were in the south. When wealthy northerners began flocking to the fashionable seaside town of Long Branch every summer, they brought "the sport of kings" with them. Yet even before Monmouth Park Racetrack was established in neighboring Oceanport in 1872, the county was already home to many small but notable horse farms.

Local farmers with recognizable names like Van Mater, Schenck, Laird, and Lloyd were already deeply involved with the American "Turf," as the sport of horse racing is called. The same year the racetrack opened in Long Branch, a New York businessman named David D. Withers arrived in New Jersey and began buying large parcels of farmland in Lincroft to create the Brookdale Stud Farm.

Not only was Lincroft close to major racing hubs in Long Branch, Brooklyn, and Saratoga, but expanses of flat land for practice tracks and rolling fields for grazing made Monmouth County's farms the perfect place for horse training.

Following Withers' death in 1891, Brookdale was purchased by the Thompson family. They leased the facility to iconic



James G. Rowe Sr. and Harry Payne Whitney c. 1915

"Turfmen" like James R. Keene and Harry Payne Whitney. The farm was leased exclusively to the Whitney family from 1910 until 1932.



The Main Training Barn, known today as the Historic Racing Stable, 1906.

Brookdale was home to some of the most famous horses from the “Golden Age of Racing” including the undefeated Colin, and Regret, the first filly to win the Kentucky Derby, as well as Sysonby, arguably one of the greatest racehorses of the twentieth century. National Museum of Racing and Hall of Fame trainers like John Rogers, Tom Healy, and James G. Rowe Sr., also called Brookdale home.



Regret made history as the first filly to win the Kentucky Derby in 1915.

James G. Rowe Sr. cultivated 34 champion horses and 10 National Museum of Racing and Hall of Fame inductees, more than anyone else in history, and has been referred to as the “greatest trainer of all time.” Another acclaimed trainer, Marshall Lilly, worked and rode nearly every famous horse that moved through the stable. Once hidden in the shadows due to the lingering effects of segregation, Lilly’s remarkable career at Brookdale has recently gained national recognition.



Looking around the park today, visitors can find evidence of the Brookdale Stud Farm across the landscape, from the yearling barns, which host theater and recreational programs, to the 1 ¼-mile track loop along the reservoir, originally used as the training track, now a shady walking trail for park visitors.

Most park visitors are unaware that the track loop was used to train some of the country’s most famous horses.

The Monmouth County Park System recently undertook a large-scale rehabilitation of Brookdale’s main training barn, now called the Historic Racing Stable, which housed the most promising Thoroughbreds. For the first time in its 145-year history, the stable is now open to the public. Through interior exhibits and guided tours, visitors will learn about life on the stud farm, the famous horses, and the fast-paced world of racing.



Staff conducting research at Monmouth Park.

Extensive research was conducted at the Monmouth County Archives, Monmouth Park Racetrack, the National Museum of Racing and Hall of Fame, and through Keeneland’s Digital Library and Photographic Collections. The exhibit content was created

in-house by staff historians and the panels were designed by the Park System’s chief graphic designer, Michael Alfano.

The Historic Racing Stable was added to the National Register of Historic Places in 2020 as a key structure in the Brookdale Farm National Historic District. The historic rehabilitation demonstrates the Monmouth County Park System’s ongoing commitment to historic preservation, education, and public access.

Thank you to the following organizations, for their contributions and support:

- The Monmouth County Board of County Commissioners
- The Monmouth County Board of Recreation Commissioners
- The Monmouth County Friends of the Parks
- The National Museum of Racing and Hall of Fame
- The Keeneland Library
- Monmouth Park Racetrack
- Brookdale Community College
- Numerous individuals and families who shared their memories of Brookdale Farm



The Historic Racing Stable after rehabilitation, 2024.

THERE'S NO SUCH THING AS A VEGETABLE? BOTANIZING IN THE PRODUCE AISLE

Kate B. Lepis, Ph.D., Horticulturist

In the world of botany there is no plant or plant part referred to as a vegetable. We eat one of three organs: roots, stems, and leaves.

Additionally, what most people consider a vegetable is actually a fruit – the mature ripened ovary of a flower. After a flower's stigma receives pollen, the grain germinates releasing a swimming sperm that travels down the style into the ovary where it fertilizes an egg. The fertilized egg becomes the seed. The ovary enlarges and differentiates forming the fruit. If your produce contains seeds, it's a fruit.



Edible Plant Organs

Roots

The long tap root of carrots (*Daucus carota*) and the red ringed roots of beets (*Beta vulgaris*) are the first to come to mind. Both function as storage organs for the plant and have been bred by human's to be bigger and less fibrous than their wild ancestors.



Wikimedia²



Wikimedia²



Anatomy of typical stem.



Potato. Wikimedia²

Other edible stems may not be as obvious.

Potatoes are tubers – underground stems that specialize in storing starch. The eyes of the potato are axillary buds arranged around the stem. Despite its name ginger root (*Zingiber officinale*), ginger is a rhizome - an underground stem that grows horizontally.



Botanical drawing of ginger. Wikimedia²



Stems

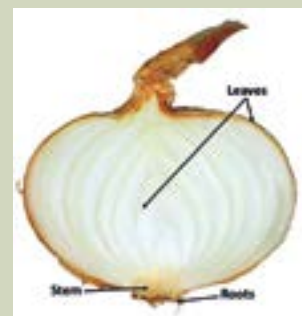
Celery (*Apium graveolens*) and asparagus (*Asparagus officinalis*) are good examples of edible stems. In the spring, as an asparagus shoot emerges from the soil the spear is harvested before it expands. What look like wispy leaves on stems left in the ground are really Cladophylls – modified stems that look and act like leaves. The true leaves are the triangular bracts on the spears we eat.¹



Whole plants - Wikimedia²

Leaves

Most recognize that we're eating leaves when using a head of lettuce (*Latuca sativa*) or make pesto from home-grown basil (*Osimum basilicum*) and parsley (*Petroselinum crispum*). What may be more surprising is that we're also ingesting leaves when chopped onion (*Allium sepa*) is added to a dish. The onion bulb has several layers of fleshy leaves specialized in storing starch.



Wikimedia²

Evolution has fashioned many kinds of fruit – all trying to disperse their seeds away from the parent plant to minimize competition between generations. Humans have taken that diversity and tinkered with it to domesticate fruit that is bigger and tastier. In some cases, like with grains (=caryopses), human breeding has diminished the dispersal function. Grasses usually produce fruit in the form of a caryopsis – a one seeded fruit with a dry ovary wall fused to the outer layer of the seed (seed coat). This type of fruit never splits open like a milkweed (*Asclepias sp.*) follicle does.



The milkweed follicle – a dry fruit of a single pistil that opens along a one side.

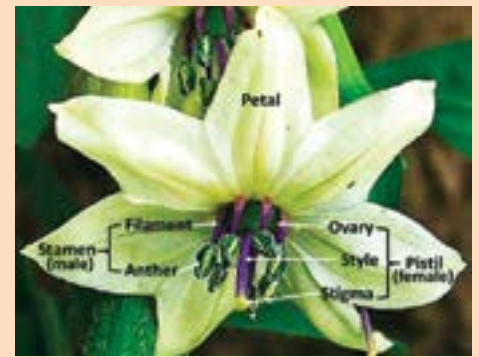
Grass spike. Wikimedia²

In wild grasses, as individual fruits ripen the bracts that hold the flower in place fall away or shatter, releasing the caryopsis for dispersal. To increase yields, human breeding has reduced the shattering trait to ensure most of the grains remain with the flower stalk until harvested.

It may be surprising that a pepper (*Capsicum sp.*) is not only a fruit, but also a berry – a fleshy fruit that arises from a single pistil containing several to many seeds.

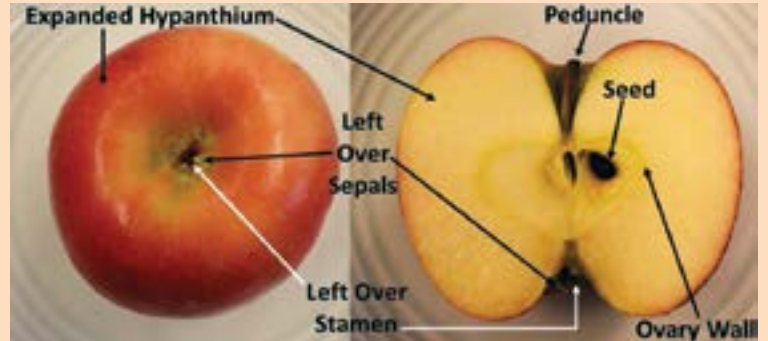


Tomatoes (*Solanum lycopersicum*), blue berries (*Vaccinium sp.*), grapes (*Vitis sp.*), bananas, and plantains (*Musa sp.*) are additional examples.

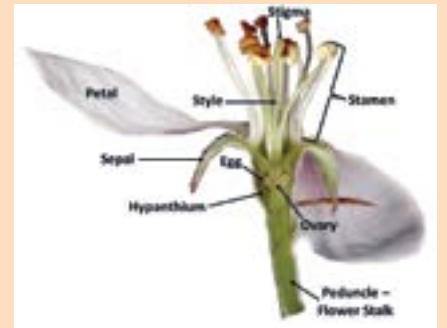


Flower - Wikimedia²

The rose family (Rosaceae) bestows many of the sweet fruits people enjoy. Apples, pears, plums, peaches, cherries, strawberries, black berries, and raspberries are all family members and present interesting examples of fruit. Unique



to Rosaceae are pomes (apples and pears) – a simple fleshy fruit, not derived from swollen ovary, but enlarged hypanthium – a floral tube of fused petal, sepal, and stamen tissue that surrounds the ovary.



Flower - Wikimedia²

Continues next page...

These Six Crops are Varieties of the Same Species (*Brassica oleracea*)!⁴

The history of domestication is not completely clear, but evidence suggests that a wild Mediterranean weed in the mustard family (Brassicaceae) was bred by farmers across Europe to have different enlarged/edible parts. Their efforts became these well-known crops.



Broccoli (var. *italica*) – stems and flower buds.



Cauliflower (var. *botrytis*) – flower buds².



Cabbage (var. *capitata*) – terminal leaf bud².



Probable wild ancestor (*Brassica cretia*)²



Kale (var. *sabellica*) – leaves².



Kohlrabi (var. *gongyloides*) – stem².



Brussel sprouts (var. *gemmifera*) – axillary leaf buds².

Strawberries are another exception where the flesh we eat is not derived from ovary but develops from a fleshy swollen receptacle – the area of tissue on which all floral structures develop. As the receptacle expands it pushes each individual ovary and its seed to the outside. What look like little seeds on a strawberry are achenes – small dry fruits that don't split open, containing a single seed basally connected to the ovary wall. Sunflower “seeds” are a larger, more well-known achene.



Flower - Wikimedia²

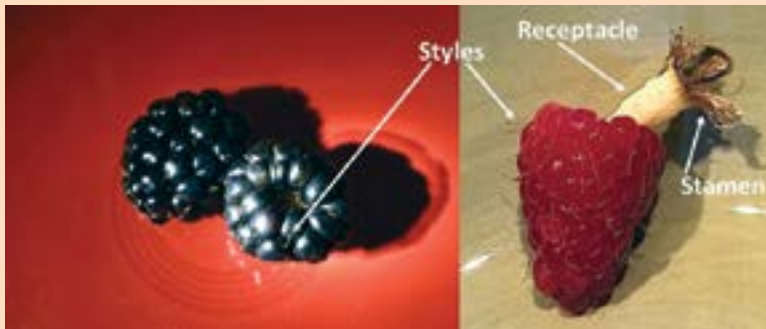
Plums, peaches, and cherries are drupes (stone fruits) – the ovary develops into three layers: skin (exocarp), flesh (mesocarp), and hard inner pit (endocarp) containing a single seed.



Wikimedia²

Almonds (*Prunus amygdalus*) and coconuts (*Cocos nucifera*) are drupes with leathery exocarp/mesocarps that are removed before being sold. If you buy almonds in the “shell” you’re cracking open a pit.

Raspberries and blackberries (*Rubus sp.*) are aggregate fruits – from a single flower with many separate pistils – each independently developing into a fruit with a single seed. In this case they are an aggregate of drupelets – small drupes. It can also be said that strawberries are an aggregate of achenes.



The receptacle separates from raspberries leaving them hollow post-harvest. We eat the attached receptacle inside of blackberries.

As the veggie garden grows, watch how flowers develop into fruits – it’s a world of wonder right in the backyard.

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AN UNBREAKABLE BOND: How Fig Trees and Fig Wasps Co-Evolved

Stephanie Horton, Recreation Leader

When we think of pollinators, we often imagine bees buzzing from flower to flower, transferring pollen as they collect nectar. This process benefits both the plant, which reproduces, and the pollinator, which gets food. But in the world of figs and fig wasps, the relationship is much more specialized—and much more intimately connected. This remarkable partnership is an example of co-evolution, where two species influence each other’s evolution over time, resulting in an incredibly intricate biological dance¹.

In most plant-pollinator relationships, pollinators like bees and butterflies visit multiple plant species, collecting nectar while inadvertently transferring pollen between flowers. These types of pollinators are called generalists (specialists vs. generalists, n.d.).



Bombus impatiens forages on nectar at Deep Cut Gardens.

This kind of interaction is a type of mutualism, where both species benefit from the relationship². It helps to think of mutualism as a win-win relationship. Not only are fig trees (*Ficus spp.*) and their pollinating wasps (family Agaonidae) an example of mutualism, but they operate on an entirely different level of exclusivity, called obligate mutualism³. Each fig species has its own specialized wasp species that is solely responsible for pollinating it¹. The wasp depends on the fig for reproduction, while the fig relies on the wasp for pollination. This specificity ensures the survival of both species, but also means their success or failure is evolutionarily locked together. If either the fig tree or the fig wasp populations were to wane, both would be negatively impacted.

Fig trees and their wasp partners are found in tropical and subtropical regions around the world. These trees are particularly common in rainforests, where they play a crucial ecological role¹. Figs provide a vital food source for many birds, mammals, and insects, making them a keystone species in their environments. Without fig trees, many animals would struggle to find food, and without fig wasps, the trees would not be able to reproduce².

The co-evolutionary relationship between fig trees and fig wasps didn't develop overnight. Co-evolution occurs only when two species influence each other's adaptations over many generations. The structure of the fig itself is a result of this co-evolution. Unlike typical flowers that display their reproductive structures openly, fig flowers are hidden inside a hollow, enclosed structure called a syconium. Once the fig fruit is ripe for pollination, it will entice the species-specific female fig wasp by emitting an enticing aroma⁴. The only way pollen can reach these flowers is if a fig wasp enters through a tiny opening, called the ostiole¹. By squeezing through this tiny opening, females lose their wings and antennae, which they won't be needing to complete the life cycle.



Ficus racemosa, also known as the cluster fig, can be found growing from Southern China to Australia. This species is pollinated by the fig wasp.

Once inside, the female wasp pollinates some of the flowers and lays her eggs inside others. The flowers that receive eggs develop into galls that contain wasp larvae, while the pollinated flowers develop into seeds. As the wasp larvae grow inside the fig, they complete their development within the protective confines of the syconium². When they mature, the wingless males emerge first, mate with the still-developing females inside their galls, and then chew exit tunnels for them. Once the newly emerged, pollen-laden females leave the fig, they search for a receptive fig of the same species to continue the cycle¹.



Female Agaonid wasps (probably *Elisabethiella comptoni*) emerging from the fruiting body of *Ficus abutilifolia*.

Many commercially grown figs, such as those from *Ficus carica*, do not require wasps for pollination. This species is parthenocarpic, meaning the trees can produce fruit without fertilization¹. That means you aren't eating wasp carcasses when you eat a fig from the grocery store. However, in wild fig species that do rely on wasps, the females die inside the fig after laying their eggs. Enzymes within the fig break down the wasp's body, incorporating it into the fruit. By the time a fig is ripe and eaten, there is no visible trace of the wasp. In other words, nature has taken care of recycling for us².

While the fig-wasp relationship has remained stable for millions of years, modern challenges such as deforestation and climate change threaten their delicate balance. Habitat destruction can reduce fig populations, leading to declines in wasp populations and vice versa¹. Conservation efforts that protect fig trees also help maintain the diverse ecosystems that depend on them.



Deforestation for the logging industry in rainforest habitats like Borneo can severely reduce, among other things, fig tree populations.

The story of figs and fig wasps is one of the most fascinating examples of co-evolution and mutualism in nature. Their relationship showcases the intricate and often surprising ways in which species adapt to each other over time, forming interdependencies that shape entire ecosystems. So, the next time you enjoy a fig, take a moment to appreciate the tiny wasp that made it all possible.

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Notes

Fig wasp mutualism - <https://www.pnas.org/doi/abs/10.1073/pnas.0501840102>

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CORNER

NATURE

FIREFLY FANFARE



Jason Goldman, Park Naturalist

Fireflies are such a fascinating group of insects. Filled with wonder, these bioluminescent beetles have inspired both children and adults alike throughout the centuries.

Firefly Fact Check

Fireflies, also called lightning bugs, have been on Earth for an incredibly long time, 99 million years to be exact. First appearing in the fossil record during the Late Cretaceous Period, these insects belong to the family Lampyridae, which is part of the beetle group Coleoptera. Today, there are over 2,200 species of fireflies found throughout the world's temperate and tropical regions. Currently, 165 of those species have been found within the US alone, showing preferences for wet environments such as marshes, swamps, and wet meadows.



Common eastern firefly (*Photinus pyralis*)

Lightning Bug Life Cycle

Throughout their lives, fireflies undergo a transformation known as complete metamorphosis. This phenomenon includes four life stages: egg, larva, pupa, and adult. Fireflies share this trait with many other beetles, as well as butterflies, bees, and ants. Other insects, such as grasshoppers and dragonflies, exhibit incomplete metamorphosis which only includes the egg, nymph, and adult life stages.

As larvae, lightning bugs are limited to life on the ground simply because they have not developed their wings yet. This stage typically lasts for just a few weeks, but some species like the Common Eastern Firefly, persist in their larval form for two years!



Firefly larva

DID YOU KNOW - All firefly species glow in their larval stage, but not all of them glow as adults.



Firefly larva feeding on snail

During the larval stage, the firefly is a fearsome predator. Don't let these beautifully illuminated insects fool you, once they hatch, they are on the hunt. With their mighty mandibles, they catch prey and inject them with a paralyzing neurotoxin. Then, just like with spiders, they inject their quarry with digestive enzymes, liquifying the internal organs. If this sounds a little too intense, don't



Winter Firefly *Photinus corruscus* overwintering on a tree

worry, fireflies are only interested in small prey such as snails, slugs, and other insect larva. In fact, gardeners should celebrate these predators as they help keep pest populations away from their vegetables.

The pupal stage has a lot less going on for itself by comparison, primarily because they do not eat. They don't have to since this part of the life cycle is a transition state towards their final form. Once the larval firefly finds a tree crevice or rotting log to hide in, they pupate for a couple of weeks until the transformation completes.

DID YOU KNOW - Most firefly species overwinter as larva, although the aptly named Winter Firefly lays dormant as an adult.

Adult fireflies are the most charismatic of the bunch. They fly, they glow, and some even pollinate our flowers! Now you might be wondering, how do scientists group the thousands of species of fireflies. This is where their adult stage comes into play. When looking at the Lampyridae family at large, it can be divided into three groups based on their adult form. The most well-known group is comprised of the flashing fireflies. Another group contains daytime dark fireflies, aka non-glowing adults. The third group has larviform females, also called glow-worms, that glow but are flightless and more so resemble larva.

DID YOU KNOW - In the US, eastern species exhibit significantly more adult bioluminescence, whereas species west of the Mississippi River are mostly comprised of daytime dark fireflies and glow-worms.

Generally, adult fireflies only live for a few weeks. Once they emerge in early summer, they take life on the wing in search of mates. Time is often of the essence as many firefly species don't even have mouths as adults! Those that do, however, have diversified their diets. Some adult fireflies act as pollinators, consuming nectar from wildflowers, whereas others remain carnivorous and eat other insects.

It's worth noting that in the genus *Photuris*, the female fireflies exhibit a deadly form of deception. These femme fatales use their bioluminescence to trick and lure in the males of another firefly genus, *Photinus*. Before the mistaken suitors realize the truth, the cunning hunters have secured their next meal.

Glorious Glows



Fireflies at night

only much further down the evolutionary line where fireflies found a new use for bioluminescence, attracting mates.

So how does it work? Thanks to a unique light-emitting organ, fireflies produce a special enzyme called luciferase. This combines with magnesium ions, ATP, and oxygen to produce the light we're familiar with. Despite the bright appearance, firefly glows are a cold light meaning they produce no heat. Color can vary by species, ranging from yellow, to green, and even a pale red.

It's a little-known fact that bioluminescence in lightning bugs first evolved as a warning to predators. This trait is an aposematic warning. By glowing, the insects could advertise the fact that their bodies were filled with distasteful compounds called lucibufagins. It was

When it comes time to show off, not all glows are the same. The males of the genera *Photinis*, *Photuris*, and *Pyrractomena* all have distinct patterns which set them apart from other species. These differences are achieved by varying glow frequency, duration, repetitions, direction, as well as by how high off the ground they occur. The females may then respond through a combination of glowing and pheromone signals. Speaking of pheromones, the daytime dark fireflies rely exclusively on these chemical signals to find one another simply because the adults don't glow.

DID YOU KNOW - Doctors and scientists can use luciferase to detect the presence of ATP or magnesium.

Challenges Ahead

Whenever we run night programs in the parks, we inevitably hear from park goers that they see less fireflies. Unfortunately, this seems to be all too common across the world. Multiple factors have led to population loss for our firefly friends.

Habitat loss is a major component in firefly decline. Each year, as more and more natural areas become developed, these bioluminescent insects become displaced. Additionally, the excessive pesticide use in lawn care takes a huge toll on fireflies. Many of the same chemicals that target pests like mosquitoes also target fireflies. Light pollution is another factor in our modern world. Artificial lights confuse all nocturnal animals not just the firefly. Lastly, invasive plants have created a stronghold within New Jersey. These exotic species outcompete our native flora while providing little to no support for fireflies and many other creatures.

Now that we have addressed the challenges, it's worth noting that these issues also contain their own solutions. By preserving natural lands, using pesticides sparingly and responsibly, switching over to wildlife friendly lights, and removing invasive species in our landscapes, balance can be restored to our ecosystems. Future generations will absolutely enjoy the unforgettable sight of a summer meadow dancing with lights, we just have to lend nature a hand and let it heal.



Meadow at Weltz Park

Work Cited

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- 4) Photo by Jason Goldman at Tatum Park
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- 6) Photo by Maribeth Gardner at Weltz Park



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Did You Know?

Fun Facts

- **Pioneers in the Field:** In 1994, the Monmouth County Park System became the first Park & Recreation agency in the U.S. to earn CAPRA accreditation—and they’ve held it ever since.
- **From Small Beginnings:** The system began in 1960 with just 24 acres from the Garden State Parkway project—now Shark River Park spans 991 acres.
- **Vast & Varied Lands:** Today, the Park System manages over 18,000 acres across 43 parks and golf courses, including forests, wetlands, gardens, and historic sites.
- **Thousands of Programs:** About 5,000 recreation programs are offered annually, covering all ages and a wide range of interests.
- **History Comes Alive:** Explore the 1890s at Historic Longstreet Farm or 200+ years of rural life at Historic Walnford, both featuring period settings and interpreters.
- **Dig for the Past:** Big Brook Park in Marlboro is a fossil-hunting favorite where visitors can search for ancient remains.
- **Accessible for All:** Programs like RecAssist offer discounts and free access to ensure all residents can enjoy recreation, regardless of income.
- **Miles of Trails:** With 145+ miles of trails, the parks are perfect for hiking, biking, and soaking in nature.
- **Wildlife Wonders:** From digger bees to flycatchers, the parks are teeming with life—check out “Nature Now” for the latest sightings and species highlights.

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