MONMOUTH COUNTY PARK SYSTEM
GREEN HERITAGE
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Winter Adaptations & Survival Tactics

Zack Karvelas, Assistant Public Information Officer

As the temperature drops, the world around us changes. Many animal species head south in search of warmer weather and more food. Others start to store a food supply to last them through winter as they prepare for a long seasonal snooze. From plants to animals, businesses and industries, to us humans and even our parks, everyone and everything has its own unique way of transitioning between the different seasons and figuring out ways to cope.

For us, colder temperatures and albeit increasingly less seasonal snowfall and wintery weather can have a deep impact on our moods and behaviors. Certain tasks or habits become more difficult to do. Due to more daytime with less sunshine, the lack of vitamin D can have a severe impact on our mental wellbeing. Focusing on the things that work for YOU throughout each season can help keep things from becoming overwhelming and stressful during the colder months and holiday season.

Plants/Trees

Outside, the transitional stages of our surroundings become more apparent. Our walkways and sidewalks become covered in the falling leaves and our gardens start to wind down production and become desolate hideaways and shelter for smaller creatures.

Whether it's an indoor or outdoor plant, the winter season has its effects on both. Considering the fact that water contributes about 80%-90% of a plant's total weight, it's important to understand how this season and the changes in temperature play a role in the behavior and survival tactics of some of our favorite leafy friends, both inside and out.

The drop in temperature signals to deciduous trees that it is time to halt production of chlorophyll, drop their leaves and go dormant for the season. This adaptation allows trees to make it through winter until next spring, when they will bud and flower and grow new leaves. Non-deciduous plants, such as conifers, don't need quite a drastic shift as they maintain their needles during winter since the waxy coating helps to conserve water year-round. Perennial plants completely die off on the surface, but underground their roots are tucked away and kept warm even during the harshest frosts until they regenerate in the spring. Indoor plants typically hail from the tropics and therefore are not used to New Jersey winters. It's important to keep them in a warm, humid environment during colder months. All our local wildlife species have different adaptations to help them survive the winter, too! Let's take a look at just a few.

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Sugar maple tree at Thompson Park.

Birds


A group of semipalmated plovers and semipalmated sandpipers at Shark River Inlet.


A pair of hooded mergansers.

Birds have a few different survival strategies to survive the winter. Most of our birds are smart about it, however, and decide to migrate. This is when they make a great migration from one place to another, in this case in search of easier access to food and warmer weather. In colder weather, since birds are endothermic (warm-blooded), they must expend a lot of energy to keep warm. Just like us, they get their energy from food. Birds mostly eat seeds and berries and small insects. As will be discussed later, insects typically die off in the winter, or burrow deep into trees and rock crevices and leaf litter. Berries and seeds are much harder to find in the cold winter months because plants try to keep them more protected, so they survive the cold weather and produce new plants in the spring. With less food to eat, and therefore less energy to keep warm, most birds decide to migrate closer to the equator. Some birds can withstand cold weather by using their feathers to maintain a warm inner body temperature, or they may seek refuge in trees and large plants during bad weather. One group that hangs around in the winter is waterfowl, like ducks and mergansers. Keep an eye out on our waters this winter for some cool visitors!


A den of garter snakes commonly found throughout NJ.

Herpetofauna (Reptiles and Amphibians)

Reptiles and amphibians are often grouped together in a group referred to as herpetofauna, often shortened to herps. This is a subject of debate because reptiles are actually more similar to birds than amphibians! However, they have very different adaptations and survival strategies in the winter. Reptiles can enter a specific kind of hibernation called brumation. They can slow their heart rate down, which slows down how much energy they use. How quickly something uses energy is often referred to as its' metabolism. As we discussed earlier, energy comes from food, but unlike birds, herps are ectothermic (cold-blooded). This means some of their energy comes from heat, and they need external heat (like sunlight or a heat lamp) to warm them up enough so they have the energy to hunt and travel in their habitats. The metabolism of reptiles slows down so much that they can go for several months without eating! They will try to find a nice hole in the ground, a crevice in a rock or a burrow in a root system below a tree and hunker down until the temperatures are warmer for them to move around. Garter snakes (*Thamnophis sirtalis*), for example, can live as far north as Canada. They choose to live in burrows in the ground in huge groups, sometimes with several dozen snakes in one pit!

Amphibians also enter a brumation period, but they can slow their metabolism down even further than reptiles can, sometimes appearing to be dead because they are so still. Some frogs can enter a state of near-total freezing! Wood frogs (*Lithobates sylvaticus*) have a special adaptation in their blood that allows the rest of their body to freeze but stops their blood from freezing. They can enter a trance and a special kind of sleep for the whole winter, until the spring sun thaws the little frogs out.

Mammals

Monmouth County has so many kinds of mammals, both in the ocean and on land. On land, creatures like squirrels and bears enter a kind of hibernation called torpor. This means that, like other animals, their metabolism, heart rate and body temperature slow down, but not quite so much as herps might. They will rely on their fur and a nest or den site to keep warm.


A black bear stretching its legs mid-winter.

However, they can wake up throughout the winter to forage for food and water if necessary, or if the weather happens to be nice in the winter, they might like to stretch their legs. One mammal that is very important to know about are New Jersey black bears (*Ursus americanus*), as most people think they sleep all winter, but you just might see one on a hiking trail! As endothermic animals, they require energy to maintain their body heat in the form of food. Many mammals stock up on lots and lots of food in the fall to prepare. Deer and foxes tend to be more active than other mammals throughout winter. In the northern US, Hemlock trees (*Tsuga canadensis*) have warmer air underneath them than other trees, so deer will seek these trees out to sleep underneath, as it can get warmer by several degrees. Foxes have burrows and will occasionally also enter a state of torpor, but they have thick fur and amazing hearing adaptations to hunt small rodents that live in the snow.

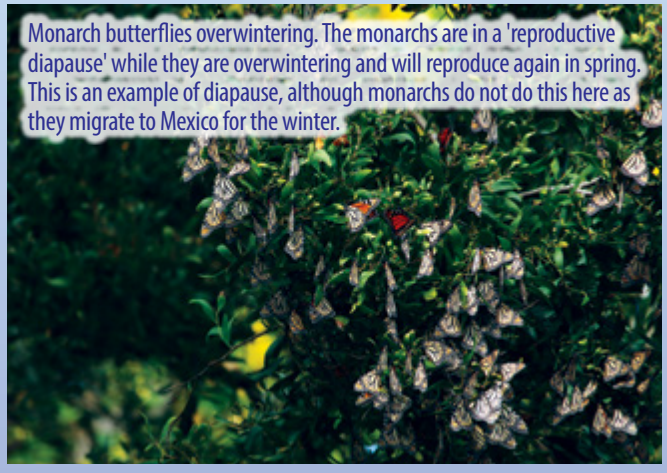
In fact, small mammals like mice and voles will build huge networks of underground homes to live in throughout the winter. They build special rooms to sleep in, rooms to eat in and even rooms to raise their young in.


A harp seal hauling out on the beach.

Some other animals that stay awake and outside through the winter are our infamous seals! We typically have two species: harbor and gray seals (*Phoca vitulina* and *Halichoerus grypus respectively*). They love to inhabit our coastlines, especially around Sandy Hook. They are there from early November to March, sometimes with a week or two difference in either direction and can be best viewed at low tide relaxing on beaches or jetties. Most marine mammals, including whales and dolphins, have a thick layer of fat under their skin called blubber. This blubber acts like a big parka, trapping heat from escaping their bodies. These mammals come to New Jersey in the winter because if they were here in the summer the water would be too warm. Imagine wearing a drysuit and going swimming in August, or wearing a parka in your backyard after summer break begins!

Insects

Insects are creepy and crawly, and frankly most people don't like them. This is an understandable feeling. However, insects form the foundations for entire ecosystems and food webs, and without them the world would be much worse off. During the cold winter months, insects tend to burrow deep inside old trees and fallen logs, and they love piles of leaf litter. This is why it's important to not rake your leaves and completely clean out your garden. They will turn your soil by the time spring comes around, and feed your lawn to make it nice and green when summer arrives. All sorts of insects need these leaf piles to make it through the winter, including the enjoyable ones like lightning bugs and butterflies' caterpillars.


Monarch butterflies overwintering. The monarchs are in a 'reproductive diapause' while they are overwintering and will reproduce again in spring. This is an example of diapause, although monarchs do not do this here as they migrate to Mexico for the winter.

Insects can also enter a special type of hibernation called diapause. Diapause happens when the weather turns very cold and harsh, so the life cycles of insects are interrupted. This means that if there is a small grub in a log, it will stay as a grub until the weather turns pleasant again and then, and only then, will the grub begin to turn into a beetle. Many insects simply die off in winter and leave behind their offspring to wait out the colder months to turn into big, beautiful adult bugs when warmer weather comes in spring.

The Park System through the Seasons

How do the parks change during winter? Well, for the most part, they don't! Your county parks are open throughout the year with a variety of different programs that we offer year-round or seasonally, as well as some special activities, depending on the weather. Looking to stay active, learn a new skill, hone-in on an already practiced skill or take a group trip? Well, no matter the season, the Monmouth County Park System has you covered! Check out our Winter Parks & Programs Guide to walk you through all the amazing opportunities we offer during the winter months and more.

Whether you prefer to be out and about or snuggled up and hibernating, maybe you can use some of these adaptations yourself. You could make a fire and create an external source of heat, like a reptile would need, or maybe cover yourself in blankets and sleep through the cold like mammals. Or maybe take a vacation to Florida like the birds do. You could enjoy the rest of the fall like other mammals and eat up. Regardless of which adaptations you choose, prepare yourself to enjoy winter as much as you can. The next time you're on a chilly walk through the woods or on our beaches, take a moment to realize and appreciate how unique and special nature and all its inhabitants are and what we all do to survive and thrive on this planet.

LET'S FIND AND SAVE THE BIGGEST TREE

Lindsay Ruotolo, Landscape Architect

Along the brick path to the Thompson Park Visitor Center, tucked between large yews, stands a National Champion black ash (*Fraxinus nigra*). Calculated by a measure of the tree's trunk circumference, canopy width and height, this ranking signifies it as the largest registered black ash in America.

This National Champion black ash at Thompson Park is estimated to be over 120 years old and is the largest registered black ash in the country.

It is one of several trees in Monmouth County recognized on the New Jersey Big Tree Registry, an online database that records large trees that have been nominated from across the state. The roots of the registry stretch back to 1940 when conservationists from the American Forestry Association launched a national campaign to preserve specimen native trees.

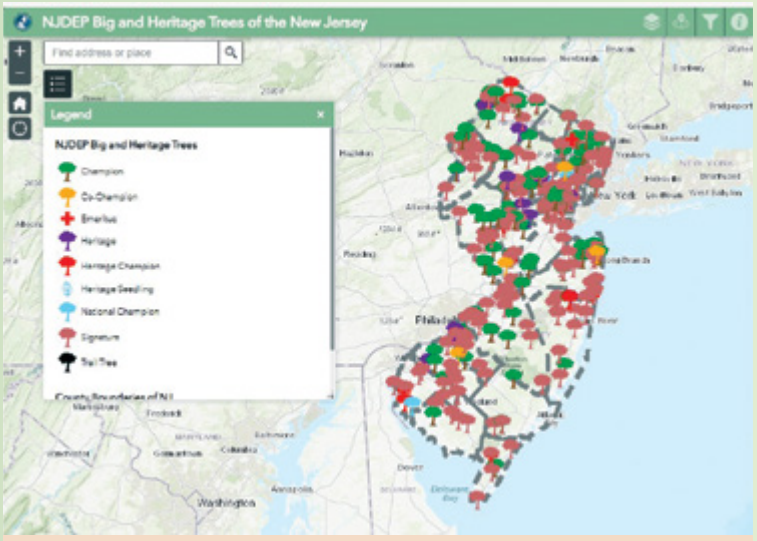
"So here is a challenge," Joseph Stearns wrote in the September 1940 issue of *American Forests* magazine, "to every individual tree lover, to every forest conservationist in the country; to every forester, to every lumberman; to farmers, vacationists, to all who come in contact with trees. The first task is to locate the largest specimens of our major species [and] concert action to bring about the protection and preservation of these great old giants." Nestled between a story entitled "*I Married a Smokechaser*" and a botanical profile on hackberry, Stearns' article "Let's Find and Save The Biggest Trees" launched a nationwide tree hunt that would continue for the next 87 years.

LET'S FIND AND SAVE THE BIGGEST TREES

By JOSEPH L. STEARNS

The article from American Forests magazine launched a tree hunt that would persist for 87 years.

At the time, America was being indiscriminately deforested by timber, agriculture and mining industries. As the mirage of limitless resources dissolved, the American Forestry Association wanted to use the registry as a way to safeguard "the giants scattered throughout our virgin forest stands." The article was accompanied by a list of eligible species including, ash, beech, buckeye, cottonwood, elm, maple, pine, sycamore, tulip, and a few dozen others. Respondents were asked to mail in nominations citing the tree location, species, height, circumference and a photo. By the November issue, the challenge was in full swing when a wye oak in Maryland, 27 feet in circumference and believed to date back to the 1500s, dethroned a chestnut oak in Connecticut for top spot.



The New Jersey Forest Service hosts an interactive online database where the public can find big trees from across the state.

Today, the registry is publicly available online. The New Jersey Forest Service manages the state database known as Big and Heritage Trees of New Jersey. The American Forestry Association, now referred to as American Forests, compiles a national record of champion trees. Public participation remains the operative driving force behind the registry, which continues to rely on public nominations to find big trees.

What is it that people continue to find so fascinating about a big tree? It is the sheer doggedness of these sylvan giants? That, while I struggle to keep a spider plant alive, a big tree has withstood hurricanes, drought and the pressures of human development, living for hundreds or even thousands of years. Perhaps it is this impressive lifespan, making our human tenures feel fugacious in comparison. Most certainly it is the size. A canopy extending a dozen stories in the air. Branches outstretching beyond the length of a tennis court. A root system weaving underground, forming a network with their fellow flora. Under a single tree's canopy an entire ecological community can thrive.

The Monmouth County Park System protects big trees through both land conservation and natural resource management. If you are on the search for big trees, the deep ravines of Hartshorne Woods Park are a great place to start. The extremely steep slopes along the edge of the Navesink were undesirable for farmers and loggers. As a result, these untouched forests are home to rich preserved communities. As you hike, pan the forest for the mighty tulip poplar (*Liriodendron tulipifera*). Identifiable by their pin straight trunk, the tulip poplar towers over the mid and understory vegetation, forming the canopy of the forest.

The Park System has also planted specimens of big trees, such as the New Jersey Champion Chinese fir (*Cunninghamia lanceolata*) which greets guests at Deep Cut Gardens. Planted by Park Manager Ken Olsen in 1984, this fast-growing conifer is over 70 feet tall and a testament to the impact individuals can have in their own landscape.

Last on the big tree tour is the historic landscape of Thompson Park, home to several big trees on the registry. Here, to the south of the 40 Stall Barn, stands an Eastern cottonwood (*Populus deltoides*), boasting a hefty 270-inch circumference, and is recognized to be the second largest in the state. The cottonwood name is derived from the tree's white fuzzy seed heads. Visit on a gusty day in spring and the flurry of fuzz resembles a late season snow. Next, flanking the east wing of the Thompson Park Visitor Center, resides a 50-foot tall American elm (*Ulmus americana*). The elm's arching branches pictorialize why this was a choice tree for so many avenues across the state. Once a common tree, the elm population collapsed in the mid-20th century when the species was ravished by Dutch Elm disease.

Emerging pests and diseases pose a new threat for our nation's big trees. Over the past decade an infestation of the emerald ash borer beetle has decimated ash populations. Once a staple in New Jersey forests, ash trees, including our National Champion black ash, are at risk of a collapse that rivals the loss of the American chestnut and American elm. Responding to these pressures, the Monmouth County Park System has initiated an injection treatment program that armors our specimen trees against known threats.

The challenge to find and protect big trees continues! Grab a camera and measuring tape to start recording big trees near you. Nomination forms along with information on how to record a trees circumference, crown width and height, can be found at https://www.nj.gov/dep/parksandforests/forest/bigtrees/nominate.html.

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Planted by Park Manager Ken Olsen in 1984, the Chinese fir greets guests at Deep Cut Gardens.

The American elm was known for its vase shape and gracefully arching branches. Every three years the Park System injects the trunk with a systemic treatment to protect it against Dutch Elm Disease.

Deep Cut Gardens
Home Gardener

152 Red Hill Road
Middletown, NJ 07748

GS Parkway Exit 114, to Red Hill Road
732-671-6050

Roses Love Garlic, And Carrots Love Tomatoes

Tanya Dinova, Horticulturist & Park Ranger

Wedding Ceremony; Married Couple at DCG

"We are great matchmakers, isn't every gardener?"
This is a tried-and-true way to reduce pests, attract pollinators and boost growth!

Finding the right partner is an art that often eludes even the most knowledgeable gardener. Irresistible planting unites texture, shape, color and scent in a smooth, meaningful symphony that connects with the core of the universe and echoes with the cells of our bodies to deliver a unique natural experience: "Welcome Home!"

Again this year the most popular activity that took place at Deep Cut Gardens were wedding ceremonies, wedding photo shoots, plus engagement and marriage proposal ceremonies. We are delighted to be a part of so many blessed unions and bright futures. Chances are you too know of someone and/or have been an attendee at one of those ceremonies, or even better – a bride or groom. Finding the right partner is not an easy task. Yes, there are millions of options on what matters, and how it should feel. There are books and magazines written to help one find the perfect partner. For decades we have gone to virtual intelligence and employed apps trusting in their algorithms to discover our match. As old as the world is so are the matchmaking services, and yet our couples chuckle and say: "We got lucky."

Like human marriage, plant marriage – that is, plants that complement each other and grow well together – cover the distance from total incompatibility to ecstatic unions. Being a gardener, one learns from experience how to match and orchestrate the plants in their garden so that they deliver a stunning performance, greater yields, healthier roots, reach higher grounds and enjoy the brightest blooms. Remember the time you went out on a limb and took a chance with a new plant? What was that outcome? What did that plant teach you about its needs? Just like that, little by little we get lucky, and from our knowledge the world benefits in leaps and bounds.

Here, you will find a brief and general list of suggestions for companion plants that are low maintenance, easy to grow, and readily available to purchase at the nursery. With their help we hope you can find inspiration to fill one small gap, transform an idle corner, or start a whole new garden from scratch and be successful. If you are already implementing these combinations and are looking for ways to build up on that knowledge, consider the greater aspect of your hard work – that is, the meaningful contribution a garden makes to the local ecosystem.

Monarch larva → cocoon → butterfly.

At Deep Cut Gardens, our mission is to provide a sanctuary for our visitors – both human and wildlife. We know how valuable our gardens are to those that seek peace, quiet and contemplation and we know the essential niche we fill for pollinators and their kin.

Here at Deep Cut, we also focus on pollinators and their wellbeing. As stewards of this landscape, we strive to create a wholesome garden that provides the essential food and habitat for pollinators. This includes flowers, nesting material, cover from predators, a safe place to escape the elements and overwintering options where critters are safe and nurtured.

Better for Us Too

A pollinator-friendly garden is a better garden for us too! More pollinators guarantee successful fruit and seed production, rewarding us with a bounty of fruits, veggies and flowers. This limits the needs for chemical applications and harmful compounds that later accumulate in our bodies causing us harm. Such harmonious gardens have fewer pests and require less care and support as they naturally grow in a way that the ecosystem dictates by supporting the food web and allowing wildlife in. Watching the birds, butterflies and bees in our space connects us to nature and brings beauty and enjoyment to our hearts.

Kids in the garden

We feel connected and fulfilled by protecting pollinators as well as a much-needed healthy habitat for them to thrive.

Springtime Favorites

A good combination for a shady ground cover is ostrich fern (*Matteuccia struthiopteris*) and dog's tooth violets (*Erythronium revolutum*); the two complement each other as they have similar growth requirements and contrasting foliage that looks better in union than apart.

Bulbs rarely have good foliage and benefit greatly when grown among borrowed leaves. Try the combination of daffodils and daylilies. The daffodils will break the ground and show up creating a green mat with stunning blooms in the spring giving the daylilies just enough time to develop and come up as the daffodils begin to wither and fadeaway. If your garden allows you can easily grow hasta instead of daylilies for a similar effect. A few more bulb suggestions for your garden: cilla and lamium maculatum; cyclamen with primula and viola; cyclamen and crocus; tulips and wallflowers.

For your perennial bed you can easily trust in the successful combination of solid pairs such as yarrows and catmints, for example *Achillea taygetea* "Moonshine" and *Napeta faassenii; Amsonia tabernaemontana* with *Sinoglostrum nervosum; Aruncus dioicus* and *iris sibirica; Asclepias tuberosa* and *Platycodon grandifloras; Chrysanthemum maximum* and *Achillea species; Cimicifuga racemose* with *Filipendula rubra "Venusta"; Dicentra spectabilis and Brunera macrophyla*.

Winter heath such as Erica carnea "Springwood White" are delightful partners for early spring bulbs such as Narcissus "Tete-a-tete". Even small bulbs such as these are vigorous enough to grow beneath the spread of heaths.

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Vegetables and Their Matches

Tomatoes love basil and so do peppers. To make them happier introduce cosmos, cleome, Queen-Anne's-lace or parsley. Basil repels insect pests such as thrips and disorientates moths which lay tomato hornworms. As basil and tomatoes are a great combination in the kitchen, this is a win-win partnership.
Potatoes like calendulas, dill and rosemary.
Cabbage mingles well with chamomile, rosemary, sage and/or thyme.
Beans love corn and squash, aka The Three Sisters Garden. Yet, you can invite the sunflower for an even more successful marriage.
Beets are companions for chicory and endives.
Carrots like the company of fennel.
Onions are well matched with cleome and dill.
Borage pairs well with tomatoes, attracting pollinating bees, as well as with strawberries, enhancing their flavor and vigor.
Melons and marigolds are best friends forever.

3 Sisters Garden

Rose Partners

Before you head to the local nursery, there are a few things to remember: Roses need six hours of sun a day, so avoid planting shade-loving plants. Make sure your roses have plenty of room to breathe, allowing for good airflow. They also need a lot of fertilizer and water, so skip over the drought-loving section.

For compatible groundcovers – black mondo grass, violets, sedums, ornamental strawberries and geraniums – are all a good choice.

Roses are amazing bloomers with a potential to attract more than pollinators. To keep the flower abundance going even after the roses have stopped blooming, pair them with these long-blooming perennials: bee balm, catmint and coneflower. Here at Deep Cut we have introduced peonies, for even greater impact.

Roses have a sturdy network of canes that comes in handy to vines like clematis and sweet pea. In return they offer protection from the sun and an abundance of flowers both to please you and the pollinators.

Annuals can help support pollinators by ensuring succession of overlapping bloom periods, supporting seasonal specialists, and providing floral resources before and after peak bloom. We use snapdragons, zinnias, floss flowers, salvias and alyssum in the rose garden.

Word of caution. These combinations are generally recommended with a broad application. We advise that you take them in combination of your site-specific requirements and needs to discover the best-fitting plants that will support pollinators and the natural environment of your home.
Here are two web sites to help you get started:
1. Rutgers: Protecting Bees (Find Plants to Attract Specific Pollinators) https://protectingbees.njaes.rutgers.edu/ and
2. Cornell Botanic Garden: Creating a Pollinator Garden for Native Specialist Bees, https://www.jerseyyards.org/wp-content/uploads/2021/05/Creating_Pollinator_Garden_for_Specialist_Bees_FINAL_071620_.pdf.

Pollinator Garden Take-Aways

To help pollinators find their favorite flowers more easily, group your plants according to similar characteristics, such as color, odor and flower shape. Pollinators also benefit from continuous blooms throughout the entire growing season, from early spring to late fall. Link your native plantings with those of neighbors to create even larger habitat areas. Connecting corridors of food and habitat are especially important for migrating pollinators like the monarch butterfly, as well as long-distance foragers.

In her latest article "Herbaceous perennial ornamental plants can support complex pollinator communities," Dr. Erickson notes that native plants might receive more visitation by pollinators, however commercial plants are bred for long bloom times and can be crucial forage resources for when native plants are not in bloom.
Dr. Erickson recommends gardeners, when possible, opt for a diverse mix of native and perennial plants with a range of bloom times, avoid spraying pesticides during peak times of pollinator activity, and leave some bare ground in your garden and hold off on clearing stems and leaf litter until spring to create habitat for ground and stem nesting bees. These actions can aid in the creation of quality pollinator foraging habitat.

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Kelley, T. M.

LET'S MEET THE ASTER FAMILY

Kate B. Lepis, Ph.D., Horticulturist

Thinking back to the vibrant colors of autumn, it's members of the aster family (Asteraceae) that can be thanked for much of the late season blossoms that carried the garden through to frost.

Mums (*Chrysanthemum*) are asters we all know and enjoy.

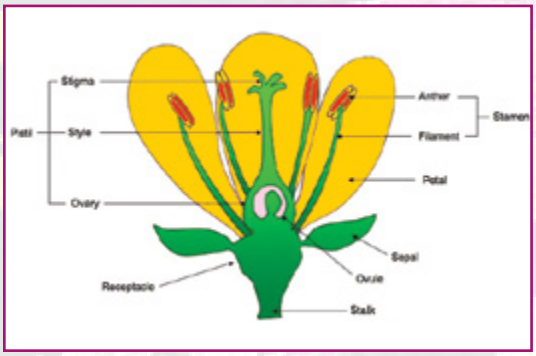
Also known as the sunflower/ daisy family it is one of the largest plant families on Earth (more than 22,500 species).[1]

What you might consider to be a single flower is really a cluster of flowers called a head or capitulum. It may be surprising to learn that lettuce, artichoke and dandelion are also well-known asters.

Zinnias (*Zinnia*) have radiate heads with ray flowers on the outside and disc flowers in the center.

Receptacle: the bed of tissue that all other floral parts grow out of.
Sepals: leafy structures that protect other parts when in bud, usually green (sometimes petal-like).
Petals: usually colorful and sometimes fragrant, functioning to attract pollinators.
Stamen: male part composed of a long filament holding the anther (produces pollen) above other structures so pollen can be dispersed.
Pistil: female organ with the ovary at the base (inside the ovule [egg]), the long style attaching the ovary to the stigma (where pollen lands). After pollination/fertilization the ovary develops into fruit and ovule into seed.

As flowering plants diversified over time, the common evolutionary trend was for floral parts to reduce in numbers, to fuse and sometimes disappear altogether. Think of a magnolia flower.



A simple flower with all four organs present and no parts fused. The four structures are always found in distinct whorls: outermost – sepals, petals, stamen, and inner most pistils.[3]

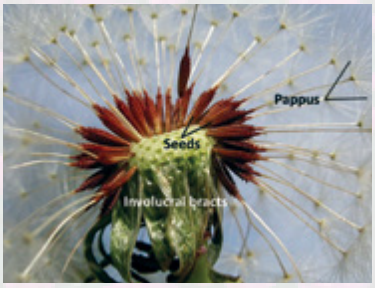
There are several common traits inherited by members of the aster family that help in identifying this group:

1. Two main flower types evolved: disc and ray flowers. Depending on the species these can be fertile or functionally female sterile.
2. The head sits on an enlarged receptacle from which flowers arise. When you eat artichoke hearts, you're eating receptacle. In some species the receptacles are cone shaped.
3. At the base of every head is a set of modified leaves collectively called the involucre. These vary greatly making them useful in identifying species.
4. The sepals are highly reduced to scales or hairs (called pappus) and often used to disperse seeds.
5. In both flower types, the petals fuse together. In disc flowers they form a tube with five teeth at the top. Ray flowers have a very short tube that flares out into the strap-like ray.
6. The anthers fuse into a tube-like structure.
7. The stigma does not develop. Instead, the style grows through the anther tube, acting like a plunger and expelling the ripe pollen grains. If fertile, the style forks and functions as the landing place for pollen.
8. Each flower has one ovary with one ovule (think sunflower seed). In contrast, visualize a pepper (*Capsicum:* nightshade family). What we eat is the ovary filled with many seeds.

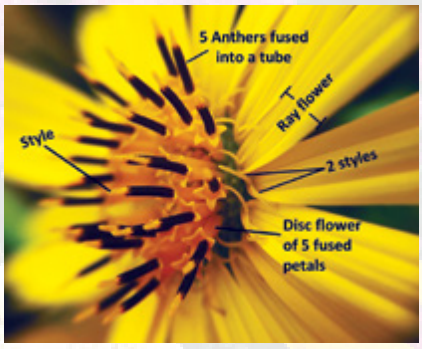
Species like string of pearls (*Curio rowleyanus*) have only disc flowers. The head is called discoid.

A whole artichoke (immature capitulum) and artichoke heart.[3]

Clockwise top left: pilewort (*Erechites hieracifolia*), oxeye daisy (*Leucanthemum vulgare*), dahlia (*Dahlia*), rosinweed (*Silphium intergifolium*).



Dandelion seed head.[3]



Close-up of a Rosinweed (*Silphium*) head.

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Nature Corner

WHERE DO SEAHORSES GO FOR THE WINTER?

Joe Reynolds, Principal Park Naturalist

Many Monmouth County residents may not know that seahorses live along the Jersey Shore. In fact, nearly every bay or estuary and even the Atlantic Ocean during the summer may contain several populations of this fascinating and delicate sea creature.

Why can't seahorses easily be found? They are some of the most elusive and hard to find sea creatures in the northeast. Throughout the more than 10 years of public drop-in seining events along Sandy Hook Bay at Bayshore Waterfront Park we have only caught a handful of seahorses in our seine net. In every case, they were single adults in search of a mate.

Why are seahorses difficult to discover? For starters, they are some of the tiniest adult fish around. The average length of an adult seahorse is just 3.9 inches. The Satomi's pygmy seahorse, which lives near Indonesia and Malaysia, is the smallest seahorse in the world at only half an inch long.

Seahorses are also masters of disguise. Just like octopuses and cuttlefish, they can change the color and the texture of their skin to match their surroundings and blend in easily to escape predation. Tiny organs in their skin contain several pigments that can expand or contract in response to a variety of stimuli, causing seahorses to change color.

The northern lined seahorse (*Hippocampus erectus*) is the only native seahorse to be found along the Jersey Shore. This unique fish can grow between 5-6 inches in length. Like many other species of seahorses, they have a horse-like head and a long snout with a small, toothless mouth at the end, and a tapered tail without a fin.

During the summer, lined seahorses live among the underwater grasses, oyster beds or piers and pilings from Raritan Bay down to Delaware Bay. They feed mostly on tiny crustaceans including amphipods and copepods. Seahorses regularly surprise their prey by changing color to match their environment and then wrapping their long tail around an object to stay very still. A seahorse will attack and suck its petite prey into its long, tubular snout, which can consume up to 3,000 crustaceans in a single day.

Seahorses are undoubtedly best known for their monogamist nature. Our local seahorse population will roam the Jersey Shore alone until it finds a mate. Once coupled, the two will stay together for a long period of time – often forever. Males have a distinct brood pouch on the front of their body, which is used by female seahorses to place their small pear-shaped eggs into the male's body. During gestation, males will often settle into a remote area to rest and protect the eggs from predators, which can last between 12-14 days.

In their book, *Ecology of Estuarine Fishes: Temperate Waters of the Western North Atlantic*, distinguished marine biologists Kenneth W. Able and Michael P. Fahay tell us from their research on lined seahorses in South Jersey waters that the breeding season is generally from May to October. Reproduction begins in May and reaches a peak in July and stays relatively high through September. The males they discovered had as many as 1,515 embryos in their pouch.

Baby seahorses are called fry, and once born are completely independent. In fact, the male seahorse is not responsible for any of the upbringing of the offspring leaving them vulnerable to predators. This is why repeated reproduction is important for seahorses. NOAA fisheries states that large litters of a thousand or more babies born from just one father are necessary because only about 0.5% will survive to adulthood. Seahorse predators include crabs, sharks, skates, rays and larger fish.

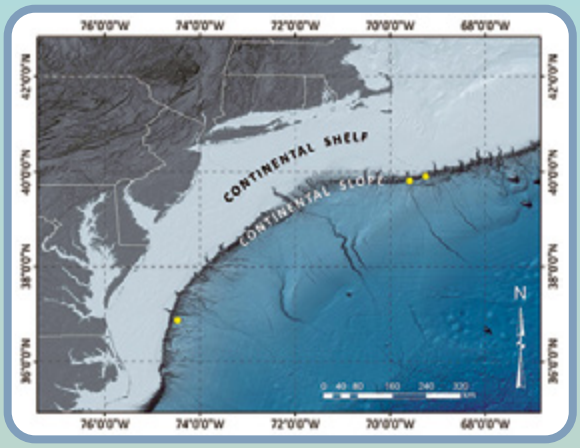
At just about 0.1 inches long, the young seahorses are recognizable by their unique body shape. Maturity is reached at lengths of 2.2-2.8 inches with males developing brood pouches at five to seven months of age. The lifespan of the lined seahorse is approximately one year.

Thanks to the difficult work of many marine biologists and citizen scientists, we have a good idea on the lives of lined seahorses during the warmer months of the year. Yet, many questions still need to be answered about what happens to seahorses during the winter.

Some research suggests that lined seahorses migrate offshore to deeper waters in the Atlantic Ocean during the colder months. This migration pattern is similar to the northern pipefish (*Syngnathus fuscus*), which are closely related to seahorses.

Marine researchers Mark A. Lazzari and Kenneth W. Able in their journal article entitled, "*Northern pipefish, Syngnathus fuscus, occurrences over the Mid-Atlantic Bight continental shelf: evidence of seasonal migration*" (1990) indicate from their studies in the north Mid-Atlantic Bight that northern pipefish undergo seasonal, inshore-offshore migrations. During spring through fall, the pipefish are residents in estuaries but move into nearshore continental shelf waters off Cape Cod in late September and October, and off Long Island and New Jersey in November.

A population of seahorses seem to be following the influence of their cousins, the pipefish, and making a long-distance migration out to the ocean every winter. Able and Fahay state that an uncertain number of lined seahorses, including young seahorses, are making an annual inshore to offshore migration, west to east, as opposed to north to south, to primarily escape rough winter weather.



From research of seahorses between North Carolina and Long Island, Able and Fahay found that from November to March, most of the seahorses they collected were from the ocean, located out to the inner and mid continental shelf in water depths between 68-224 feet. In the spring, seahorses were discovered primarily at the inner shelf at depths of 26-260 feet. Able and Fahay reported that during the winter, at sea temperatures of 51^{0}F seahorses were observed by deep sea divers on the inner continental shelf off Long Island, where the seahorses laid motionless on the ground.

It seems at least a particular population of lined seahorses may make a long-distance migration to school in the deep areas of the continental shelf and take a "winter rest." In this resting state, the hearts of seahorses slow down, their needs for food and oxygen decrease, and they move about very little.

In other parts of the world, various species of seahorses also make inshore to offshore migrations. In the northwestern Pacific Ocean along the coast of China, seahorses will make long-distance migrations to the ocean to breed, while seahorses along the British Isles will move in and out of estuaries to feed on plankton rich waters from the Gulf Stream.

What makes this inshore to offshore migration particularly interesting is that seahorses are ridiculously poor swimmers. Author Liz Langley in her National Geographic article entitled: *Why some fish are really bad at swimming* (2018), reveals that seahorses are the slowest moving of all fish species. Seahorses move so slowly due to having primarily one small fin located in the middle of their backs. This tiny dorsal fin is the only way seahorses can propel themselves forward to a high speed of 1.5 mph or as low as 0.01 mph!

Although their hind fin can beat back and forth up to 50 times a second, the size of the fin keeps it from making much progress when it comes to distance traveled. Even with small pectoral fins that assist in steering, seahorses are known to be so delicate that they can become fatally exhausted when waters get rough during intense storms.

So how do seahorses make it all the way from the shallow waters of the Jersey Shore to the deep offshore waters of the Atlantic Ocean?

No one knows for sure, but some scientists have theorized that seahorses are really good at hitchhiking. Author Katie Hogge from the Ocean Conservancy states that while seahorses may not be able to travel long distances quickly, connecting themselves onto floating vegetation or other debris can improve the journey while going back and forth from the ocean to a bay. Their tails are quite flexible, which can enable seahorses to anchor themselves to floating fragments when they're in need of a rest.

How many lined seahorses make the journey from the Jersey Shore to deeper ocean waters is currently unknown. It would not be surprising, though, if some seahorses remain in local bay waters throughout the year. Lined seahorses in Chesapeake Bay for example, are thought to remain in home waters all winter, but will retreat to deeper ship channels.

The lined seahorse is listed by the World Conservation Union (IUCN) Red List as "Vulnerable." Indirect evidence shows that numbers are continuing to decline, which has raised concern. Threats to lined seahorses include habitat loss, pollution, climate change, invasive species and direct exploitation in the form of overfishing and bycatch. This species is also targeted within the aquarium and souvenir trade fishery. More scientific research is certainly needed about the northern lined seahorse if we wish to help support our only seahorse population along the Jersey Shore.

Sources

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