MONMOUTH COUNTY PARK SYSTEM
GREEN HERITAGE
The Newsletter of Monmouth County's Open Space, Parks & Recreation Agency
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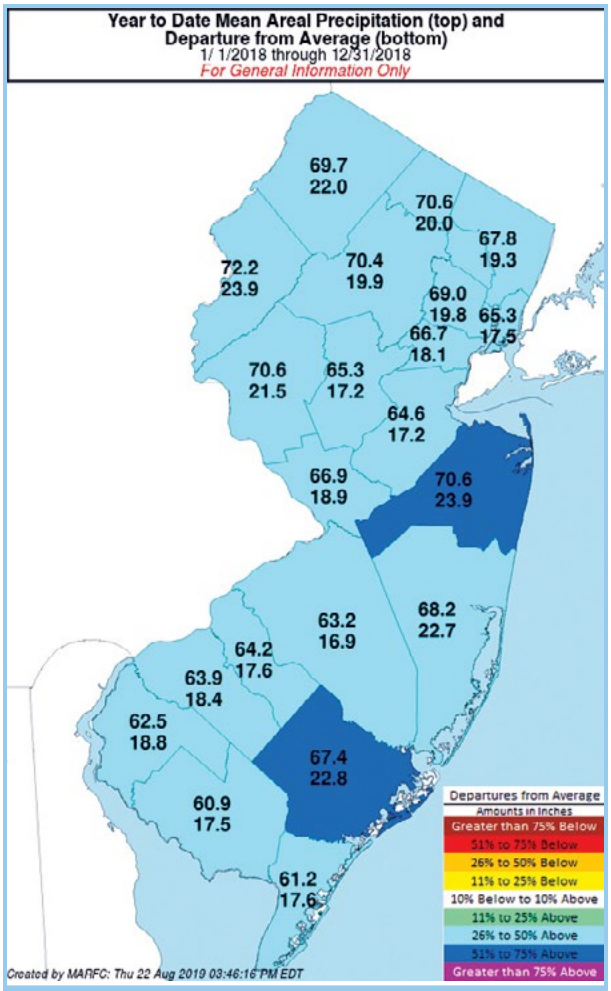
WHERE DOES ALL THE WATER GO?



NJ Rainfall levels were above average in 2018.
Source: weather.gov/marfc/precipitation_departures

Last year, 2018, was NJ's wettest year on record. Monmouth and Atlantic Counties in particular experienced a 51-75% increase in rainfall above average—the largest in the state. Given all that precipitation, we thought now might be a good time to point out some of the efforts we undertake to control, manage, re-route and plan for excess rainfall. You might not think that's necessary with all this open space, but there are consequences to too much rainfall, even in the parks.

Excess spring rainfall caused flooding at **Turkey Swamp Park** a few years ago. Park fields and walkways were affected, and flooding shut down access to the lake, and all associated activities (fishing, boating, etc.)

With nearly 500 buildings and structures on the county's 43 park properties, there are many roofs that can leak, gutters that can clog, and basements/ crawl spaces that can flood. But even more importantly, if we don't manage excess runoff on the ground, it can cause widespread damage throughout the parks.

Storm water flooding can immerse parking lots and roadways, making driving unsafe and damaging infrastructure like the pavement and concrete. Flooding can also carve up natural surface roads and trails, as well as damage playground surfaces, ball courts and golf courses requiring us to close down for costly repairs. Too much rain can also disturb fields, gardens and waterways (streams, ponds, lakes, etc.) disrupting plants and wildlife habitat. Many destructive molds, fungi, invasive weeds and insects thrive in excess moisture.

Roads and trails can erode following excessive rainfall. Pictured, **Shark River Park** (above) and **Huber Woods Park** (right)

Streambanks can erode from too much stormwater flowing in too fast and super-saturated soil. The resulting cloudy, turbid water is of lower quality and that's bad for fish and wildlife. The water may also contain minerals from eroded soil or contaminants from stormwater that disturb the ecosystem (eg. algae bloom). This is especially critical when these streams feed our drinking reservoirs. Pictured, an eroded streambank at Ramanessin Brook in **Holmdel Park** (left) and in **Shark River Park** (right).

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Capturing Run-off: Drainage Basins

Drainage basins are among the most common stormwater management features found in the parks. You can spot them next to all our new and recently renovated parking lots and access roads (you may also notice them in your neighborhood/town). They have been required by the state since 2004 in response to environmental problems caused by rapid development.

Any time you add a paved road or parking lot in the parks, you create a new impervious surface–one that prevents rainfall from seeping naturally into the ground to replenish underground aquifers.

'Slow the Flow' panels like these were posted at **Holmdel Park** help to explain newly installed stormwater management features.

Prior to 2004, runoff was often routed to the nearest stream or water body. But by the 1980s and 1990s, heavy development in NJ began exceeding the capacity of our waterways to absorb all this runoff. The excess stormwater caused flooding and a host of associated environmental problems, such as streambank erosion and pollution (runoff collects garbage and chemicals along the way, depositing them into our waterways).

So today, any time we pave the ground (i.e. add impervious surface over a certain amount), like when we build a new parking lot or expand an existing one, we also build a stormwater management structure nearby to contain the extra runoff until it can percolate into the ground.

Our newest drainage basin next to the renovated parking lot at Rocky Point in **Hartshorne Woods Park**, during construction 2019. The concrete headwall (background) is where runoff from the lot above empties. The concrete box (foreground) is an overflow feature to help drain away any extra water.

Next time you are at Deep Cut Gardens, the Rocky Point section of Hartshorne Woods Park or driving through Thompson Park look for the adjacent stormwater drainage basins. They will appear as large indentations in the ground, often surrounded by plants. Excess water is collected through drains around a building, road or parking lot then routed into each basin over land or underground through a series of pipes.

A new bio-filtration basin next to the renovated parking lot at **Deep Cut Gardens**, during and after construction 2018. Plantings help improve water quality by filtering pollutions before water seeps into the ground.

Thompson Park has a series of drainage basins located on either side of the main road. During the record rainfall last autumn, they all filled and stayed full for some time.

Trailside Water Controls

You might also notice stormwater control features on or near the trails, especially in parks where there is already a lot of water. In the first two examples the repairs shored up a stream bank to support a nearby trail bridge.

The heavily eroded Ramanessin Brook streambank in Holmdel Park (pictured on p. 1) was stabilized in 2013 with tree stumps and rocks. A special rock vane feature was also added to direct the flow of water away from the streambank. These repairs were part of a much larger remediation project at multiple sites along the Ramanessin Brook to reduce pollution, because the brook flows into the Swimming River Reservoir (a drinking water source).

Streambank erosion repairs along the Ramanessin Trail in the south section of **Holmdel Park**, 2013.

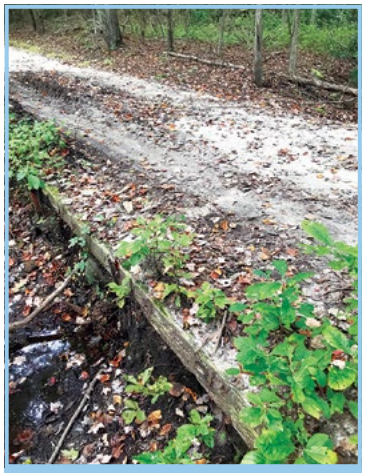
In 2015, another heavily eroded streambank was repaired with rock-filled cages called gabion baskets in Shark River Park.

Streambank erosion repair, just off the Bridge Loop in the northernmost section **Shark River Park**, 2015.

As former railroads, the 21-mile Henry Hudson Trail and 9-mile Union Transportation Trail were built to travel over various streams and waterways. They do this via underground culverts that let water flow underneath. These culverts are repaired as needed due to wear and tear or during initial construction of the trail.

A culvert running beneath the **Union Transportation Trail**, replaced in 2009.

Not all culverts are large and obvious. In Shark River Park, the Hidden Creek Trail is named for the creek that flows underneath. You have to look closely if you wish to see where it crosses, as these culvert pipes are much smaller and often obscured by mud, vegetation and the trail itself.



Here's one spot where the Hidden Creek Trail crosses over the creek in **Shark River Park**.

A water bar is a classic control feature found along many park trails, installed where there's enough water flowing after rainfall to cut in and damage the trail. A water bar is made when one or more thick branches or wood beams are cut in and placed right across the trail to route water off to the side.

Volunteers dig a trench to install a wood beam reinforced with heavy Belgian blocks to re-route water along the road and away from the trails at **Huber Woods Park**.

This kind of trail engineering takes special training and is often performed by the experts on our Volunteer Trails Team. They are shown installing water diverting features last spring to improve runoff that damaged some trails at Huber Woods Park.

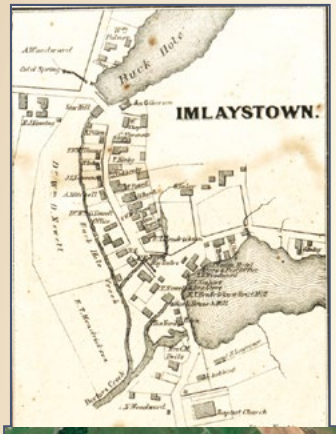
Volunteers install a water bar along a trail at **Huber Woods Park**.

Layers Of History At Clayton Park

Kristen Hohn, Historic Preservationist

The Lincoln Legacy

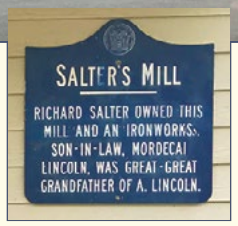
Born in a log cabin in 1808, Abraham Lincoln is often spoken of as one of our best presidents; certainly, the president from the most humble beginnings. Yet years before the Lincoln family moved to Kentucky, several direct descendants called Monmouth County their home.



This Imlaystown map (1861) shows a productive mill village with many shops and craftsmen. Note the winding Main Street along Buckhole Creek and Imlaystown Lake (lower right). Map: Beers S.N. & F.W. Beers .

Wheelwright shop in Imlaystown, (1912). PHOTO: Courtesy of Randall Gabrielan.

Current view of the winding main street.



Imlaystown town center current veiw. The Happy Apple Inn was the site of a tavern that burned during a 1897 fire. The current structure was built c. 1915. The Upper Freehold Municipal Building was constructed at another site in 1898 after the fire and moved here a few years later. The Salter's Mill burned to the ground in the fire, but was rebuilt on its old foundation the following year. The name Salter's Mill is kind of a misnomer because the original mill (circa 1690s) is no longer standing.

Historic Imlaystown sits just northwest of Clayton Park in Upper Freehold. The small map inset (1873) shows the site of an iron forge once located inside the park, operated by President Lincoln's great-great grandfather Mordecai Lincoln and his brother Thomas. Map inset: Old Forge Imlaystown. New York: Smith, Gallup & Holt.

In the late 1690s Richard Salter had purchased 2,100 acres of land near Doctor's Creek and formed the small village of Imlaystown.[2] It developed as a rural mill village; farmers could take corn and grain to the local gristmill to be ground into flour. The town also had a sawmill which processed trees from abundant local forests into lumber to build local houses and barns.

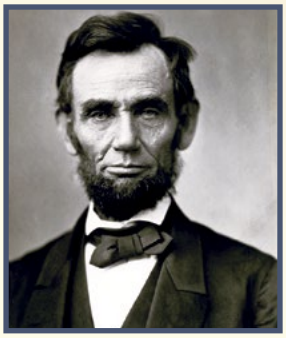
In 1714, a young blacksmith from Massachusetts named Mordecai Lincoln married Hannah Salter, the daughter of Richard Salter and Sarah Bowne of Upper Freehold, New Jersey.[1]

Colonial villages like Imlaystown were situated inland away from coastal trade routes, so they required skilled craftsmen like weavers, furniture makers, and blacksmiths to make their everyday items. In 1716, an iron forge was established here, one of the first in the nation.[3] Mordecai Lincoln was a second generation smith who operated this forge with his brother Thomas. The forge's depiction on historic maps indicates that it was possibly located inside the present boundaries of Clayton Park.[4]

PHOTO: Stephen Lignowski, Find-A-Grave.com (used with permission)

Mordecai and Hannah gave birth to a son, John Lincoln, in 1716. Their second child, Deborah, died tragically at the age of 3 in 1720. Her tiny headstone is still visible at the Ye Olde Robbins Burial Yard just up the road from Clayton Park. As an adult, John moved his family to Virginia in 1748.

John Lincoln's son Abraham (President Lincoln's grandfather) worked as a tanner in Virginia on frontier lands which were in dispute with a local Native American tribe. In 1786, the farm was ambushed by a band of warriors and Abraham was shot and killed. His youngest son, five year-old Thomas, was nearly captured but was saved by his older brother.[5] Abraham's widow moved the family to Kentucky, where Thomas would grow up to marry Nancy Hanks and father a son named Abraham, our sixteenth president. The rest, as they say, is history.



Abraham Lincoln, US 16th President, had family who lived in Monmouth County near Clayton Park. PHOTO: Alexander Gardner, wikicommons

The American Revolution

In the days of the Revolution, Imlaystown was located on the primary route between Philadelphia and New York Harbor. In 1775, a meeting was held to discuss what was to be done about the British. Loyalties in the village were split.

County Sheriff Elisha Lawrence soon revealed his allegiance to the crown when early conflict developed into full-scale war. He rallied approximately 500 men from around Imlaystown to join the New Jersey Volunteers, a loyalist regiment stationed on Sandy Hook.[7]

In 1778, the British were evacuating Philadelphia with Washington on their heels. They traveled diagonally through Monmouth County on their way to New York City, camping out near Imlaystown on June 24.[8] The Continental Army caught up with them four days later on June 28 at Monmouth Court House in Freehold, and there they fought the Battle of Monmouth.

George Washington at the Battle of Monmouth. PHOTO: wikicommons.

Native American Travel Route

Beyond national historic themes, the local history of Imlaystown is interesting, too. The area along the Doctor's Creek, including Clayton Park, was once a migratory route for both Archaic and Woodland-era Native Americans beginning around 8,000 BCE.* Small bands would travel to coastal regions during the warmer months to harvest marine resources returning westward as the weather cooled.

The winding road through the Village of Imlaystown, once called the "most crooked Main Street in America," is said to have been based on a Native American trail which followed the meandering banks of Buckhole Creek.[9] Many temporary campsites from this time have been identified with intact "caches". Caches are shallow pits to bury tools and other useful items, to be retrieved later. They were useful to people traveling back and forth along the same route.

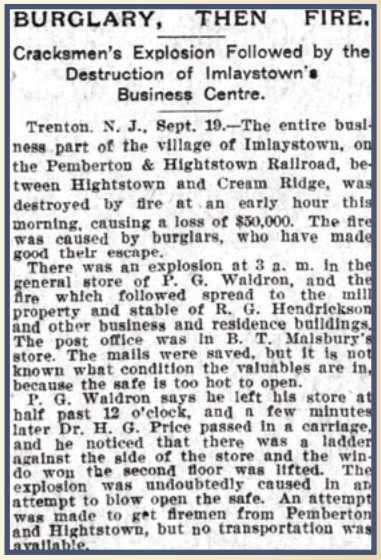
Projectile points from a site a near Doctor's Creek. PHOTO: Dr. R. Michael Stewart (used with permission)

By the late 1700s, most of the Lenape Indians who originally occupied the region had moved west, or south to the reservation at Brotherton in Burlington County.

Railroad, Then Fire Brings Change

By the mid 1800s, Imlaystown was one of the larger villages in the area. There were three mills, three wagon shops, a blacksmith shop, tannery, tavern, and several stores. However, when the Pemberton & Hightstown Railroad was built, the Imlaystown station was constructed nearly a mile outside town. The inconvenience drew business away to neighboring villages that had stations right in town.

Disaster struck in September 1897 when a fire tore through the business district. A newspaper reported the cause as a burglary attempt in which the thieves tried to blow up a safe in the general store, but instead set the building on fire. [11]



BURGLARY, THEN FIRE.

Cracksmen's Explosion Followed by the Destruction of Imlaystown's Business Centre.

Trenton, N. J., Sept. 19.—The entire business part of the village of Imlaystown, on the Pemberton & Hightstown Railroad, between Hightstown and Cream Ridge, was destroyed by fire at an early hour this morning, causing a loss of $50,000. The fire was caused by burglars, who have made good their escape.

There was an explosion at 3 a. m. in the general store of P. G. Waldron, and the fire which followed spread to the mill property and stable of R. G. Hendrickson and other business and residence buildings. The post office was in B. T. Maisbury's store. The mails were saved, but it is not known what condition the valuables are in, because the safe is too hot to open.

P. G. Waldron says he left his store at half past 12 o'clock, and a few minutes later Dr. H. G. Price passed in a carriage, and he noticed that there was a ladder against the side of the store and the window on the second floor was lifted. The explosion was undoubtedly caused in an attempt to blow open the safe. An attempt was made to get firemen from Pemberton and Hightstown, but no transportation was available.

Local papers covered the 1897 fire that destroyed Imlaystown business district.

The town did not have its own fire department, instead a bucket brigade hauled water from the millpond to fight the blaze. The fire was only stopped when a blazing tree was felled alongside the butcher shop. The town rebuilt after the fire, but today faces a new struggle. Failing infrastructure along Buckhole Creek prevents many buildings in the Historic District from getting a certificate of occupancy. Despite this challenge, the village retains much of its historic charm and is well worth a visit.

*BCE=Before the Common Era (formerly known as BC=Before Christ)

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Winter Is Coming...

Ruth Carll, Naturalist

Few local plants can continue growing through the cold and freezing temperatures of winter. Let's explore what plants experience as they prepare for winter, and what care we can provide to help them survive. There are three "lifestyle" strategies plants will employ to get through winter, each requires a different type of care between now and November.

Evading Winter – The Perennials

The first winter strategy plants employ may be to ***evade*** inhospitable temperatures by going dormant. In the animal world, hibernation is an example of this strategy. Plants that do this are perennials. When preparing for dormancy, a few important things need to happen in the correct order.

As winter approaches, the days shorten, the light changes and trees drop their leaves.

Between now and November, perennials like trees and shrubs are sending as much sugar as they can to their roots for storage. Therefore, it is important to encourage root growth by fertilizing with a high phosphate, low nitrogen and potassium fertilizer. The middle number on the fertilizer package is phosphate, so look for a 0-20-0 or 5-10-5 mix and fertilize now. Follow the instructions on the package as more is not better when it comes to fertilizer.

With the focus on root growth, plants will stop producing new leaves and instead survive on the sugar produced by older leaves. While trimming, make sure to leave any green leaves on the plant so it can produce as much sugar as possible with these last-of-the-season leaves. Leaves that have completely died back to yellow or brown can be removed. Seed heads can also be cut off, although leaving them will provide food for birds as they prepare for winter as well.

Tie up winter grasses to keep the base from freezing.

Once the plant has gone completely dormant, you can remove twigs, stems and leaves reducing the chance for fungus to get a foot hold and infect the dormant root system. An exception to this rule is bunch grasses. Removing the dead grass reduces the insulation that keeps the base of the grass from freezing. Instead, tie up this portion or leave about a foot of dead grass to help prevent winter grass death.

Fall is the time for clearing out landscape beds and trimming back trees for winter. These expert Pruning/Garden Volunteers show us how it's done.

September to early October is the best time to plant trees and shrubs. It is important to plant them early enough to establish roots before going dormant. It is a common misconception that you plant in fall soley to provide a cold shock. This leads to planting too late, and not allowing time to establish before going dormant. Many of these plants will die as they won't have roots to sustain them or to help them break dormancy in spring.

By early fall, perennial coneflowers have gone to seed (upper left) while the late flowering sedum (light pink) and goldenrod are still in bloom.



Dozens of new trees and shrubs were planted at Deep Cut Gardens last fall to fill in the landscape after the parking lot expansion and walkway renovations.

Escaping Winter – The Annuals

The second strategy plants employ to survive winter is to ***escape***. In the animal world, this would be migration. In the plant world, this is "going to seed" and therefore most plants that use this strategy are annuals.

Annuals already invest fewer resources in their bodies. Instead, they use most of the food they make to produce flowers, and thus seeds, ensuring the next generation. This explains why annuals are such heavy bloomers compared to perennials that invest in their "bodies" first and flowers second.


Celosia is the perfect example of a fall annual that has invested more heavily in its flower, versus its body.

At the end of the season, let your spent flowers go to seed. If you want your annuals to reseed, you must allow this final round of blooms to go through to seed. Seeds can survive freezing winter temperatures in the soil due, in part, to their high oil content. They also produce a water-soluble hormone which inhibits germination. When enough thawing snow and spring rains wash out the hormone, the seeds are no longer inhibited and sprout. This ensures that the seeds don't sprout until spring has sprung!

Enduring Winter – Evergreens

The final strategy to survive winter is to ***endure***. Perennials that endure the winter have a slow metabolism, but remain active. Evergreens are examples of endurers. These plants have specific needs in the fall, because they must go into winter as healthy as possible in order to thrive.

Evergreen needles encased in ice are not frozen–the liquid in their cells is too concentrated with salts and sugars to freeze.

This healthy evergreen, a Japanese Fir, will endure winter by slowing down.

Evergreens are metabolically very slow. They survive mostly on water and nutrients they have already stored. In order to prevent freezing, their cells produce extra sugars and a chemical "botanical anti-freeze" that makes the contents of their cells too concentrated to freeze, even in below freezing temperatures. Because of this, you don't want to overwater evergreens, because it raises the water content in their cells and possibly induces freezing.

Also, do not apply fertilizer. Applying a fertilizer now would induce new leaf or shoot growth, and that would be a mistake because new leaves and shoots are NOT prepared for winter and will likely die. If there is a cold snap before the plant has a chance to harden off, the plant could die, even though it could have survived the same low temperature once the acclimation process had finished.

Leaves In Autumn Work Two Full-Time Jobs

Leaves have two primary jobs: short order cook and traffic cop. Each has an impact on why leaves change color in the fall.

In the first role, leaves are excellent sugar-making, short order cooks. They take energy from sunlight to "cook" water and carbon dioxide into sugar. To make as much sugar as possible, they must collect every bit of sunlight they can. Plants only use blue, green and red light to make the sugar and since each color of light moves at a different speed, you need a different "net" to catch each one. In leaves, these nets are called pigments.

- The first pigment group—carotenoids—are orange to yellow. Their job is to catch blue light.
- The second pigment group—anthocyanins—are pink to red. Their job is to catch green light (and some blue).
- The third pigment is chlorophyll; this "Hulk" of pigments is green. It's job is to catch red light. Because it is so big and plentiful, chlorophyll covers up most of the other pigments most of the year, which is why leaves usually appear green. That is, until fall.

This oak leaf is transitioning from green to yellow to red. Leaves contain color pigments throughout the year, but most aren't visible until fall.

When the short-order cook is busy catching light and making sugar in the kitchen, the second role of traffic cop is keeping the delivery of nutrients moving, carrying supplies from roots to leaves, and sugar from the leaves to the rest of the plant. A traffic jam could be deadly! The traffic cop does its job by opening and closing the stoma, little openings on the surface of leaves–like opening and closing a bridge–to control the flow of chemicals.

Changing Fall Colors

As winter approaches, it gets too cold to make sugar and chemicals won't be moving around much, so both the cook and cop will need to be let go. It's actually more harmful to keep leaves in winter, so many plants will drop them altogether before going dormant. Changing color is part of this process.

This large poplar leaf successfully changed from green to yellow before falling to the forest floor.

A plug forms where the leaf meets branch and the stoma close, cutting off the nutrient supply. Without any use for the light collected, the pigments overheat and burn off. The busiest pigment (chlorophyll) dies off first, revealing the underlying pigments that were masked: orange, yellow and red. But these won't last long either; without energy to sustain them, the whole leaf will eventually turn brown and fall off.

TRY THIS UNUSUAL FALL-BLOOMING NATIVE

There are many familiar plants that bloom in autumn: montauk daisies, cone flowers, goldenrod and anemone. Annuals such as pansies and amaranth are also common fall bloomers. But have you ever considered a thistle for your fall landscape? You are probably thinking this is a crazy idea–thistles are sharp and nasty plants! But, they are also one of the most important native fall flowers in our region. Planting a few in your yard will bring many birds and insects to visit, and may introduce a different kind of beauty into your landscape.

Tall Thistle

Consider **Tall Thistle** (***Cirsium altissimum***) which lives up to its name by growing up to seven feet in height. It can tolerate full sun to part shade and doesn't mind moist soil. It is a biennial which means that the first year it doesn't flower, and the second year it flowers and dies. The trick is to plant it the first year with seeds alongside the mature plant. This will begin an alternating cycle and provide blooms each year. This thistle is not as thorny as most, and can be touched by bare fingers and skin.

The flowers of Tall Thistle are typically pale purple, but they can also be pink or white. The thistles are medium sized and long lasting. The flowers attract a wide variety of pollinators, including bumblebees, long-horned bees, swallowtail butterflies, many beetles and caterpillars. The seeds are favorites of many bird species, such as goldfinches, sparrows, and indigo buntings.

Fall Events & Programs

Deep Cut Gardens will host a variety of landscape and propagation classes this fall. Also this season, craft classes such as Living Succulent Wreath, Pine Needle Basketry and Introduction to Felting are available. See the Fall Volume of our ***Parks & Program Guide*** for a complete list of opportunities.

Save the Date: Great Fall Perennial Plant Swap

Saturday
September 21

NATURE CORNER

Carnivorous Plants of NJ

Blake Beyer, Park Naturalist

To most people the term carnivorous plant conjures images of the Carolina native Venus flytrap with its mouth-like leaf that snaps shut at the slightest touch. But carnivorous plants encompass so much more than just this one species.

Carnivorous plants are not solely tropical, nor are they only found in the depths of a remote rainforest. They are found on every continent except Antarctica and in every climate–from the sweltering heat of the equator to the frigid Arctic Circle. New Jersey alone is home to three families of carnivorous plants, containing 19 distinct species.

Why & How Some Plants Eat Bugs

All plants need nutrients such as nitrogen and phosphorus to grow properly. Most get all the nutrients they need through an extensive root system, absorbing it directly from the soil. But carnivorous plants are different. Almost all of them have small, under-developed roots. This is because they are naturally found in areas that lack the nutrients required for plants to grow. With no nutrients in the soil to absorb, a large root system becomes obsolete.

These plants must look elsewhere for nutrition…but they needn't look far! Insects are chock full of the nitrogen, phosphorous and other vital micro nutrients that plants need to grow. Getting their nutrients from an outside source allows these plants to survive in areas where most other plants can't. This means there is less competition and more room to grow.

There are several methods plants use to catch their lunch or dinner. Plants in the active group typically have traps with cups or tentacle-like stalks that physically move or snap shut. Think of the Venus flytrap with its moving "mouth parts." Plants in the passive group are stationary; they rely on pitfall traps or sticky leaves to catch and hold onto insects. In both cases, these traps are modified leaves that have evolved to capture insects, digest them and absorb their nutrients directly into the plant.

Meet the Common Sundew

Sundews are a widespread type of carnivorous plant, with relatives found on six different continents. They belong to a large family called Drosera, which contain over 190 carnivorous relatives![1] These plants range from the tiny, two inch dwarf sundew (*Drosera brevifolia*) all the way up to the nearly 4-foot tall giant sundew (*Drosera magnifica*). New Jersey has three different species of sundew: Round Leaf, Spatula Leaf and Thread Leaf. All three are found in bogs throughout the state, hiding amongst cranberries and sphagnum moss.

*Round Leaf Sundew (*Drosera rotundifolia*), Freneau Woods Park.*

*Thread Leaf Sundew (*Drosera filiformis*), Pine Barrens Bog PHOTO: H&M Ling, NJ Native Plant Society (www.njnps.org).*

Spatula Leaf Sundew, two variants: Drosera linearis *PHOTO: Reuven Martin, wikicommons* and Drosera intermedia *at Manasquan Reservoir.*

They all use sticky, tentacle-like appendages to capture their prey. These appendages are small stalks, covered in a sweet, gel-like substance that attracts insects, and then trap them. When an insect lands on the sundew, enticed by the sweet smell and promise of an easy meal, they find themselves helplessly stuck there by hundreds of tiny little glue traps. Many species of sundew will then close its leaf around the ensnared insect, further trapping it.

The tentacles of sundew species are covered in a sticky, sweet gel that attracts and traps insects. PHOTO: wikicommons

Once the insect is fully captured, the plant will begin its digestion process first by releasing enzymes to break it down. As the insect dissolves, the plant takes up the nutrients through the surface of the leaf. Amazingly, these plants seem able to distinguish between an insect and, say, a random piece or dirt or debris that also got caught. If a piece of dirt is stuck, the plant simply won't respond—it won't wrap its leaves or release any digestive enzymes. Instead, it will remain dormant and unfurled, conserving its resources and waiting for the next rain to wash the leaf clean, and prepare it for its next unsuspecting meal.

Pitcher Plants

"Pitcher plant" is a general term used to describe several families of carnivorous plant that all use the same, pitfall-type trap. These include: Nepenthes, Sarraceniaceae, Cephalotus, Heliamphora, Darlingtonia and some species of Bromeliaceae. In total there are about 200 species in these families.[2]

Pitfall traps collect rain water in a cup-shaped leaf. The cup is then used to passively trap insects. Many species also produce a sweet-smelling nectar on the inside edge of their pitcher cup, to lure insects to the trap. Once an insect lands on the rim of the pitcher, a slick waxy coating makes it difficult for them to hold on, and they slip and then fall into the water below.

NJ Native Purple Pitcher Plant (Sarracenia purpera) PHOTO: wikicommons

Flower of the Purple Pitcher Plant, Manasquan Reservoir.

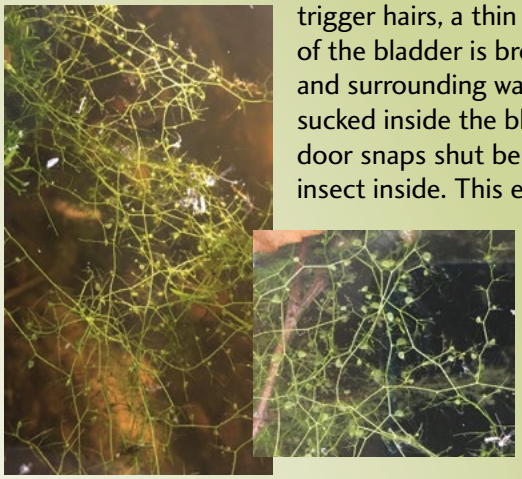
To make sure their buggy meal can't escape, plants like the NJ native Purple Pitcher Plant (*Sarracenia purpera*) have small, downward facing hairs lining the inside of the pitcher. These hairs make it very difficult for an insect to make its way back up and out of the pitcher. Once inside, the insect will be broken down by enzymes in the water and absorbed by the leaf.

Downward facing hairs on the Purple Pitcher Plant, Manasquan Reservoir.

Bladderwort

Bladderworts belong to the largest family of carnivorous plants called Utricularia, containing over 200 species.[3] Members of this family either live in water, or in soil that is permanently saturated. Although bladderworts are not nearly as well-known as the Venus flytrap, they have their own claim to fame as the fastest plant in the world!

Bladderworts are named for hundreds of small, bladder-like chambers found growing along its stalk. Each bladder has a small "trap door" set to snap closed following even the slightest touch to one of its trigger hairs. When a small aquatic insect is unfortunate enough to swim by one of these trigger hairs, a thin wall on the front of the bladder is broken. The insect and surrounding water are then sucked inside the bladder, and a trap door snaps shut behind, locking the insect inside. This entire process takes less than 1/100 of a second, that's more than 30 times faster than you can blink an eye.[4]



Bladderworts grow near the surface of a pond near the Manasquan Reservoir Environmental Center.

All of the 15 species of bladderworts native to NJ are entirely aquatic. They can be found growing close to the surface of bogs, ponds, and lakes in large mats in late summer. The traps are not much larger than a small freckle, so they are often mistaken for fish or frog eggs as they darken with age.

Yellow flower of the bladderwort, Manasquan Reservoir.

More Fun Facts

Carnivorous plants are incredible examples of evolutionary adaptation. They even fascinated the mind of Charles Darwin during development of his famous theory. You can learn more by visiting the soon-to-be completed ***Floating Bog Exhibit*** at the Manasquan Reservoir in Howell (anticipated completion in late 2019). It will feature five native carnivorous plants. If you can't wait until then, attend one of our *Carnivorous Plant Terrarium Builds* scheduled for September 21 and October 5, 2019. You can create your own habitat to bring these botanical curiosities into your own home.

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GREEN HERITAGE

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Water Management Strategies

A bio-filtration basin captures and filters run-off from this parking lot at Shark River Golf Course for improved water quality, culverts help route water from the paved trail and parking lot at Dorbrook Recreation Area.

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