MONMOUTH COUNTY PARK SYSTEM
GREEN HERITAGE
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Through The Seasons At Historic Longstreet Farm

Zack Karvelas, Assistant Public Information Officer

For more than 50 years, Historic Longstreet Farm has offered visitors a glimpse into a previous chapter of Monmouth County's agricultural past. Set within Holmdel Park, the 9-acre farm recreates the sights, sounds, and daily tempos of a working Monmouth County farm in the 1890s, when horses powered the fields, families preserved and prepared much of their own food, and the changing seasons dictated the work that needed to be done.

Longstreet Farm was once among the largest and most prosperous of farms in Holmdel. Its history, however, stretches back well before the 19th century.



When English and Dutch immigrants established Middletown around 1680, the land was part of an 1,800-acre plantation settled by Richard Stout and his Dutch wife, Penelope Van Princis Stout. The central portion of the Longstreet farmhouse is the oldest existing structure on the farm, beginning as a one-and-one-half-story Dutch American house in the mid-to-late 18th century. The home was expanded over the following generations, while the massive Dutch barn was constructed around 1792.

In 1806, Hendrick Longstreet assembled the original 495-acre farm from several properties. By the 1890s, tenant farmers raised cereal grains, potatoes, and livestock, making it a general farm that relied heavily on horsepower. At the time, agriculture was changing rapidly. Competition from Midwestern farmers and new steam and gasoline-powered machinery were beginning to transform farming throughout Monmouth County. Longstreet, with its horses, mules, and traditional equipment, represented what was becoming an old-style farm.

The property remained in the Longstreet family until 1967, when Mary Longstreet Holmes Duncan and her husband sold it to the Monmouth County Park System. Park System staff chose to interpret the farm as it might have appeared in the 1890s, a period remembered as a major transition in local agriculture. The barn complex opened in 1971 with farm animals and historically-clothed interpreters, followed by the restored farmhouse in 1983.





Today, the farm's seasonal cycle brings that history to life.

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SPRING: Getting Back To Work

Spring is a season of preparation and renewal. Fields are readied, gardens are planned, and seeds are planted. Equipment that spent the winter being cleaned and repaired returns to the fields.



Livestock remain central to the work. Horses and mules help with agricultural tasks, including plowing and harvesting. Cows provide milk, while sheep, pigs, and chickens represent the food and materials that livestock historically supplied.





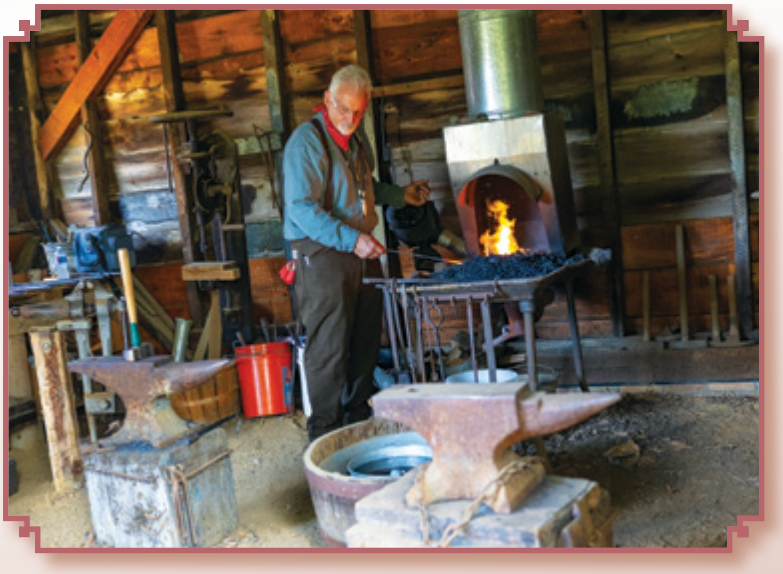
The work begins early. Animals must be fed and watered, cows milked, horses and mules groomed and their hooves checked. Those chores happen daily, regardless of the season.

SUMMER: A Working Farm

By summer, the farm is in full swing. Crops grow, fields require attention, and livestock need constant care.

The farm's demonstrations help explain the skills that once made agricultural life possible. Visitors get glimpses of cooking on a wood-fired stove or a blacksmith turning iron into useful tools and hardware.





There is an old farming sentiment that captures the reality particularly well: farming is largely about fixing whatever breaks. That remains true at Longstreet Farm, where historic equipment must still be maintained and repaired, which is becoming more challenging as time goes on.

The distinction between hay and straw is another reminder of how little went to waste. Hay is cut, dried grass used as livestock feed, while straw is the leftover stalk from grain crops and is primarily used as bedding.

FALL: Harvest and Preservation

As temperatures cool, the growing season winds down and attention turns toward the coming winter.

Potatoes are harvested, while winter wheat is planted so it can establish itself before cold weather arrives. The crop also helps hold soil in place. Field corn can be dried and later run through a sheller to remove the kernels before being ground into cornmeal.

Fall is also a season of preservation. Families could salt, pickle, dry, jell, and can food to extend their harvest through winter. They could also purchase goods at local markets, combining farm production with outside supplies.

Cider making and butchering were also important seasonal activities, with cooler temperatures making preservation easier.

WINTER: Preparation Never Stops

Winter may quiet the fields, but it does not stop the farm.







Much of the season is spent preparing for the year ahead. In the heated workshop, equipment can be disassembled, cleaned, greased and reassembled. Garden plans are made, seeds are ordered, clothing is mended, and staff receive training in everything from livestock care to historic farming techniques.

The weather creates its own work. Ice must be broken from livestock water tanks, snow cleared, and roads maintained. When winter gives way to warmer temperatures, muddy conditions create another challenge for both staff and animals.

Even the farm's winter programming reflects the season, with activities such as firewood demonstrations, sewing and mending workshops, Victorian Christmas tree trimming, and historic parlor games.

Through it all, the animals still need care. Horses and mules are fed, watered, groomed, and tended to each morning. Cows are fed, watered, and milked, while sheep, hogs, and chickens receive their daily care before the rest of the day's work begins.



A Living History

Longstreet Farm's history is preserved not simply in its buildings, but in its continued work.

The Tenant House across Longstreet Road once housed farm workers, including the Irish immigrant Hylin family during the 1890s. The Holmes-Hendrickson House nearby offers an earlier glimpse into the area's Dutch colonial history. Together, these locations help tell the broader story of farming and settlement in Monmouth County.





Maintaining a working 19th-century farm today comes with its own challenges. Historic equipment is increasingly difficult to find and replace, while teaching new staff skills that few people use anymore can be time-consuming. Yet that work is precisely what makes Longstreet Farm valuable.



Spring brings planting. Summer brings growth. Fall brings harvest and preservation. Winter brings repair and preparation.

Then the cycle begins again.

At Historic Longstreet Farm, the changing seasons aren't simply the backdrop to history. **They are the history**.

THIS LAND IS YOUR LAND: A Park Planner's Perspective

Jay Cummins, Assistant Planner

The race to preserve open space as Monmouth County approaches full build-out has widespread support across political, social, and economic boundaries. However, the mechanisms and processes behind preservation of open space may not be as obvious to the public eye. This article will discuss the "behind-the-scenes" processes, timelines, and decisions that go into the Park System's open space preservation projects.

Since its creation in 1960, the Monmouth County Park System (MCPS) has consistently worked to protect open space, with over 19,000 acres preserved today. Every acquisition is unique and has its own story, which always begins with landowner contact. As a public agency, MCPS has an obligation to be financially responsible and cognizant of the public good. Therefore, we prefer to work with willing sellers who are within the Monmouth County Open Space Plan project areas. The project areas were identified as part of the 2019 Monmouth County Open Space Plan and typically outline where parks could be expanded. The Plan also identifies areas where new parks could be created. MCPS keeps an eye on real estate listings within said project areas while also occasionally conducting targeted letter campaigns in order to designate willing sellers. Some landowners also reach out directly to avoid publicly listing their property thus saving them time and money.



The Monmouth County Open Space Plan was published in 2019. The Plan was prepared by the Park System and outlines protocols for the acquisition of open space, provision of recreational opportunities, protection of vital potable water resources, and preservation of significant county natural and cultural resources.

Since our Open Space Plan was created with broad strokes, every individual property also goes through an internal evaluation process before we decide to pursue acquisition. Our Natural Resources department evaluates a property for its habitat value, threatened and endangered species potential, and invasive plant species threats. Our Historical Preservation Specialists also get a chance to review the property for historic structures or archaeological value. Both evaluations are incredibly important to understanding what work will be required once a property is acquired.



Fair Winds Farm in Upper Freehold was acquired by Monmouth County in 2026. The 300-acre property will accommodate additional trail links including the nearby Union Transportation Trail (UTT). It will preserve buffer areas around Crosswicks Creek and prevent incompatible development in the watershed. Fairwinds Farm once oversaw the breeding, boarding, and sales of standardbred horses.

After the initial landowner contact is made for a property identified within our project areas, the first step is to complete a real estate appraisal to determine the Fair Market Value (FMV) of the property. MCPS typically commissions two appraisals, as a difference in opinion between appraisers often results in a varied value conclusion. The range that the appraisals create gives us the opportunity to negotiate between the two values. The Monmouth County Board of Recreation Commissioners (MRBRC) grants the authorization to negotiate and make an offer to the landowner. When an offer is accepted, the BRC will recommend the purchase of the property to the Board of County Commissioners (BCC). Once the resolution is passed by the BCC, MCPS can assign County Counsel to the project to draft a contract of sale.

Once under contract, as a property buyer, MCPS enters what's called a "due diligence" period. There are two main responsibilities we have during due diligence which are the Survey and the Preliminary Assessment/Site Investigation (PASI). Both are essential for any real estate transaction, but MCPS holds itself to strict standards to ensure efficient use of public funds and to avoid any setbacks or restrictions for future needs.

The purpose of the survey is to outline the exact property boundaries and identify any encroachments. Park System policy states that since these properties are acquired with public funds, the public has a right to access and benefit from the properties. If there are any encroachments, often fences or sheds, we have a right to have them removed so the full extent of the property may be enjoyed by all.

Every property acquired by the County is investigated by a Licensed Site Remediation Professional (LSRP) for any environmental contamination. Preliminary Assessment is the first step of the process. The LSRP will look at historic aerial imagery, property records, and conduct a site visit to identify any potential Areas of Concern (AOC). Most of these areas do not require further investigation but may have some recommended actions before opening a site to the public. Often, there are a handful of AOCs identified that require soil sampling or other testing.

This leads us into step two, the Site Investigation (the SI in PASI). The testing done during a SI will either confirm or deny any potential contamination that was identified in the PA. Most testing that gets completed will show contaminants within healthy levels and will require no further testing. When a sample contains a high level of contamination, a second round of testing is often required to assess whether the contamination found was found in error or caused by elevated natural background levels. If a site is determined to have contamination, then the County will require the site to be remediated before we purchase it. This is a three-stage process that involves State regulators and other remediation experts.



Historic Portland Place in the Locust section of Middletown, along with nearly five acres, was bequeathed to the Park System in 2008 by Daniel Ward Seitz. Since then, through strategic acquisitions, the Park System has added to this majestic property along the Navesink River. One such acquisition is Brushwood Point, which at just under 17 acres and lies to the west of Portland Place; it was acquired through purchase in 2023. The Park System now maintains over 35 riverfront acres along Hartshorne Road, affording public access and enjoyment and expanding the boundaries of Hartshorne Woods Park.

The entire acquisition process from landowner outreach to closing typically takes the County between nine to twelve months. Often, larger properties or projects with many stakeholders can take much longer to negotiate. There are many projects still actively being pursued by the MCPS that have been ongoing for decades. Throughout the process, resolutions from our County Boards are made public, even if we are far from closing date.

Monmouth County is very fortunate to have a Park System with such a robust land acquisition policy. Open Space and recreational areas enhance the quality of life in Monmouth County, and our staff take great pride in helping to provide this important benefit to our residents. After all, this land is your land!

The Park System has been the beneficiary of many land donations, such as Historic Portland Place in the Locust section of Middletown. In 2008, Daniel Seitz bequeathed his historic home and nearly five acres along the Navesink River to the Park System. Since then, the County has purchased additional adjoining acreage to expand the historic site and the public's access to the Navesink River. Donations are great for us since we can then use our Open Space Trust Fund to acquire more properties. It also is beneficial to the original landowner, as the donation counts as a tax-deductible donation to a public agency. These donations still go through the same process as any other acquisition, including appraisal to determine the amount of the donation.



Brushwood Point was once part of Richard Hartshorne's 17th century land holdings until 1869. The site offers the ½ mile Brushwood Ramble woodland trail, a fishing pier, and expansive views across the Navesink River.

Deep Cut Gardens
Home Gardener
152 Red Hill Road
Middletown, NJ 07748
GS Parkway Exit 114, to Red Hill Road
732-671-6050

WHITE-TAILED DEER IN THE GARDEN STATE

Kate B. Lepis, Ph.D., Horticulturist



White-tailed deer (*Odocoileus virginianus*) are beautiful animals. Their summer coat of chestnut brown gives way to a duller gray brown in winter. The fur is highlighted by patches of white inside the ears, around the eyes, nose, throat, and underbelly. The patch of white fur on the underside of their tail (from which their name derives) flares up as they dash away, warning others to do the same.[1]



Males that are at least a year in age grow antlers covered in a velvety skin each April, completing their annual development by September. At that point the blood supply is cut off, causing the velvet to dry. Bucks rub against young trunks of woody plants to remove the dry layer through October when the breeding season begins. By January the breeding season ceases, followed by their antlers dropping off, with regrowth the following spring. The size of the rack is dependent on age, nutrition, and genetics.[3]



If you find a fawn hiding in the vegetation leave it alone.The mother is off feeding and will return.



Spotted fawns are born in May. Females typically mature at two years, but with ample nutrition maturation can occur as early as six months old – a situation commonplace in NJ. Young deer usually have just one fawn, while those over a year old typically have twins, and it is not unheard of for older females to give birth to triplets.

An Overabundance

As beautiful as they are, NJ is suffering from a deer population that is out of balance. In the early 20th century, deer were nearly extirpated from the state due to unregulated hunting. Over the decades, conservation efforts successfully led to a revival of the state's population. The elimination of their predators (wolves and cougars) also contributed to the comeback as did land management trends. Deer are an edge species, meaning they prefer habitat where forest meets open field. With much of our state developed for human use, large continuous tracts of forest are few and far between. Instead, our woodlands exist as small, isolated patches surrounded by open land (fields, agriculture, lawns). We've created an overabundance of prime edge habitat.



These factors have led to unhealthy deer densities across our state, negatively impacting the health of the herd and the greater environment in which we live. It has been estimated that healthy densities range between 5-15 deer per square mile. A survey of communities across NJ found an average density greater than 100 per square mile![4]

Resulting Problems

Deer should be a part of the living fabric of NJ. While the situation that existed at the turn of the last century was unacceptable, their current densities cause a wide range of problems. Agriculture in the Garden State is the third largest sector of our economy. Farmers sustain significant economic hardship due to deer browse.[3,4] A Survey of 27 NJ farmers reported a loss totaling $1.3 million in 2019.[5] Damage to the individual homeowner's property can also be significant.[6] NJ Drivers have a 1 in 191 chance of experiencing a deer-vehicle collision.[3] This threat is highest during mating season, but it's important to remain aware and watch our speed year-round.

This overabundance is also contributing to ecological harm. Ecological dysfunction can be attributed to a slew of factors, but the level of deer herbivory is changing the structure and composition of our preserved lands. Deer eat food that is easy to reach, creating a four-foot browse line that can be seen in our landscapes and forests.



Yew (Taxus sp.) shrubs are a deer delicacy.

Deer prefer to eat the native species they evolved with causing herbivory that is too intense for our native plants. They lack defenses for this level of pressure – causing an increase in their mortality and an expansion of exotic invasive species. In our preserved woodlands it is all too common to see a forest understory that barely exists or one that is dominated by exotic plants (species deer cannot digest). The lack of understory means the shrub layer that provides nesting sites, berries for migratory birds, and food for insect herbivores who support a vast portion of the food web are missing. We can see the effect of eliminating deer from relatively small areas by installing eight-foot fence deer exclosures and observing the regrowth of the native understory.





Forest understory growth within a deer exclosure installed at Thompson Park two decades ago.



The depleted forest understory adjacent to the exclosure and subject to deer browse.

Without an understory the fate of the forest itself is in jeopardy. The seedlings and saplings that should grow to be the forest canopy's next generation are not surviving. Any community that cannot produce young that grow into reproducing adults will dwindle away. The animal species that depend on those plants for habitat will also disappear. A study tracking forest regeneration in 39 national parks along the east coast (VA to ME) found 27 to be threatened with imminent or probable failure; deer browse consistently had the strongest influence on these forests' inability to regenerate.[7]



Red-eyed vireo (Vireo olivaceus) and other shrub nesting birds are at risk.[9]

Managing the Herd

There are lethal and non-lethal strategies for managing a deer population. Hunting is a necessary tool and the most cost effective.[4] Past human behavior eliminated the predators that could maintain a healthy population. Without them humans need to fill that ecological role. Venison is a source of nutritious, local, free-range protein. Hunting permit fees also help fund wildlife management projects in the state. One important obstacle to the success of this strategy is the amount of urban/suburban land use in NJ. As the state transitions to more urban/suburban settings, the ability to manage deer in this way grows more difficult. Also, as development trends toward urban, the number of recreational hunters decline. This trend also restricts areas where deer can be harvested due to safety concerns.

Non-lethal fertility controls may be an appropriate option for dense residential areas where recreational hunting must be restricted. Chemical fertility controls administered to females are one example. These activities require a wildlife specialist and state permit. They are labor-intensive, costly, and their innate effectiveness is questioned.[3] One challenge to success is the movement of individual deer in and out of the management area. As untreated females migrate into the local population, they hinder reaching the treatment threshold needed to decrease population size.[3]

Surgical sterilization of males is another method that has been in place on Staten Island for a decade. They have had success in decreasing the population, but the effort is expensive (thousands of dollars per buck), and the costs continue to accumulate as the program must be ongoing.[4] Staten Island has the benefit of a New York City sized budget and an isolated island. Deer can swim, but migration is limited compared to mainland situations. Trapping and relocating is another method, but it is too costly, labor intensive, and banned in many states. It doesn't solve the problem, rather it shifts to another location. The threat of moving diseases with relocated animals is also a very big concern.[3]

Living with Deer

Installed fencing, deer repellants, and planting species that the deer tend to avoid are ways to enjoy a garden with deer. Fencing off the vegetable garden is probably the only way to grow your own food in an area with too

Continues next page...

many deer. An eight foot fence is the recommended height, but smaller plots may get away with shorter fences as deer avoid jumping into places where they can't take a running jump back out. Individual plants can be fenced off singularly as is necessary when planting young trees and shrubs. Once the woody plants get taller than the browse line the leaves are safe, but you still need to protect from buck rub until the trunk is bigger than six inches in diameter. Deer repellants can be effective but need to be reapplied on a regular basis – waiting too long can decimate the garden in one night. Using deer repellant on food crops is also unappealing.



There are plants that deer tend to leave alone, but diets vary from place to place and there are no guarantees. What they eat can also be influenced by the amount of food available. As densities increase food availability per individual decreases. A plant that was deer proof decades ago may now sustain damage. The weather also has an effect. In drought years when available food decreases, we see deer relying on plants they would never bother with in better times. Winter can also bring food scarcity and force the herd to rely on less palatable food. Temporary four-foot fencing can protect plants from this seasonal damage. Do not feed deer, this exacerbates the problem by supporting more deer.

Deer are simply trying to live their lives. The environmental conditions that led to this imbalance are human induced and require our stewardship to correct the situation. We can fence off and spray our gardens, but those strategies are not realistic on most of the acres of preserved land in the state. Native plant communities that form the foundation of the ecosystems that we rely upon need our help.

References

1NJDEP, 1/2025. Wildlife Populations: White Tailed Deer, Environmental Trends Report. https://dep.nj.gov/dsr/environmental-trends/white-tailed-deer/

2Photos by Monmouth County Park System Staff

3Maslo, B & S Wehman. 2013. An Overview of White-tailed Deer Status & Management in NJ. Rutgers Cooperative Extension Fact Sheet FS1202. https://njaes.rutgers.edu/fs1202/

4DeVito, E. & J Kelly. The White-tailed Deer Problem in NJ. NJ Farm Bureau. https://deer.njfb.org/devito-kelly/

5Schuman, M. 2022. The Impact of White-tailed Deer on NJ Farming. Rutgers Today. https://www.rutgers.edu/news/impact-white-tailed-deer-new-jersey-farming

6Maslo, B. 2016. Deer in the New Jersey Landscape and Garden. Rutgers – NJ Agriculture Experiment Station https://sebsnjaesnews.rutgers.edu/2016/04/deer-in-the-new-jersey-landscape-and-garden/

7Miller, K. et al., 2023. Overabundant Deer and Invasive Plants Drive Widespread Regeneration Debt in Eastern US National Parks. Ecological Applications. 33 https://esajournals.onlinelibrary.wiley.com/doi/10.1002/eap.2837?__cf_chl_tk=BjA7RrNLh_Gt4jbV562SVPqDrVbzOTyD.YnROFZ1Xrc-1788883170-1.0.1.1-looBvV4FnRXN.uiJUqIdsfVu0zLUUu_2YiH61EKpckw

8Wikimedia Commons. Public Domain. Free Art. Creative Commons 2.0 https://commons.wikimedia.org/wiki/File:Vireo_olivaceus_-Madison_-Wisconsin_-USA-8.jpg

9. DeCalesta, D. 1994. Effect of White-tailed Deer on Songbirds Within Managed Forests in PA. J. Wildl Manage. 58(4):711-718. https://www.fs.usda.gov/nrs/pubs/jrnl/1994/ne_1994_decalesta_001.pdf

Deer Resistant Annuals for Full Sun Gardens

Kate B. Lepis, Ph.D., Horticulturist

Floss Flower (*Ageratum houstonianum*) is good for the front edge of the garden (Height 0.5-1'). Blue flowers are most common, but white is usually available as seed.





Sweet Alyssum (*Lobularia maritima*) is a mounding annual for the front border edge (Height 0.25-0.75'). Blooms come in white and shades of purple.

Annual Vinca (*Calycanthus roseus*) grows up to 1.5' tall making it good for the front half of the garden bed. Flowers come in white or shades of red, pink, and purple.



Canna (*Canna sp.*) are herbaceous plants that spread by rhizomes (underground stems). Plant rhizomes in the spring. Heights vary depending on the species or cultivar selected: short cannas (height 3-4'), medium (height 4-5'), tall (height 5-6'), and giant (height 6-8'). After the first frost, dig up and overwinter in a basement or attached garage. Blooms come in red, yellow, orange, or pink. Foliage can be varying shades of green, burgundy, or in a variety of variegated patterns.



Celosia (*Celosia argentea*) are annuals grouped based on the arrangement of the tiny flowers. The plume group has flower clusters resembling a feather duster and the cock's comb has wavy flower clusters resembling the surface of a brain. These annuals are good for the front half of the garden (height 1-2'). Colors range from yellow, orange, red, and pink. A third group, wheat, is another species (*Deeringia spicata*) with purple flowers arranged into a pointy cylinder. Wheat celosia is a bit taller (height 2-4') so they can be used in the back half of the garden bed.


Plume


Cock's comb[1]


Wheat

Dahlia (*Dahlia sp.*) have tuberous roots that are planted in the spring. Blooms come in many shapes, sizes, and colors. Plants can be 1-5' tall depending on the variety. They are hardy to zone 7 and may survive winter in Monmouth County. When in doubt, dig up tubers in late fall and overwinter in a basement or attached garage.



Lantana (*Lantana camara*) is a woody shrub in zones 10-11, but in colder climates are grown as bedding plants. Plants can be container grown and overwintered indoors in a very bright room. The circular cluster of tubular flowers come in white, yellow, red, orange, and purple. The flowers often change color as they open – displaying stunning color combinations.



Ornamental Peppers (*Capsicum annuum*) reach 1-2' in height and are great in the front border. Unlike the peppers grown in the veggie garden, these are considered inedible. The small white flowers give way to the real display of small colorful pods that change color as they mature – combination of green, yellow, orange, red, and purple are possible.



Salvia (*Salvia sp.*) is a very large genus that includes sage – species grown for culinary/medicinal purposes. Several species of salvia are grown as bedding plants – two are deer resistant. Mealycup sage (*Salvia farinacea*) sometimes over winters in Monmouth County. Flower stalks in white or shades of blue can be grown in the front half of the garden (height 1-3'). Texas sage (*Salvia coccinea*) displays vibrant red flowers (height 1-2') and can be used in a similar fashion as mealycup sage.


Mealycup sage


Texas sage

Snapdragon (*Antirrhinum majus*) is a short-lived perennial hardy to zone 7. Some years gardeners get lucky and plants overwinter. The flower stalks come in white, yellow, pink, red, orange, peach, or purple, while some varieties are bi-colored. Growing to three feet tall they display well in the front half of the garden. A variety called Snaptini is dwarf (height 0.5') and can be used in the front edge.



Zinnias (*Zinnia elegans*) are a true workhorse of the flower garden. Some hybrids like Profusion are short in stature (height 1-2'), working well in the front half of the garden. Others, like State Fair can grow to be 3-4' tall. Taller zinnas may experience some herbivory, especially as younger seedlings.


Zinnia Profusion

References

1Wikimedia Commons. Public Domain. Free Art. Creative Commons 4.0 https://commons.wikimedia.org/wiki/File:Celosia_cristata_(8)_1200.jpg

Missouri Botanical Garden Plant Finder. https://plantfinder.mobot.org/



The Science Of Snow

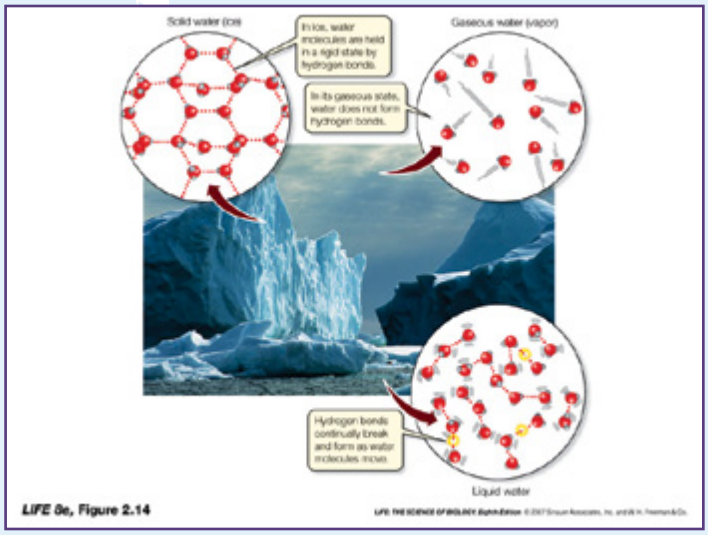
Heather FitzGerald, Park Naturalist



Besides the colder temperatures and shorter days, snow is without a doubt winter's most defining characteristic. It can lead to many hazards in our day-to-day shuffle, but let's not forget that snow may also be part of our favorite experiences; school closings leading to cozy family days, a picturesque winter walk through your favorite park, winter sports, or maybe just trying to capture a single perfect snowflake on your glove. Beyond being a seasonal nuisance or a scenic backdrop, snow is a crucial component of Earth's life-support system. In this article, we will be discussing the science behind snow starting at its atomic level, its changing physical properties, how snowflakes are made, and the factors that influence snow formation.

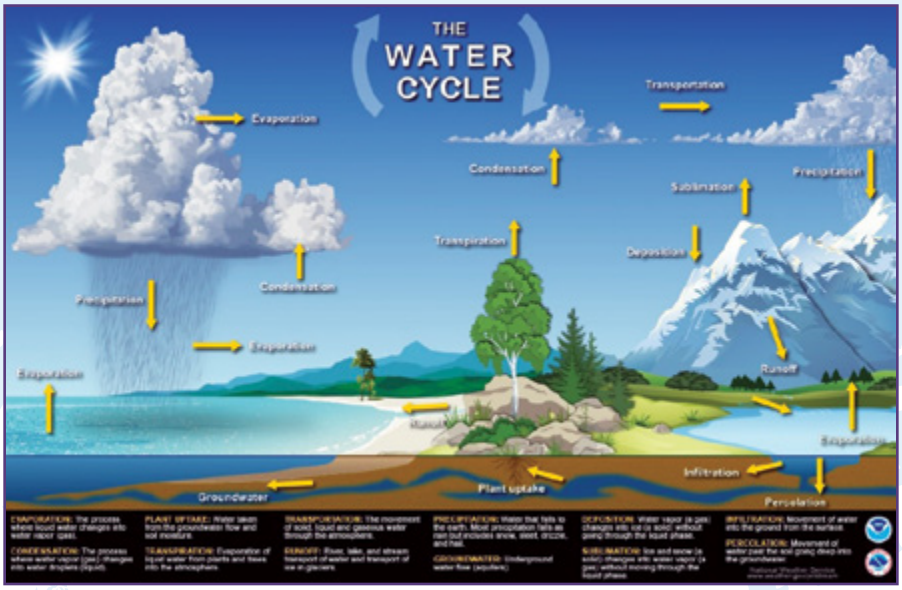
Did you S'know?

Snow is chemically identical to liquid water. A single water molecule has the chemical formula: H_2O; one oxygen atom bonded to two hydrogen atoms. Water is considered a polar molecule because it has an unequal sharing of electrons and a bent shape, which creates a positive side and a negative side. This polarity plays an important role in defining the structural bonds created in water, ice, and snow. Weak hydrogen bonds form due to the slightly negative oxygen of one water molecule binding to the slightly positive hydrogen of another.[1] When looking at liquid water, these hydrogen bonds continuously break and reform in a fraction of a picosecond (that's one trillionth of a second!).[3] Whereas the hydrogen bonds of ice are stable and locked in a fixed, open hexagonal crystal structure. Water molecules constantly change their form between solid, liquid, and gas as they move through the water cycle. In fact, the Earth's water has been here since before the age of dinosaurs, constantly changing its shape and form. It is the same water we drink and swim in today.



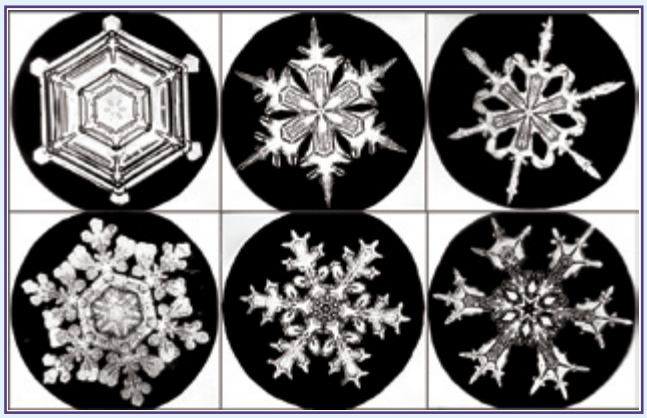
The Water Cycle

During evaporation, the sun heats the Earth's water to create gaseous vapors that rise into the sky. When this vapor meets tiny airborne particles called cloud nuclei, they attach forming a tiny droplet called a cloud droplet. Cloud nuclei can be from both natural and man-made origins such as pollen, sea salt from ocean spray, smoke from wildfires, soot from burning fossil fuels, sulfates and aerosols from vehicle exhausts and factories, and industrial chemical pollution. Rising air currents push up against these droplets and keep them floating. A single cloud droplet weighs about four trillionths of a gram



before it combines with others to fall.[1] Gravity takes over when the droplets become too heavy for the rising air to support, and they fall as rain, snow, or other precipitation. Rain forms when atmospheric temperatures remain above freezing from the cloud layer all the way down to the ground. If that entire vertical column of air stays at or below 32°F (0°C), ice crystals will remain frozen the entire way down reaching the ground as snow. Sleet will form if the snow falls through a warm layer of air causing it to melt into rain, then passes through a deep-freezing layer near the ground that causes it to refreeze into ice pellets before impact.[2]

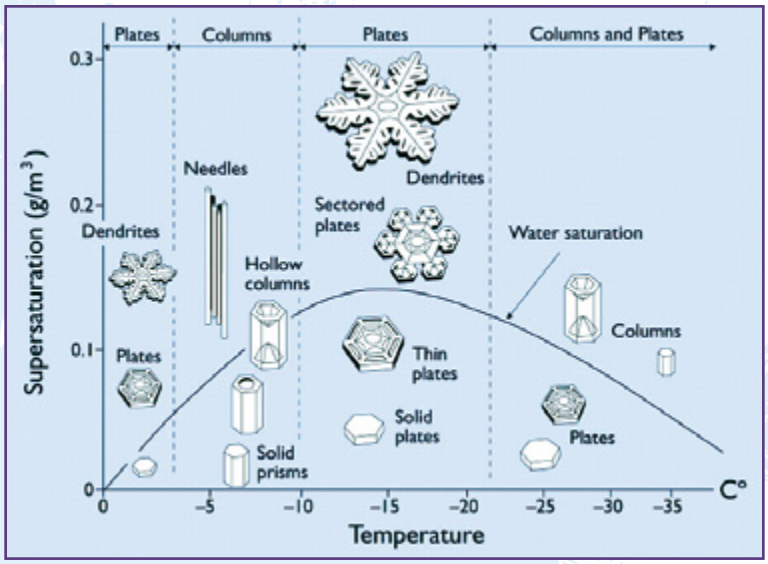
The Study of Snowflakes



In 1885, Wilson Bentley, a Vermont farmer at the age of 19, took the first close-up photograph of a single snowflake by adapting a microscope to a camera. From 1885-1931, Bentley photographed over 5,000 unique crystals, developing the idea that every crystal was a masterpiece of design and no one design was ever repeated. "When a snowflake melted, that design was forever lost … without leaving any record behind," Bently stated during a 1925 interview.[4]

A snowflake begins to form in a cloud when a cold-water droplet freezes onto a solid particle to create an ice crystal seed. As water vapor freezes onto this seed, new molecules attach in a hexagonal pattern to form six distinct arms.[5] As stated earlier, a water molecule has a bent shape due to its polarity. So as more water vapor freezes onto the microscopic ice "seed," it naturally mimics the underlying molecular blueprint. The six corners of the initial hexagon have the strongest chemical attraction, so new molecules attach there first. This causes six distinct arms to grow outward, ultimately creating the classic symmetry of a snowflake.

Each individual snowflake follows its own path as it falls to the ground. By growing snow crystals in the laboratory under controlled conditions, it was found that a snowflake's shape depends on different levels of temperature, humidity, and moisture. These changing conditions dictate how and where new water molecules will attach to the growing ice crystal.[6] Thus, proving Wilson Bentley's statement, "No two snowflakes are alike."



The Importance of Snow

Snow is a crucial part of the Earth's life-support system that regulates climate, insulates soil, and provides essential water resources. By reflecting incoming solar radiation back into space, it helps to cool the planet and maintain global temperature patterns. Fresh, uncompacted snow consists of about 90% to 95% trapped air.[3] It acts like a blanket, creating a protective microclimate layer right above the soil where mosses, fungi, insects, and small animals find warmth, food, and safety to survive winter. Snowmelt recharges groundwater levels, refills local rivers and reservoirs, and supplies essential freshwater to the ecosystem. But as global temperatures rise, winters are becoming warmer, shorter, and less predictable. We may see a shift in plant activity starting ahead of historical averages. Milder winters fail to kill off certain ticks, insects, and invasive plant species that rely on hard freezes to control populations. Ultimately, the loss of a reliable snowpack threatens to unravel the delicate natural buffers that keep our environment stable.



Sledding at Holmdel Park from 1983.

Works Cited

1. US Geological Survey, Dept. of the Interior. "Explore Search: Water" www.usgs.gov
2. National Oceanic and Atmospheric Administration. "The Water Cycle" www.noaa.gov
3. National Snow and Ice Data Center https://nsidc.org
4. Jericho Historical Society. https://snowflakebentley.com/
5. National Oceanic and Atmospheric Administration. "How do snowflakes form? Get the science behind snow" www.noaa.gov
6. Kenneth Libbrecht. www.Snowcrystals.com

GREEN HERITAGE

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What Can You Grow Throughout The Winter?

Keep your green thumb active this winter right here in New Jersey by planting cold-hardy outdoor crops like spinach, kale, and garlic that brave the garden frost. For indoors, now is the perfect time to setup grow lights and start preparing your seeds for spring favorites like tomatoes, peppers, and herbs. With a little planning, your Garden State harvest never truly has to stop!





A winter garden in growing zone 8 is filled with broccoli, kale, and collard greens covered in a fresh blanket of snow. Photo by AsheyBelle.

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Deer Resistant Annuals For Full Sun Gardens

The Science Of Snow