

Joan and John Evans Legacy Sundial

Information about the Plants & Animals Depicted in the Sundial

By Richard Evans

Why are images of plants and animals included in the sundial?

Images of plants and animals are included to remind us that our lives, and the lives of virtually all organisms on earth, are intimately connected to and controlled by the relative motions and positions of the sun and earth. It is easy to take for granted that in spring birds sing at dawn and frogs call in the evening; that in summer crickets call and lightening bugs flash in the evening. Yet it is worth reflecting on the fact that it is the relative motions and positions of the sun and earth that ultimately drive the activities and seasonal cycles of these and a multitude of other organisms on earth.

The cycles of organisms in turn drive daily and seasonal cycles of ecosystems and the entire biosphere. For example, daily and seasonal cycles of light, dark, and temperature drive cycles of photosynthesis, decomposition, and respiration. These in turn drive daily and seasonal cycles in the levels of dissolved oxygen, carbon dioxide, and acidity in ponds, lakes, and streams. On a global scale, carbon dioxide concentrations in the atmosphere increase during winter as net photosynthesis decreases, and decrease during summer as net photosynthesis increases. Thus, our entire biosphere “breaths” – inhales and exhales – as earth circles around the sun, from summer to winter.

* Note: Hours of daylength (daylight) provided for each month are approximate and may be off by $\pm$ 10 minutes because they vary from year to year.

January, Northern Cardinal (*Cardinalis cardinalis*)

Daylength increasing following the Winter Solstice in December, from about 9 to about 10 hours of daylight in Janesville, Wisconsin.



Keep an eye – and ear – out for resident Northern Cardinals. Both the males and females sing year-round.

Northern Cardinals are one of the most widely recognized and popular of the more than 300 species of birds that occur in Wisconsin. The sight of a

brilliant scarlet-red male Cardinal against fresh white snow is striking and sure to brighten your day. Although not as brilliantly colored as the male's, the female's plumage is a beautiful mixture of tan and creamy-orange with accents of red wings, tail, and bill.

Northern Cardinals do not migrate and are permanent, year-round residents of most of the eastern two-thirds of the United States. Unlike most songbirds, Northern Cardinals retain their colorful plumage and sing year-round, and both the males and females sing. Northern Cardinals are only active during daylight (diurnal) and may sing throughout the day.

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From late October through February Northern Cardinals often gather together in small flocks. From late February through August, they are busy finding and defending breeding territories, courtship, nest-building, breeding, and nurturing their offspring. From late August into October, they are molting; replacing year-old feathers with new feathers.

The best habitats for Northern Cardinals are open woodlands that include a mix of dense shrubs – where they place their nests – and some open spaces and trees. Thus, they inhabit and are frequently seen in parks and backyards. The main food of Northern Cardinals is a mix of fruits and seeds, supplemented with insects.

For More Information about Northern Cardinals, including song recordings, see:

https://www.allaboutbirds.org/guide/Northern_Cardinal

(Cornell University Laboratory of Ornithology website).

February, Red Fox (*Vulpes vulpes*)

Daylength increasing from about 10 hours to about 11 hours 15 minutes in Janesville, Wisconsin.



Image from <https://unsplash.com/s/photos/red-fox>

Keep an eye out for Red Foxes – they are active and mate this time of year.

Two species of foxes occur throughout Wisconsin – and most of the United States: Red Fox and Gray Fox (*Urocyon cinereoargenteus*). The simplest way to tell a Red Fox from a Gray Fox is that Red Foxes have black feet and “stockings” (lower legs) and a white tip on their tail, whereas Gray Foxes don’t have either of these color markings. The fox depicted on the sundial is a Red Fox. A healthy adult Red Fox typically weighs

about 10 pounds and is about three feet long including the tail, which is 12 to 16 inches long.

During most of the year – spring, summer, and fall – Red Foxes are most active during very early mornings and in the evenings (crepuscular). They are active to a lesser degree at night (nocturnal), and typically sleep during the day. However, during the winter Red Foxes are often active during the day. Red Foxes mate in January and February, and most keep the same mate (are monogamous) throughout their lives. In late March or April, a litter of young pups – typically three to six – are born in a den. The den may be an old woodchuck burrow or a hollow log. Sometime around June, when the young are about two months old, they are weaned and are then called kits. Sometime in July or August the kits begin to hunt on their own. During autumn they disperse and go off on their own.

Red Foxes occur in a wide variety of habitats but are most abundant in areas with mixtures of forest and forest edges, brush, and open fields. In addition to excellent eyesight and sense of smell, Red Foxes have outstanding hearing which they use to hunt. Red Foxes are opportunistic feeders and

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consume a wide variety of prey, including mice, voles, squirrels, rabbits, frogs, snakes, turtles and turtle eggs, birds and bird eggs, insects, and even berries and seeds. Surprisingly, when not raising young, and even in the winter, adult Red Foxes often sleep out in the open with their tails curled over their nose and feet to keep warm.

For More Information see:

https://en.wikipedia.org/wiki/American_red_fox

https://en.wikipedia.org/wiki/Gray_fox

March, Spring Equinox

Daylength is rapidly increasing and crosses the 12-hour mark, from about 11 hours 15 minutes to about 12 hours and 45 minutes in Janesville, Wisconsin.

April, Daffodil (*Narcissus* species)

Daylength continuing to increase, from about 12 hours 45 minutes to about 14 hours in Janesville, Wisconsin.



Daffodils and other spring ephemeral flowers signal longer, warmer days ahead.

Daffodils, which are originally from Eurasia, are popular flowers and common sights in gardens and yards during early spring. Daffodils are a type of cultivated *spring ephemeral flower* that bring a very welcome burst of color to the faded landscape of winter. Daffodil blossoms are proof that longer days of sunlight and warmer temperatures are well on the way! Like all other spring ephemeral flowers, all evidence of the Daffodils – the flowers, stems, and leaves – die and completely disappear by summer. Daffodils are the national flowers of Wales, and John Evans was proud of his Welsh heritage.

Spring ephemerals are *perennial* woodland plants that complete their life cycle in the brief time between snow melt and leaf-out of forest trees and shrubs. That is, spring ephemerals must grow, blossom, be pollinated, and set seed within the brief time after the greatest danger of frost has passed and it is warm enough to grow, but before the trees and shrubs of the forest leaf-out and block too much light to grow. In that brief time, they must also store enough energy and nutrients in their underground bulbs, corms, or rhizomes to be able to generate new leaves, stems, and flowers the next

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spring. By June, all the flowers and leaves of these plants have died and disappeared. Most of our native spring ephemeral flowers grow best in moist, rich soils in undisturbed deciduous forests. Examples of native spring ephemerals in Wisconsin include Trout Lilly, Spring Beauty, Dutchman's Breeches, Snowdrops, Bloodroot, and Bellwort.



Dutchman's Breeches

Image from

<https://www.istockphoto.com/photos/dutchman-breeches>

Although small, delicate, and ephemeral these native plants often grow in large patches and play important roles in forest ecology. They utilize and retain nutrients in the soil that could otherwise be lost to early spring rains. Later, they return the nutrients to the soil as their leaves, stems, and flowers decompose. A variety of insects depend on the nectar and pollen that spring ephemeral flowers provide at this time of year when no other nectar or pollen is available. Examples of insects entirely or largely dependent on spring ephemeral flowers include species of bumblebees, mining bees, halictic bees, and beetles. The seeds of spring ephemerals provide food for a variety of forest ants, birds, small mammals, and amphibians and reptiles. The seeds of some spring ephemerals have a fleshy, protein rich "cap" called an *elaiosome*. Forest ants disperse these seeds by carrying them to their nests to feed the elaiosomes to their young.

For more information see:

<http://authenticwisconsin.com/ephemerals.html>

https://soil.evs.buffalo.edu/index.php/Spring_Ephemerals

https://www.bbg.org/gardening/article/native_spring_ephemerals

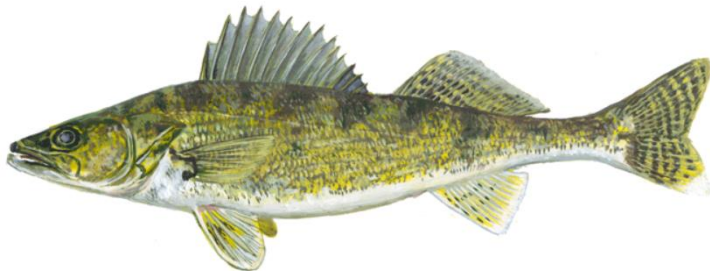
<https://hgic.clemson.edu/an-ecology-of-spring-wildflowers/>

<https://edgeofthewoodsnursery.com/thinking-of-spring-the-spring-ephemerals>

<https://edgeofthewoodsnursery.com/the-ecological-role-of-spring-ephemerals>

May, Walleye (*Sander vitreus*)

Daylength continuing to increase from about 14 hours to about 15 hours in Janesville, Wisconsin; approaching the Summer Solstice in June.



Fishing season begins for Walleye, one of Wisconsin's most iconic native fish – important to the state's culture, ecology, and economy.

Illustration by Virgil Beck, courtesy of the Wisconsin Department of Natural Resources

<https://dnr.wisconsin.gov/topic/Fishing/species/walleye.html>

Of the more than 160 species of fishes in Wisconsin, Walleye are one of the most well-



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known. They are important to the state's economy as well as the ecology of many Wisconsin lakes and rivers. Walleye are one of the most highly prized game fish in Wisconsin, and activities associated with recreational fishing for Walleye contribute significantly to the economy of the state. The Wisconsin Department of Natural Resources actively manages Walleye populations, and each year rears and stocks hundreds of thousands of young Walleye "fingerlings" into Wisconsin lakes. Typical adult Walleye caught are 15 to 24 inches long and one to five pounds, but Walleye can exceed 30 inches and ten pounds.

Although often referred to as "walleye pike," Walleye are members of the perch family, not the pike family. Other members of this fish family in Wisconsin include Yellow Perch and 15 species of darters – all of them small but many of them very colorful.

Walleye behavior is strongly influenced by changing light levels throughout the day and seasons. The common name Walleye refers to their large "glassy" eyes; the Latin species name *vitreus* means "glassy" in reference to their eyes. Walleyes have extremely sensitive eyes and are able to see exceptionally well in low light. They are typically most active hunting and feeding (mostly eating smaller fish) at dawn and dusk (crepuscular). However, Walleyes (like all fish) cannot dilate their pupils and do not have eyelids that enable them to "close" their eyes. Walleyes will seek shade and move to deep water to avoid bright light. Daily migrations of Walleyes from deeper areas of lakes during daylight to shallower waters at night are common, especially on sunny days in clear water.

Walleyes spawn from mid-April to mid-May over clean hard gravel or cobble substrate. Spawning "runs" to these areas begin in late winter, with male fish arriving first. Walleyes spawn at night, usually in small groups of one or two females and up to six males. The fertilized eggs are dispersed in the water, settle to the bottom, and hatch in about two weeks. After spawning, females soon move to their early-summer locations, but males may remain in the spawning area for several weeks.

For further information see:

<https://dnr.wisconsin.gov/topic/Fishing/species/walleye.html>

<https://www.fishandboat.com/Fish/PennsylvaniaFishes/GalleryPennsylvaniaFishes/Pages/PerchesandDarters.aspx>

<https://uwzm.integrativebiology.wisc.edu/wp-content/uploads/sites/246/2017/06/Perch-large.jpg>

June, Summer Solstice

Daylength reaches its maximum and changes little in June, from about 15 hours on June 1st to about 15 hours 20 minutes on June 30th in Janesville, Wisconsin.

NOTE: Keep a lookout for Fireflies after dusk from June through August. For information see:

<https://www.eekwi.org/animals/insects/summer-night-lights>

https://wisconsinpollinators.com/Garden/G_Firefly.aspx

[https://grow.cals.wisc.edu/deprecated/on-henry-mall/five-things-everyone-should-know-about-](https://grow.cals.wisc.edu/deprecated/on-henry-mall/five-things-everyone-should-know-about-fireflies#:~:text=Many%20of%20Wisconsin's%20fireflies%20are,luciferin%20and%20the%20enzyme%20luciferase)

[fireflies#:~:text=Many%20of%20Wisconsin's%20fireflies%20are,luciferin%20and%20the%20enzyme%20luciferase](https://grow.cals.wisc.edu/deprecated/on-henry-mall/five-things-everyone-should-know-about-fireflies#:~:text=Many%20of%20Wisconsin's%20fireflies%20are,luciferin%20and%20the%20enzyme%20luciferase)

<https://hort.extension.wisc.edu/articles/fireflies/>

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July, Cherry (*Prunus avium* or *Prunus cerasus*)

Daylength decreasing following the Summer Solstice in June, from about 15 hours 20 minutes to about 14 hours 30 minutes in Janesville, Wisconsin.



Image from
<https://unsplash.com/s/photos/cherries>

A bounty of cherries and other sweet summer fruits become available to people and wildlife alike.

A succession of sweet fruits ripens throughout the long days of summer, and in July a bounty of both wild and cultivated fruits including Blackberries, Raspberries, Blueberries, and Cherries become available. These sweet summer fruits are not only refreshing additions to our diets, they are also important foods for many species of wildlife.

Door County, Wisconsin is a major producer of both sweet (*Prunus avium*) and sour or tart (*Prunus cerasus*) varieties of Cherries. The sweet varieties are grown for direct consumption and the tart varieties are grown primarily for use in jams, pies, and other cooking. One of the reasons Door County is such a good cherry producing area is that it is surrounded by the waters of Green Bay and Lake Michigan. These big bodies of water moderate temperatures and minimize the risk of lost Cherry crops due to late spring frosts.

In addition to our cultivated, commercially available Cherries, the genus *Prunus* also includes a variety of other “wild” trees and shrubs that produce fruit important to wildlife. Examples include Black Cherry, Pin Cherry, and Choke Cherry trees. All of these trees provide summer fruit important for wildlife in Wisconsin, including songbirds like Cedar Waxwings and Robins, and mammals like Black Bears.

Blackberries and Raspberries (*Rubus sp.*) are widely available and often free for the picking on public lands and along roadsides. Blackberries and Raspberries are also one of the most important summer foods for many species of wildlife, including birds like Grouse, Cardinals, Catbirds, Orioles, Tanagers, Brown Thrashers, and Yellow-breasted Chats; and mammals like Squirrels, Chipmunks, Raccoons, and Black Bears.

Just as flowers evolved to entice animals to provide pollination services, fruits evolved to entice animals to provide seed dispersal services. When consumed, the seeds of the fruits are not digested, but are either regurgitated or simply pass through the digestive systems intact. Cherry pits are regurgitated by Cedar Waxwings and Robins, but simply pass through the digestive system of Black Bears. The small seeds of Blackberries and Raspberries simply pass through the digestive systems intact. The seeds are thus not only dispersed by the animals, but “planted” in the droppings – a rich source of nutrient fertilizers!

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For more information see:

<https://wi101.wisc.edu/2017/07/01/the-cherry-industry-in-door-county/>

[https://en.wikipedia.org/wiki/Cherry#:~:text=A%20cherry%20is%20the%20fruit,fleshy%20drupe%20\(stone%20fruit\)](https://en.wikipedia.org/wiki/Cherry#:~:text=A%20cherry%20is%20the%20fruit,fleshy%20drupe%20(stone%20fruit))

Martin, A.C., H.S. Zim, and A.L. Nelson. 1951. American Wildlife and Plants: A Guide to Wildlife Food Habits. Published under the direction of the United States Fish and Wildlife Service, Department of Interior. Dover edition, published in 1961. 500 pp.

August, Monarch Butterfly (*Danaus plexippus*)

Daylength decreasing from about 14 hours 30 minutes to about 13 hours 10 minutes in Janesville, Wisconsin.



The complex ecology of Monarch butterflies culminates in long fall migrations.

Monarchs are the most widely recognized of the approximately 750 species of butterflies in the

Images from https://en.wikipedia.org/wiki/Monarch_butterfly

United States. The life history and ecology of Monarch butterflies is complex and truly amazing. It involves “chemical warfare” as well as one of the longest and most complex insect migrations in the world.

Like many insects, the Monarch life cycle involves four distinct stages: egg, larva, pupa, and adult. The larva are caterpillars that feed exclusively on various species of Milkweed plants that contain toxins (*cardiac glycosides*). Most animals can’t consume Milkweed plants because of the toxins. But Monarch caterpillars not only consume them, they retain the toxins, which then make the caterpillars toxic to potential predators. Rather than trying to hide from potential predators, the caterpillars “advertise” their toxic quality through their bold black, white, and yellow horizontal stripes. Furthermore, the toxins accumulated by the caterpillars are retained through the pupal stage – where metamorphosis occurs – and into the adults, which are thus also toxic to predators. Unlike the caterpillars, adult Monarchs sip nectar from a wide variety of flowers.



Although very similar, it’s possible to tell male and female Monarchs apart. Males have a small black spot near the middle of each hind-wing which females do not have. The black spots are special scent glands that release pheromones (chemical scents) that attract females. Females, on the other hand, have noticeably thicker black veins in their wings. After mating, females search for and lay eggs on

Milkweed plants. Each of the two or three summer generations of Monarchs complete this life cycle in two to six weeks, but the autumn-through-winter generation takes up to nine months.



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From late August into October, decreasing day length and temperatures stimulate adult Monarchs across the eastern United States and southern Canada to begin their long migration south. This migration can take several months and may be as long as 3,000 miles. All along the way the butterflies must have nectar sources to “fuel” their flight. While some of the Monarchs overwinter in southern Florida, the vast majority fly to very specific locations in the mountains of central Mexico. Beginning in March, increasing day length and temperatures stimulate these overwintering Monarchs to migrate north again. By April they’ve reached the southern United States where they mate, lay their eggs on Milkweed plants, and die. The next two generations – the “children” and “grandchildren” of the overwintering generation – continue the migration north to the Monarch summer habitats.

How Monarchs from as far away as New Brunswick and Saskatchewan in Canada navigate their way in the autumn to very specific locations in central Mexico remains a mystery. Research has shown that Monarchs very likely use a “sun compass” – the location of the sun throughout the day – as part of their migratory navigation system. Adult Monarchs possess magnetic sensors in their antennae, and there is some evidence that a “magnetic compass” may also aid their migratory navigation. How they find the very specific overwintering locations in the mountains of Mexico may also involve chemical scents.

These migratory populations of Monarch butterflies have been in precipitous decline recently. (Non-migratory populations of Monarch butterflies exist in South American and Europe.) Monarch butterflies were listed as a Candidate for inclusion as a Threatened or Endangered species under the United States Endangered Species Act in December, 2020. In July, 2022, the migratory populations of Monarch butterflies in the eastern U.S. were classified as *Endangered* by the International Union for the Conservation of Nature (IUCN). The IUCN estimated these populations have declined by between 22% and 72% in recent years. Causes for the decline include habitat loss, insecticides, diseases, climate change, and invasive species.

Anyone and everyone can help maintain Monarch populations by protecting and expanding their local populations of Milkweed for the caterpillars and native flowers for the adults. Additionally, you can support one of the many larger-scale Monarch butterfly conservation efforts underway, and/or participate as “citizen scientist” in Monarch research and monitoring.

For more information see:

<https://monarchjointventure.org/monarch-biology>

<https://www.fws.gov/initiative/pollinators/monarchs>

https://en.wikipedia.org/wiki/Monarch_butterfly

<https://www.si.edu/spotlight/buginfo/monarch>

<https://www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates/Monarch-Butterfly>

September, Fall Equinox

Daylength is rapidly decreasing and crosses the 12-hour mark, from about 13 hours 10 minutes to about 11 hours 50 minutes in Janesville, Wisconsin.

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October, Acorn (*Quercus* sp.)

Daylength decreasing from about 11 hours 50 minutes to about 10 hours 20 minutes in Janesville, Wisconsin.

Acorns and other nuts provide the food and fuel many species of wildlife need to survive the approaching winter.

Image of acorns from various species of oak trees, from :

<https://www.pinterest.com/pin/391391023865400868/>

The rapidly shortening days and cooler temperatures in October bring a kaleidoscope of bright colors to forested landscapes and a bounty of nuts essential for wildlife. Nuts contain high amounts of lipids (fats and oils), which have about twice the energy content of the carbohydrates found in the sweeter summer fruits (see July). Acorns – the fruits of oak trees – are iconic symbols of this time of year for they are ubiquitous and familiar; and no other type of nut is as valuable to as many species of wildlife.

The many species of oak trees are divided into two distinct groups based on the time it takes for their acorns to mature. Acorns of species in the “white oak group” mature in one season, whereas acorns of species in the “red oak group” require two full seasons to mature. White oak group acorns generally contain more carbohydrates and less tannic acids and do not last as long in storage as acorns from species in the red oak group. This leads some wildlife species to prefer to eat the white oak group acorns and store the red oak group acorns.

Probably the animal most associated with eating acorns is the Gray Squirrel, which is also reported to be “the most commonly seen mammal in the eastern United States.” For as long as half of every year, Gray Squirrels may rely on the acorns they bury – one at a time – in the ground in the fall. Populations of Gray Squirrels often fluctuate in response to the abundance of acorns and other nuts available each year.

Other animals that store acorns for winter consumption include Chipmunks, Southern Flying Squirrels, a variety of mice, and Blue Jays. Southern Flying Squirrels (which are fairly common but rarely seen because they are nocturnal) and Blue Jays store piles of acorns in hollow trees. Chipmunks store the acorns in their underground burrows.

Black Bears must accumulate enough fat reserves in the fall to insulate them and sustain them through their winter sleep, and pregnant female bears must also accumulate enough fat to nourish their developing young through the winter. To meet these needs, Black Bears may spend 20 hours a day feeding – mainly on acorns – and consume as much as 20,000 calories a day in the fall.

White-tailed Deer, Wood Ducks, Ruffed Grouse, and Wild Turkeys also gorge themselves on acorns this time of year to boost their energy reserves for the coming winter. Acorns may comprise 80 percent of the diet of White-tailed Deer during the fall. As with Black Bears, this acorn rich diet produces fat reserves that provide the insulation and energy that enable White-tailed Deer to survive the harsh winter conditions and give birth to fawns in the spring. Wood Ducks, Ruffed Grouse, and Wild Turkeys swallow acorns whole, relying on their muscular gizzards containing sand and small stones to grind them up.

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For more information see:

Daley-Laursen, S.B., and J. DeBoe, eds. 1991. The Oak Resource in the Upper Midwest: Implications for Management. Minnesota Extension Service, University of Minnesota. 309 pp.

<https://blog.nwf.org/2013/10/the-wildlife-benefits-of-acorns-and-oaks/>

<https://edis.ifas.ufl.edu/publication/UW292>

November, Wild Turkey (*Meleagris gallopavo*)

Daylength decreasing from about 10 hours 20 minutes to about 9 hours 20 minutes in Janesville, Wisconsin; approaching the winter solstice in December.

The Wild Turkey has had a long, intimate, and mutually consequential history with humans, and is a conservation success story.



Image courtesy of the National Wild Turkey Federation

<https://www.nwtf.org/hunt/article/wild-turkey-body-language>

Wild Turkeys have been very important to human cultures for at least 1,000 years. They were vitally important to many Native American cultures for food, clothing, tools, and religious and decorative art. When Europeans first colonized North America in the 1600's Wild Turkeys inhabited 39 of what became the 50 United States – including Wisconsin. Wild Turkeys were an important food for early European settlers through the 1700's.

However, by the 1800's Wild Turkey populations were plummeting because of unlimited hunting and habitat destruction (deforestation). By the early 1900's, Wild Turkeys had been extirpated from many states and were at risk of extinction. Wild Turkeys were extirpated from Wisconsin for nearly 100 years, from about 1880 to 1976.

Recovery of our Wild Turkey populations began with the partial recovery of our forests in the early 1900's as the result of better forest management practices and the establishment of the United States Forest Service in 1905. The recovery was soon bolstered by the establishment of state and federal wildlife conservation agencies and laws, and the establishment of the science of wildlife management by University of Wisconsin Professor and conservation leader Aldo Leopold.

At first large-scale efforts were undertaken to raise "wild" turkeys in pens on farms and then release them to natural areas. But these turned out to be massive failures. Why? Because newly hatched Wild Turkeys – called poults – must imprint on their mother within 24 hours and learn the behaviors that are essential for survival and successful reproduction in the wild.



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Tremendous success at restoring and expanding Wild Turkey populations has been achieved in the past 70 years through “trap and transfer” programs. These programs trapped flocks of Wild Turkeys and transferred them to natural areas. In 1976, Wisconsin provided Ruffed Grouse to the state of Missouri in exchange for Wild Turkeys, which were then released in Vernon County. After several more trap and transfers to Wisconsin, Wild Turkeys have flourished and spread throughout the state to the extent that hunting for them is now allowed.

For more information see:

https://en.wikipedia.org/wiki/Wild_turkey

<https://www.nwtf-wi.com/eastern-wild-turkey-information.html>

<https://www.eekwi.org/animals/birds/wild-turkey#:~:text=Wild%20turkeys%20are%20native%20to,wild%20turkeys%20disappeared%20from%20Wisconsin>

December, Winter Solstice

Daylength is nearly constant, from about 9 hours 20 minutes on December 1st, and about 9 hours 10 minutes on December 31st.
