Let children walk with nature. Let them see the beautiful blendings and communions of death and life. Their joys inseparable unity. As taught in woods and meadows. Plains and mountains. And streams. -John Muir

Forest Hill Nature Area:

In 1992, the Gratiot County Soil Conservation District acquired a 90 acre abandoned farm from the U.S. Department of Agriculture. In 1993, the District leased the property to the Gratiot-Isabella RESD to develop an outdoor education center. The RESD named the property, the Forest Hill Nature Area and in partnership with the U.S. Fish and Wildlife Service began a major wetland restoration project.

Forest Hill Nature Area, located in northern Gratiot County, Michigan, is land that has been set aside for the preservation and appreciation of the natural world. The nature area has walking trails through 90 acres of gently rolling hills, open fields, wetlands, willow thickets, and woodlots. Forest Hill Nature Area is home to a variety of wildlife such as white-tailed deer, muskrats, ducks and turkeys.

Also, over the years, some farm buildings were demolished while others were renovated. The Nature Area has evolved into an important outdoor educational resource for the school children in Gratiot and Isabella Counties as well as the citizens of Mid-Michigan. Since 1993, thousands of school children and adults have participated in field trips and nature programs at Forest Hill Nature Area.
Digital Nature Trail

Forest Hill is brimming with biodiversity and all it entails: succession, evolution, adaptation, wildlife and food chains. When an ecosystem is healthy, it is full of living and nonliving diversity. This diversity falters when an ecosystem suffers from pollution, industrialization and climate change.

This nature trail provides a guide to what natural processes and wildlife can be found at Forest Hill. It also allows you to become a citizen scientist. You don’t need a college degree to be a scientist. Anyone can use the scientific method to study and make observations about their surroundings: whether that means discovering what’s making that strange call or investigating how an American Toad makes it’s long trill.

Scan the QR code that ring our nature trail and take part in data collection to show trends in biodiversity and change at Forest Hill 5, 10, 20 years from now and beyond. Trends show us how the earth changes through vegetation growth, warming temperatures, lowering and rising waters and fluctuating wildlife presence. Understanding these changes can help us learn to interact and support the environment in more beneficial ways.
Trees, shrubs, grasses and weeds all call Forest Hill their home. Whether you are in the woodlands with the hardwood trees or the meadows full of tall grasses, fauna will surround you at Forest Hill.
The three types of Wildflowers

To understand how wildflowers grow and reproduce, it’s important to know which type of plant is being discussed. These plant types, of course, apply not only to wildflowers, but to all the thousands of hybrids that have been “made” from them as garden flowers we all enjoy. Remember, every flower is descended from a wildflower (or more than one) that is native somewhere on earth.

Annuals

Annual wildflowers are the ones which grow quickly from seed, bloom usually for a long period (about two months, on average), and then die with the first hard frost. This
means annual wildflowers live only one growing season. They are propagated by dropping their seeds as their flowers fade. This tells you that if you know of an annual that "came back" for a second year after a winter, it simply re-grew the second year from seed it produced the year before. This is called "self-sowing, and usually happens only when annual seed falls on bare ground. Most wild annuals are native to open spaces, rather than areas that are, or were originally, wooded. Popular wild annuals are the European red poppy and North America's plains coreopsis.

**Perennials**

Perennial wildflowers are the ones that "come back" each year from the same roots, forming larger and larger clumps with more and more flowers as they age. From seed, they germinate more slowly than most annuals, and make minor above-ground growth during their first growing season. Bloom usually begins their second growing season, and a perennial's season of bloom is usually much shorter than that of an annual. (The average perennial blooms for about two weeks.) Examples of perennials are common daisies, purple coneflower, St. Johnswort, and the goldenrods. Some perennials live to return year after year for decades or even centuries. Others are what botanists call "short-lived", which usually means the plant persists for less than five years.

**Biennials**

The third and smallest group of wildflowers are the biennials. These plants have a two-year life-cycle. Like perennials, they normally do not bloom their first year, but bloom and seed profusely-- for a comparatively long period-- their second. Common examples of biennials are our common roadside weed, Queen Anne's lace, and one of North America's most popular native flowers, the black-eyed Susan.

**Video for Identifying wildflowers:**

https://www.youtube.com/embed/yBY44CkQbVc

**Interactive**

http://mywildflowers.com/identify.asp
Family: Apiaceae – Carrot family
Genus Common Name: Queen Anne’s Lace
Native Status: Introduced
Daucus carota - Queen Anne’s Lace, Wild Carrot. While the root of Queen Anne’s Lace is edible, use caution! This plant, as with all members of the carrot family, has a tap root.

Family: Rosaceae – Rose family
Genus Common Name: Cinquefoil
Native Status: Introduced
Potentilla recta - Sulfur Cinquefoil, Roughfruit Cinquefoil. Sulfur Cinquefoil is an upright perennial with hairy stems to nearly 3 feet tall, found frequently along roadsides throughout most of the United States. This non-native was introduced from Europe, and is so invasive that despite its beauty is considered an obnoxious weed in Colorado, Montana, Nevada, Oregon, and Washington, and is found in all but 5 states. Sulfur Cinquefoil is also known as Roughfruit Cinquefoil.
Common Milkweed (Asclepias syriaca) has flowers in dense spherical umbels. Their color varies from white to pink to rose to almost green. The leaves are hairy, opposite and blunt tipped. Warty, fleshy, follicles are covered with fine dense hair. This species is common in fields, woodland edges, and waste places.

Eastern Purple Coneflower, Purple Coneflower - Echinacea purpurea

Family: Asteraceae – Aster family
Genus Common Name: Purple Coneflower

Native Status: Native
Echinacea purpurea - Eastern Purple Coneflower, Purple Coneflower.

There are nine species of Echinacea found in the United State, with every state except for our 9 western-most states having at least one species. This species, Echinacea purpurea, is found in more of our states (28) than any of the other species.

Echinacea purpurea is a plant that grows to about 3 feet tall, with single terminal composite blossoms having pinkish-purple rays.
Name: Early Goldenrod (Solidago juncea)
Description: Bright yellow flower clusters, sometimes shaped like fireworks.
Blooms: July - September

Name: Yarrow (Achillea millefolium)
Description: White, lacy flowers, and feathery or fern-like leaves. The flowers look like a bunch of tiny flowers clumped together.
Blooms: May - June
Fun Fact: You can tell this apart from Queen Anne’s Lace by the leaves, and the fact that the flower has no red spot.

Name: Apocynum androsaemifolium
Spreading dogbane, Bitterroot, Flytrap dogbane
The common name, Dogbane, refers to the plant’s toxic nature, which has been described as “poisonous to dogs.” Apocynum means “Away dog!” and cannabinum means “like hemp,” in reference to the strong cordage that was made by weaving together the stem’s long fibers.

Description: A perennial with opposite leaves that secretes a milky sap when bruised or broken, reaching 5-6 feet in height. Found throughout the United States.
**Name: Red Clover (Trifolium pretense)**  
Appearance: Ball-shaped flowers that are pink all over.  
Blooms: May - October

**Name: Spotted Knapweed**  
*Centaurea stoebe ssp. micranthos* (Gugler) Hayek  
Aster family (Asteraceae)  
Origin: Europe and western Asia

**Family: Asteraceae – Aster family**  
Genus Common Name: Thistle  
Native Status: Introduced

**Family: Asteraceae - Aster family**  
Genus Common Name: Thistle  
Native Status: Introduced

*Cirsium vulgare - Bull Thistle, Spear Thistle. This is an introduced species which has spread to every state in the United States. It is listed as a noxious weed (and thus it is prohibited to propagate) in at least 10 states.*
Raspberries are the fruit of raspberry plant (Rubus Idaeus). The raspberry plant is a plant of the Rosaceae family.

Name: Oxeye (Heliopsis helianthoides)
Other common names: False Sunflower, Ox-Eye
Family: Asteraceae (Sunflower)
Height: 2 to 5 ft.
Blooms: July to September
Leaf Type: toothed
Bloom Size: 2 in. (typical)
Flower Description: Individual flowers, Regular blooms, 10 or more parts

Name: Annual Fleabane
Erigeron annuus
(an annual fleabane, daisy fleabane or eastern daisy fleabane) is a North American plant species in the daisy family.
Name: White Campion
Silene latifolia
Name also: Bladder Campion (USA)
Family: Pink Family – Caryophyllaceae
Growing form: Annual, biennial or short-lived perennial herb.
Height: 30–60 cm (12–25 in.). Stem erect, branched, short-haired, upper part with glandular hairs, but not sticky.

Common Name: Hawkweed
Latin Name: Hieracium spp.
Family: Compositae
A genus of both native and exotic species, the dozen (or more) hawkweed species are difficult to distinguish but as a genus are easy to recognize. There are few orange flowers, especially along roadsides. Hawkweeds look like orange dandelions on slender stalks, but there is no milky sap. The intensity of orange varies, some are even yellow.

Name: Hoary Cress
Cardaria draba
Other common names:
whitetop
Weed Class: C
Year Listed: 1988
Native to: Europe, Asia and Northern Africa
Toxic: humans, livestock; plants may cause digestive tract irritation.
Name: The apple tree (Malus domestica) is a deciduous tree in the rose family best known for its sweet, pomaceous fruit, the apple. It is cultivated worldwide as a fruit tree, and is the most widely grown species in the genus Malus.

Name: Black-Eyed Susan (Rudbeckia hirta)

Family: Asteraceae (Sunflower)
Height: 1 to 3 ft.
Blooms: June to October
Leaf Type: toothed
Bloom Size: 2.5 in. (typical)
Flower Description: Individual flowers, Regular blooms, 10 or more parts

Name: Thimble weed (Anemone virginiana)

Other common names: Tall Anemone
Family: Ranunculaceae (Buttercup)
Height: 2 to 3 ft.
Blooms: June to August
Leaf Type: lobed
Bloom Size: 1 in. (typical)
Flower Description: Individual flowers, Regular blooms, 5 parts
Name: Spiderwort (Tradescantia virginiana)
Family: Commelinaceae (Spiderwort)
Height: 0.65 to 2 ft.
Leaf Type: smooth
Bloom Size: 2 in. (typical)
Flower Description: Individual flowers, Regular blooms, 3 parts

Name: Common Name: blue flag
Type: Herbaceous perennial
Family: Iridaceae
Native Range: Eastern United States
Zone: 3 to 9
Height: 2.00 to 2.50 feet
Spread: 2.00 to 2.50 feet
Bloom Time: May to June
Bloom Description: Violet blue
Important Factors to Tree Growth

1. Soil serves as both an anchor and the source of essential nutrients for trees. The type of soil determines which nutrients are present and the quantities available. Clay and loamy soils are generally rich in nutrients. Sandy soils usually contain few nutrients. Hardwood (broad leafed) trees tend to dominate areas containing the richer loamy soils while coniferous (needle leafed) trees are more common on sandy soils.

2. Moisture is vital to all plants. Its availability throughout the growing season helps determine which species occupy which sites. Clay and loamy soils hold moisture from summer rains much better than porous sandy soils. Pines, particularly jack and red pine, tolerate the low moisture of droughty sandy soils. Hardwood trees, like the beech and sugar maple shown on this poster, require greater amounts of moisture and prefer loamy soils. Swamps (wet forested areas) are occupied by species such as black ash, red maple, black spruce and white cedar that can tolerate saturated conditions over much of the growing season.

3. Climate is a key determinant of where certain trees and forests occur. Temperature is the most important climatic factor affecting where different trees live within a particular climate or region. The decrease in average temperature from southern to northern Michigan brings about major changes in the distribution of trees and forest types. In southern Michigan deciduous hardwood trees are the dominant forest species. Although several of those species, including sugar maple, beech, and basswood, can be found in both southern and northern Michigan, most of the oaks and hickories are restricted to the Lower Peninsula, many to its southern half. Young oak and hickory trees are easily killed by low temperatures or late frosts during the growing season.
**Sugar Maple**

Acer saccharum. The sugar maple (hard maple, rock maple) is one of our largest and finest forest trees, growing to a feet with a diameter of 2 or more feet. The tree produces a dense, round, compact crown when grown in the open and is used quite extensively as a shade or ornamental tree.

**Austrian Pine Pinus nigra**

Leaf: Evergreen needles, 4 to 6 inches long, flexible with two thick, dark green needles per fascicle.

Flower: Species is monoecious; males cylindrical, yellow, in large clusters along twigs; females oval, yellow to purple.

Fruit: Cones are ovoid, 2 to 3 inches long, yellow-brown; umbo is armed with a very short, minute prickle, maturing in the fall.

Twig: Quite stout, brown to gray in color with a large white, ovoid terminal bud.

Bark: Brown to gray, developing gray-brown ridges and dark brown furrows.

Form: A medium sized tree reaching up to 100 feet tall with a very dense crown (needles retained up to 4 years) that eventually develops a flat top.
Birch is a deciduous tree that belongs to the family Betulaceae. There are around 60 different species of birch that grow in temperate climate around the world. Birch requires well-drained soil, enough moisture and direct sunlight for the proper growth. It usually grows near the lakes and rivers. Birch is known as pioneer species because it easily populates habitats destroyed by fire. This plant is mainly cultivated because of its ornamental morphology and high-quality wood. Out of 60 birch species, 11 are listed as endangered mainly due to habitat destruction and various fungal diseases.
White Oak  
Fagaceae Quercus

**Leaf:** Alternate, simple, oblong to ovate in shape, 4 to 7 inches long; 7 to 10 rounded, finger-like lobes, sinus depth varies from deep to shallow, apex is rounded and the base is wedge-shaped, green to blue-green above and whitish below.

**Flower:** Species is monoecious; male flowers are yellow-green, borne in naked, slender catkins, 2 to 4 inches long; female flowers are reddish green and appear as very small single spikes; appearing with the leaves in mid-spring.

**Fruit:** Ovoid to oblong acorn, cap is warty and bowl-shaped, covers 1/4 of the fruit; cap always detaches at maturity; matures in one growing season in the early fall.

**Twig:** Red-brown to somewhat gray, even a bit purple at times, hairless and often shiny; multiple terminal buds are red-brown, small, rounded (globose) and hairless.

**Bark:** Whitish or ashy gray, varying from scaly on smaller stems to irregularly platy or blocky on large stems. On older trees smooth patches are not uncommon.

**Form:** A very large tree; when open grown, white oaks have rugged, irregular crowns that are wide spreading, with a stocky bole. In the forest crowns are upright and oval with trees reaching up to 100 feet tall and several feet in diameter.
Northern Red Oak
Quercus rubra

Oak trees are usually large in size. They can reach 70 feet in height and 9 feet in width. Their branches can reach 135 feet in length.

One of the biggest oaks is located in Goose Island State Park. This oak is 45 feet tall, 35 feet wide, with crown that has 90 feet in diameter.

Due to its large dimensions, oak requires large amount of water per day. It can absorb 50 gallons of water each day.

Oaks have leaves that can be lobed, serrated or flat on the edges. Certain species have leaves with bristles.

Oaks produce both male and female flowers. Male flowers are arranged in clusters called catkins. Female flowers are much smaller. Fruit of the oak is called acorn. Production of acorns starts at the age of 20 to 50 years.

Oaks produce more than 2000 acorns every year, but only one in 10 000 acorns will manage to develop into oak tree.
The components of an ecosystem are really pretty basic. The main players are plants, animals, watersheds, and climate. However, processes such as energy flow and nutrient and water cycling make ecosystems incredibly complex. Embedded within the ecosystem concept is the idea of interconnectedness. Weed introductions often alter ecosystem processes, creating a domino effect throughout the rest of the ecosystem. Let’s try to understand how such a simple thing as a new plant species can have such far-reaching effects.

### Impacts to the Ecosystem

1. **Energy Flow**
   Energy flow refers to the transfer of energy between different living organisms and their environment. This is somewhat the same as a food web. Through photosynthesis, plants use energy from the sun to grow and reproduce. When plants are eaten, the consumers use the energy stored in plants for their own movement and growth.

2. **Nutrient Cycling**
   Unlike energy, many nutrients come from the mineral soil. Others, like nitrogen, can also from the atmosphere. Many nutrients are often limited and are recycled as organisms grow, shed leaves, and die.

3. **Water Cycling**
   A watershed is the area of land drained by a common stream. Vegetation affects how a watershed functions. A watershed should store moisture from winter months and slowly release it in streams and springs.

4. **Biological Diversity**
   Plants provide food and cover for wildlife.

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**Plants & Grasses**

The components of an ecosystem are really pretty basic. The main players are plants, animals, watersheds, and climate. However, processes such as energy flow and nutrient and water cycling make ecosystems incredibly complex. Embedded within the ecosystem concept is the idea of interconnectedness. Weed introductions often alter ecosystem processes, creating a domino effect throughout the rest of the ecosystem. Let’s try to understand how such a simple thing as a new plant species can have such far-reaching effects.
Gymnocarpium dryopteris
Oak Fern

The Oak Fern is one of the most delicate and elegant of our species of ferns. The roots are creeping, fibrous, and black, forming a dense, matted mass. The young fronds make their appearance in March and April.
Wild Red Raspberry
Rubus idaeus L.

General: strong perennial with sparsely to copiously bristly and prickly branches about 1-2 m tall, the bark mostly yellow to cinnamon-brown, peeling off in layers. Flowering branches non-glandular to more or less with bristly or stalked glands and otherwise with or without hairs.

Leaves: alternate, palmate with 3-5 leaflets that are ovate to broadly lanceolate, 4-10 cm long, pointed, irregularly double sharp-toothed, greenish and hairless to stiff-hairy on the upper surface, usually grayish-woolly but sometimes greenish and almost hairless beneath. Stipules linear-awl-shaped, 4-10 mm long, often dropped soon.

Flowers: nodding, 1-4 in small clusters from upper leaf axils. Petals white, erect or ascending, narrowly oblong to oblong-spatulate, 4-6 mm long. Calyx more or less woolly and non-glandular or with bristly or stalked glands, the lobes bent back, lanceolate, mostly 4-8 mm long. Stamens 75-100, the filaments somewhat flattened, hairless. Many pistils with slender, hairless styles. Ovary woolly-hairy.

Flowering time: May-July.

Fruits: drupelets forming red, juicy, finely woolly-hairy raspberries, about 1 cm across.
Cattail Comparison
Broadleaf vs. Narrowleaf vs. Hybrid cattail
Typha latifolia vs. Typha angustifolia vs. Typha x glauca

Mature Leaves:
*Broadleaf: 14-23 mm wide, shorter than flower spike.
*Narrowleaf: 4-10 mm wide, taller than flower spike.
*Hybrid: Variable width and height, usually between broadleaf and narrowleaf in width.

Stems:
*Broadleaf: 1-3 m, stout in form  *Narrowleaf: 1-3 m, weak in form  *Hybrid: 2-3 m, stout in form

Flowers and Fruit:
*Broadleaf: male and female portions of spike typically together; spike < 6 in.  *Narrowleaf: male and female portions of spike separated by 2-4 cm gap; spike < 6 in.
*Hybrid: male and female portions of spike typically separated by 2-4 cm gap; spike 6 in or longer.

Plant communities: Broadleaf cattail is the native cattail that will often cross with narrowleaf cattail to form the hybrid, Typha x glauca. Both narrowleaf and hybrid cattails are superior competitors to broadleaf cattail, with the ability to dominate not only healthy wetlands, but also ditches and urban stormwater basins. Narrowleaf and hybrid cattails form dense, single-species stands, while the broadleaf cattail colonies are less dense.
Forest Hill is home to a variety of animals. Woodlands, wetlands, prairies, shrublands and aquatic ecosystems allow for diverse populations.
Bird Identification

1. Size and shape of the bird.
2. Color and Patterns
3. Behavior
4. Habitat

https://www.allaboutbirds.org/building-skills-the-4-keys-to-bird-identification/

Great Blue Heron: A classic silhouette: long, spear-like bill, elegant S-shaped neck, long legs.

BIRDS
• have feathers & wings
• lay eggs
• warm-blooded
**Calls:** The call is a gurgling "oak-a-lee." Call a dry "chek" and "cheer." 

**Listen to calls of this species »**

**Where they live:** The range of red-winged blackbirds extends from southern Alaska at its northern most point, to the Yucatan peninsula in the south and covers the greater part of the continent reaching from the Pacific coast of California and Canada to the eastern seaboard.

In North America Red-winged Blackbirds roost and breed in a variety of habitats, but tend to prefer wetlands. They have been known to live in fresh and saltwater marshes. On drier ground, red-winged blackbirds gravitate towards open fields (often in agricultural areas) and lightly wooded deciduous forests.

**What they look like:** The Red-winged Blackbird is a medium-sized songbird found in wetland areas. The male is black with bright red and yellow shoulders, while the female looks pale with brown feathers and stripes all over. The adult male can hide the brilliant red shoulders or show them off in a dazzling display.

This aggressive species is widespread and abundant at lower elevations of the State of Washington, in, virtually every habitat as long as a suitable microhabitat with emergent vegetation is available. They can be found along roads where ditches have created suitable habitat. Rarely, they will nest in upland shrubby areas.
The blue jay (Cyanocitta cristata) is a passerine bird in the family Corvidae, native to North America. It is resident through most of eastern and central United States, although western populations may be migratory. Resident populations are also found in Newfoundland, Canada, while breeding populations can be found in southern Canada. It breeds in both deciduous and coniferous forests, and is common near and in residential areas. It is predominantly blue with a white chest and "underpants", and a blue crest. It has a black, U-shaped collar around its neck and a black border behind the crest. Genders are similar in size and plumage, and plumage does not vary throughout the year. Four subspecies of the blue jay are recognized.

The blue jay mainly feeds on nuts and seeds such as acorns, soft fruits, arthropods, and occasionally small vertebrates. It typically glean food from trees, shrubs, and the ground, though it sometimes hawks insects from the air. Like squirrels, blue jays are known to hide nuts for later consumption. It builds an open cup nest in the branches of a tree, which both sexes participate in constructing. The clutch can contain two to seven eggs, which are blueish or light brown with brown spots. Young are altricial, and are brooded by the female for 8–12 days after hatching. They may remain with their parents for one to two months. The bird's name derives from its noisy, garrulous nature. It is sometimes called a "jaybird"
Cardinal
Cardinalis cardinalis

The cardinal is a medium sized non migratory songbird weighing in between 1.5 and 1.8 ounces. They range in length from 7-9 inches. The male cardinal sports a brilliant red color with a black mask and crested head covering. The female (a little less showy) is a pale brown with a red tipped crest and long tail. Both male and female add to their embellishments with a brilliant orange nut cracking beak.

Their beaks are adapted to help supply their food. They consume weeds, sunflower seeds, grains, fruits and occasionally an insect. Their habitat is usually found on the edges of woodlands, swamps, riverside thickets or in residential areas such as your backyard.

The cardinal being a song bird has over 24 different songs that they sing. Both the male and the female sing and have been known to do a duet. The male can often be heard when attempting to attract a mate or ward off intruders.

Song Sparrow
Melospiza melodia

*Breast with coarse brown streaks
*Often shows a spot in the middle of breast
*Thick, dark malar (moustache) stripe
*Rather long tail
The robin is one of many of the birds found in the family of thrushes. A robin can be seen in the city, on a farm, the forest or a winter berry bearing tree. Most likely you have seen them on the ground foraging for their next meal. Their food selection includes meaty earthworms, insects, snails, spiders and berries.

The warm orange breasted bird, complete with a light black tail coat and head covering can be spotted in its nest in bushes, or on low tree branches. Their nest would be constructed of the highest quality of forest finds including twigs, debris, mud and grass. The natural and not so natural elements would be shaped into a small U shaped nest. It is here that the robin will lay a clutch of 3-4 pale blue eggs. Robin's egg blue to be exact. In just 12-14 days the incubation will be complete and the new hatchlings will be ready to enter the world. 15 days after their arrivals the new robins will be ready to leave the nest. The father can often times be seen feeding and helping the young birds to fledge as the mother will be off building a new nest. The robin can have up to 3 broods of hatchlings a year. At his rate of reproduction one would expect the population of robins to be rapidly increasing, but it is not. Unfortunately, the robin's enemies include not only
Size of Canada goose depends on the subspecies. It can reach 30 to 43 inches in length and 7.1 to 14.3 pounds of weight. Males are slightly larger than females.

Head and neck of Canada goose are covered with black plumage. It has white patches on the face. The rest of the body is brown in color.

Canada goose has a wingspan of 50 to 73 inches.

Canada goose flies at the speed of 40 miles per hour during the migration, but it can accelerate to the speed of 60 miles per hour when it is threatened.

Canada goose is herbivore (plant eater). Its diet consists of grass, berries, grains and seed.

Canada goose migrates seasonally. It travels from north to south to avoid low temperatures and lack of food during the winter.
Great Blue Heron

Scientific name: Ardea herodias
Average weight: Just over 2 kg
Average height: 1 m

Killdeer Scientific Classification

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Charadriiformes
Family: Charadriidae
Genus: Charadrius
Scientific Name: Charadrius vociferus

Measurements

Length
7.9–11 in

Wingspan
18.1–18.9 in

Weight
2.6–4.5 oz

Killdeer Call

Great Blue Heron

Scientific name: Ardea herodias
Average weight: Just over 2 kg
Average height: 1 m
Green Heron (Butorides virescens)

Other names: Green-backed Heron, Garcita verde (Spanish), Heron vert (French)

What they look like: The Green Heron is a small, stocky wading bird, common in wetlands across much of North America. Greenish black cap on head with a rufous (reddish-brown) neck. The crest can be raised on back of head. Eyes orange or yellow. Wings blackish with green or blue gloss. Underparts gray. Wing feathers edged in buff. Legs yellow or yellowish orange - changing to glossy orange during breeding season.

American Yellow Warbler
Setophaga petechia

Yellow warbler is small songbird that belongs to family of New World warblers. There are 35 subspecies of yellow warblers that can be found in North, Central and South America. Yellow warbler inhabits edges of the forests and swamps, areas near the streams and rivers, mangrove forests and orchards. Yellow warbler can be found on the altitude of 9,000 feet. Habitat destruction, pollution of the ground with pesticides and accidental collisions with man-made objects represent major threats for the survival of yellow warblers in the wild. Despite these factors, yellow warblers are numerous and widespread (especially) in the North America.
What kind of turtle is that?

To identify a species, you can refer to multiple characteristics that vary from turtle to turtle (http://www.discoverlife.org/mp/20q?). To guide=Turtles). What kind of pattern is on the top of the shell? What about the head and the neck? What color are the patterns? How many scutes (bony plates) are on the plastron (bottom) shell? (http://www.peteducation.com/article.cfm?c=17+1797&aid=2700) What shape and texture is the carapace (top) shell?
Once you observe a turtle’s traits, you can use a traditional dichotomous key or an online identification guide to tell between a Red-eared Slider (Trachemys scripta elegant) and a Painted Turtle (Chrysemys picta) for example. Turtles can be terrestrial and live only on land, aquatic and live only in water, or split their time between the two. Any turtle you can find basking on the dock is either aquatic or semi-aquatic.

**Why do they lay in the sun?**

Basking is an important of a turtle’s day. UVB and UVA rays from the sun provide Vitamin D to process calcium and strengthen their shells ([http://www.redearslider.com/basking.html](http://www.redearslider.com/basking.html)). The sun’s heat helps the cold blooded turtle maintain homeostasis to make sure they are the right temperature and are digesting their food properly. Basking can also help fend off parasites like leeches and reduce algae growth on the shell. If a turtle is not allowed to bask, they’re susceptibility to predators increases while their health decreases ([http://www.ncbi.nlm.nih.gov/pubmed/22226990](http://www.ncbi.nlm.nih.gov/pubmed/22226990)). This can be brought about by competition with introduced or invasive species; for example, the red-eared slider is suspected to be a non-native turtle brought to Michigan by owners releasing their pets. Humans and their boats are also suspected to disrupt turtle basking ([http://www.sciencedirect.com/science/article/pii/S000632070706000085](http://www.sciencedirect.com/science/article/pii/S000632070706000085)). Trends can be found in the times that turtles bask. They prefer to have a higher body temperature after eating to aid in digestion ([http://www.jstor.org/stable/1442590?seq=1#page_scan_tab_contents](http://www.jstor.org/stable/1442590?seq=1#page_scan_tab_contents)). Morning time is the peak turtle basking time ([http://www.jstor.org/stable/3892589?seq=1#page_scan_tab_contents](http://www.jstor.org/stable/3892589?seq=1#page_scan_tab_contents)).
**Blanding's Turtle**

Blanding's turtle (Emys blandingii)

1. **Carapace**: Brown with yellow speckles
2. **Skin**: Dark with yellow and/or green markings and a yellow blotch beside each eye
3. **Plastron**: 12 scutes with dark marks
4. Blanding’s turtles have bright, yellow throats and speckles on their smooth black carapace and skin.

This turtle is found at Forest Hill. ([http://www.iucnredlist.org/details/7709/0](http://www.iucnredlist.org/details/7709/0)). Blanding’s turtle is an endangered species because of damage to its habitat, death by vehicles and predation by raccoons and foxes ([http://www.iucnredlist.org/details/7709/0](http://www.iucnredlist.org/details/7709/0)). They have been known to live up to 70 years ([http://www.dec.ny.gov/animals/7166.html](http://www.dec.ny.gov/animals/7166.html)). These turtles survive the winters by burrowing in muck and warmer season by hunting for prey such as fish. They may seem like a very happy, smiling turtle thanks to a notch in their beak ([http://www.biokids.umich.edu/critters/Emydoidea_blandingii/](http://www.biokids.umich.edu/critters/Emydoidea_blandingii/)).
1. **Northern map turtle** (*Graptemys geographica*)

2. **Carapace:**
   Olive green with many lines like a topographical map

3. **Skin:**
   Dark with yellow speckles except for a solid yellow throat

4. **Plastron:**
   12 solid yellow scutes

The Northern map turtle is not the most likely to be basking at Forest Hill, because they prefer moving and large water bodies like rivers and are cautious about basking ([http://srelherp.uga.edu/turtles/grageo.htm](http://srelherp.uga.edu/turtles/grageo.htm)). The carapace of a Northern map turtle looks like a topographical map ([http://www.biokids.umich.edu/critters/Graptemys_geographica/](http://www.biokids.umich.edu/critters/Graptemys_geographica/)).

Their skin is tattooed with yellow lines. This species is sexually dimorphic— the females look different than the males. In this case, the females are bigger and can eat larger prey than the males. Even though the map turtle isn’t listed as an endangered species, they are not kept as pets, because of their unique sensitivity to changes in their habitat such as pollution. Map turtles are largely carnivorous and only eat their vegetables on accident while dining on mussels, crayfish and insects. They hibernate on the water bottom in plain sight.
1. Carapace:
Dark and shaped like a dome

2. Skin:
Usually yellow lines starting at the nose and going down the neck

3. Plastron:

To feel for prey, the musk turtles use barbels, which are a sensory organ on the underside of their chin (http://www.biokids.umich.edu/critters/Sternotherus_odoratus/). Rather than swimming, musk turtles sometimes walk along the bottom of water bodies. They will do this to forage their omnivorous diet of plants and small aquatic life. They are more likely to be found in rivers and streams than ponds (http://www.ct.gov/deep/lib/deep/wildlife/pdf_files/outreach/fact_sheets/muskturtle.pdf). Musk turtles have been found to climb up branches of small shrubs and trees.
Snapping Turtle

The sharp beak of a snapping turtle is more of a threat on land where it’s aggressive than when it’s underwater and calm. (http://www.fcps.edu/islandcreekes/ ecology/common_snapping_turtle.htm) “Snappers” are mostly nocturnal and awake at night, but will ambush fish, amphibians, snakes, insects, small birds and mammals by day. To surprise their food, they bury themselves in mud and use their tongue as a worm-like bait. Carrion, dead animals, also make good meals for snapping turtles. The tail is about the same length as the shell and is lined with spikes.

Snappers grow to be from 10 to 35 pounds. (http://www.biokids.umich.edu/critters/Chelydra_serpen			
tina/). The ping pong ball sized eggs of snapping turtles can also be preyed on by birds such as hawks or mammals such as foxes. The bumps all along snapping turtle skin are called tubercles. When a turtle’s plastron (bottom shell) is small like a snapping turtle’s, they lack the ability to defend themselves by retreating into their shell. So instead of defending itself, these turtles act uncommonly aggressive.

1. Carapace:
   Dark black or brown with horny scutes

2. Skin:
   Dark head with a yellowish body

3. Plastron:
   9 yellowish scutes
Painted Turtles

Painted turtles can be found all over North America and are the most likely sight at this basking dock. ([http://www.warnernaturecenter.org/animals/paintedturtle](http://www.warnernaturecenter.org/animals/paintedturtle)).

They can even live in brakish or slightly salty waters and marshes ([http://www.ct.gov/deep/cwp/view.asp?a=2723&q=475292](http://www.ct.gov/deep/cwp/view.asp?a=2723&q=475292)).

There are four subspecies of painted turtles: the eastern painted turtle, the midland painted turtle, the western painted turtle and the southern painted turtle. ([http://www.chelonia.org/articles/diffpaintedturtles.htm](http://www.chelonia.org/articles/diffpaintedturtles.htm)).

Michigan’s lower peninsula has both eastern and midland painted turtles. They are often seen to bask in large groups of the same species or with red-eared sliders ([http://www.fcps.edu/islandcreekes/ecology/eastern_painted_turtle.htm](http://www.fcps.edu/islandcreekes/ecology/eastern_painted_turtle.htm)). These turtles have been found to live up to 60 years old in the wild ([http://www.fcps.edu/islandcreekes/ecology/eastern_painted_turtle.htm](http://www.fcps.edu/islandcreekes/ecology/eastern_painted_turtle.htm)).

To express their desire to mate, male painted turtles approach a female and shake their front claws in her face. Red-eared sliders also do this.

Chrysemys picta

1. **Carapace:**
   Dark with thick lines between scutes

2. **Skin:**
   Dark with red and yellow streaks

3. **Plastron:**
   12 yellow scutes
Trachemys scripta elegans

1. Carapace:
   Brown

2. Skin:
   Thick red lines from behind ear down the neck and skin is covered in yellow lines.

3. Plastron:
   12 yellow scutes with dark dots

Red-eared sliders are good adapters and can tolerate many living conditions, but they prefer calm waters (http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=1261). The pet trade has caused these turtles to be introduced to Michigan and other states they’re not native to. These are the most popular pet store turtle. To help stay afloat, red-eared sliders inflate their throats (http://ccfpd.org/Education/AdoptAnAnimal/RedEaredSlider.html).
Spiny Softshell Turtle

Spiny softshell turtles are sexually dimorphic: females are larger than males and only males have a sandpaper like texture to their carapace (http://www.discoverlife.org/mp/20q?guide=Turtles). Aside from basking, these turtles burrow in sand with only their snout exposed to stay warm. They spend a lot of time in the water thanks to their ability to absorb oxygen through their skin and into their blood. The spiny softshell turtle may look vulnerable, but it can also give a painful bite to creatures that threaten it. Their eggs are exceptionally brittle and vulnerable up to around 40 are laid at a time (http://www.biokids.umich.edu/critters/Apalone_spinifera/). You’re more likely to find these turtles in rivers than this pond (http://www.warnernaturecenter.org/animals/softshellturtle).
Mammals are one of the 6 main classes of animals. Animal classes are groups of animals that scientists consider to be alike in some important ways. Mammals are the animal class that people belong to.

There are only about 4,000 kinds of mammals. This sounds like a lot, but when you consider there are 21,000 kinds of fish and a whopping 800,000 kinds of insects you’ll realize mammals are a pretty small class.

All Mammals...

1. Are vertebrates (which means they have a backbone or spine).
2. Are endothermic. Also known as “warm-blooded,” endothermic animals regulate their own body temperate which allows them to live in almost every climate on Earth.
3. Have hair on their bodies.
4. Produce milk to feed their babies.
• Squirrels are rodents in the Sciuridae family.

• Animals in the Sciuridae family include squirrels, chipmunks, and woodchucks.

• There are around 280 species of squirrel.

• Squirrels live in North America, Europe, Asia and Africa.

• The most common squirrel in America is the gray squirrel.

• The word squirrel comes from the Greek word Skiouros meaning “shadow tail.”

• Squirrels are mammals.

• Squirrels are omnivores. Omnivores are animals that eat both plants and meat.

• Squirrels like to eat nuts, fruits, seeds, tree bark, roots, insects and caterpillars. Sometimes they will eat baby birds.

• A squirrel’s four front teeth never stop growing.

• Their teeth get worn down when they chomp on nuts and tree bark.
Common Name: White-tailed deer

Scientific name: Odocoileus virginianus

Size: The average adult male buck weighs about 140 pounds and stands 32-34 inches at the shoulder.

Life Span: The average lifespan of the white-tailed deer in captivity is 6 to 14 years.

Habitat: White-tailed deer can adapt to a variety of habitats including wooded forest, open prairie, savanna woodlands, and sage communities.

Food: In the wild, deer eat leaves, grass, buds, berries, bark, wild grapes, apples and acorns. At the zoo they are fed alfalfa, clover, timothy hay, and processed grains.
Types of Amphibians

1. Frogs - Frogs are amphibians of the order anura. They generally have a short body, webbed fingers and toes, bulging eyes, and no tail. Frogs are good jumpers with long powerful legs. Toads are a type of frog. Two species of frogs are the American bullfrog and the poison dart frog.

2. Salamanders - Salamanders look a bit like lizards. They have skinny bodies, short legs, and long tails. Salamanders can re-grow lost limbs and other body parts. They like wet, moist areas like wetlands. A newt is a type of salamander.

3. Caecilians - Caecilians are amphibians that don’t have legs or arms. They look a lot like snakes or worms. Some of them can be long and reach lengths of over 4 feet. They have a strong skull and a pointed nose to help them burrow through dirt and mud.

Life Cycle
Common Garter Snake

Scientific name: Thamnophis sirtalis
Average weight: 150 g
Average length: 46 to 137 cm
Average lifespan: 2 years in the wild and 6 to 10 years in captivity
The Eastern American Toad is the most widely distributed toad and can be found throughout most of the United States and Canada. Their skin and warts vary between olive, yellow, tan and reddish hues. Coloration is affected by stress, temperature and humidity. Males are smaller with dark throats while females are larger and have light throats. To tell an American Toad apart from other species, check the back for dark areas that contain one or two warts. Two paratoid glands on the head allow this toad to excrete poison when threatened by predators, such as snakes. Eggs of the Eastern American Toad are also poisonous. Fish-free and shallow water bodies are preferred for mating. Damp conditions and soft soils are required so the toad can burrow. Activity dies down with dry weather, but at night and on wet days males will call to attract females. Fall and Spring see the highest frequencies of calling. Other interesting habits include playing dead and using their front limbs to stuff too-large prey down their throat. Hybrids have been found as a result of mating between the Eastern American Toad and the Fowler’s Toad. The idea that toads can cause warts in humans is a myth. In fact, these toads are great for cutting down on insect pests in yards.
Green Frog
*Rana clamitans*


Though they’re called Green Frog, bronze or brown colors are common in this species ([http://www.enature.com/fieldguides/detail.asp?reenum=AR0027](http://www.enature.com/fieldguides/detail.asp?reenum=AR0027)). Males have a bright yellow throat and both males and females have a white belly. On rare occasions, blue Green Frogs have been found. ([http://www.biokids.umich.edu/critters/Lithobates_clamitans_clamitans/](http://www.biokids.umich.edu/critters/Lithobates_clamitans_clamitans/)) The call of a Green Frog sounds like the twang of a banjo. Green Frogs live in clear and shallow water. They’re opportunistic eaters, so they will eat almost anything that will fit in their mouth. The larch spot behind their eyes is their tympanum, or ear. It’s believed that the reason Green Frogs look like Mink Frogs, is that they want to fool predators into believing they’re toxic like the Mink Frog.
Northern Leopard Frog
*Rana pipiens*


Northern Leopard Frogs were once more abundant and commonly used for science dissections as well as frog leg feasting ([http://animals.nationalgeographic.com/animals/amphibians/northern-leopard-frog/](http://animals.nationalgeographic.com/animals/amphibians/northern-leopard-frog/)). There are less of these frogs to be found, though; possibly from climate change and pollution. Leopard Frogs are green or brown with dark brown, leopard-like spots. These frogs usually stay near water bodies, but also frequent grasslands. Even areas of cold temperatures and high elevations can be suitable for Leopard Frogs ([http://www.biokids.umich.edu/critters/Lithobates_pipiens/](http://www.biokids.umich.edu/critters/Lithobates_pipiens/)). They’re not sociable frogs, but they’re not territorial either and will hang out in the same area as other frogs. Leopard Frogs look similar to Pickerel Frogs, possibly because Pickerels have bad tasting skin that ward off predators.
Fowler’s Toad
(Bufo fowleri)
Call: http://www.in.gov/dnr/fishwild/files/fowlers2.MP3

Fowler’s Toad looks similar to the American Toad, but has more warts and plainer and lighter coloration (http://www.michigan.gov/dnr/0,4570,7-153-10370_12145_12201-60112--,00.html). Their calling sounds almost like a lamb bleating. Sometimes two males confuse each other for females and try to mate (http://www.biokids.umich.edu/critters/Anaxyrus_fowleri/). Sandy habitats near water are preferred by this toad (http://www.in.gov/dnr/fishwild/3338.htm). Loose soil allows them to burrow and hide during the day (http://www.marshall.edu/herp/old/fowlers.htm). Females lay thousands of eggs at a time in strings. The best time to see this toad is on hot and humid evenings; they’re primarily nocturnal and awake at night (http://srelherp.uga.edu/anurans/buffow.htm).

Blanchard’s Cricket Frog
(Acris crepitans blanchardi)
Call: http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/cricket_frog.mp3

Blanchard’s Cricket Frog is a grayish-green type of tree frog with dark marks on the legs and a dark triangle mark between the eyes (https://www.michigan.gov/dnr/0,4570,7-153-10370_12145_12201-32986--,00.html). Males may also have a dark throat and a yellow vocal patch. Before the 1980’s, Blanchard’s Cricket Frog was more common in Michigan. Pesticides, non-native fish and habitat change are blamed for the drop in their numbers. Male cricket frogs make a call that sounds like two pebbles are being tapped together in the evening and at night. These frogs establish their habitat next to permanent bodies of water (https://mnfi.anr.msu.edu/explorer/species.cfm?id=10848). Like other amphibians, the cricket frog is dependent on water and pollution has a big impact on their ability to survive. Blanchard’s Cricket Frog is documented to be below Gratiot county, in lower parts of Michigan, but it’s possible to find isolated habitats outside of their established range and more research about their
Mink Frog
Lithobates septentrionalis
Call: http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/mink_frog.mp3

The Mink Frog has mottled green and brown skin and can produce a rotten-onion smell from it when threatened (http://www.arkive.org/mink-frog/lithobates-septentrionalis/). Minks have a similar odor and are the reason behind the Mink Frog's name. Mink Frogs like to use water lillies as protection from predators (http://www.biokids.umich.edu/critters/Lithobates_septentrionalis/). They also use lily pads for basking in the sun (http://www.dnr.state.mn.us/reptiles_amphibians/frogs_toads/truefrogs/mink.html).

The call of a Mink Frog sounds like a hammer hitting wood or the clatter of horse hooves. Mink Frogs can be found in the Upper Peninsula of Michigan (http://www.nhptv.org/wild/minkfrog.asp).

Western Chorus Frog
Pseudacris triseriata
Call: http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/chorus_frog.mp3

These frogs have a white and a brown line running from their eye and down their throat with more lines down their back (http://www.biokids.umich.edu/critters/Pseudacris_triseriata/). Western Chorus Frogs generally have grey-green skin. This coloration provides them with good camouflage. Mink Frogs prefer wet habitats, but can also be found in forested areas. A good way to mimic the sound of this frog is to run your finger down the teeth of a comb (http://animaldiversity.org/accounts/Pseudacris_triseriata/). Their call can be heard from half a mile away. These frogs hibernate under rocks, logs and leaf litter.
Gray Tree Frog  
*Hyla versicolor* and *Hyla chrysoscelis*

**Call:** ([http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/eastern_gray_treefrog.mp3](http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/eastern_gray_treefrog.mp3)) Eastern  

Both Cope's Gray Tree Frog and the Eastern Gray Tree Frog live in Michigan. Both have a musical, trilling call, but the Cope's Gray Tree Frog has a higher pitched one. The Eastern Gray Tree Frog is tetraploid and has double the amount of chromosomes frogs usually have ([https://en.wikipedia.org/wiki/Cope%27s_gray_tree_frog](https://en.wikipedia.org/wiki/Cope%27s_gray_tree_frog)).

The Gray Tree Frog can be a solid color or come in gray, brown and green blotches ([http://www.nhptv.org/natureworks/graytreefrog.htm](http://www.nhptv.org/natureworks/graytreefrog.htm)). These frogs can even change between these colors to blend in with their surroundings. The bottom of their hind legs have yellow coloration ([http://www.michigan.gov/dnr/0,4570,7-153-10370_12145_12201-60110--00.html](http://www.michigan.gov/dnr/0,4570,7-153-10370_12145_12201-60110--00.html)). Sticky pads on their toes allow them to cling to and climb trees. The stickiness is caused my the production of mucous ([http://animaldiversity.org/accounts/Hyla_versicolor/](http://animaldiversity.org/accounts/Hyla_versicolor/)). Gray Frogs are often found jumping branch to branch in deciduous forests to catch crickets, moths and other arthropods. They will even eat other, smaller tree frogs. When it’s time to breed, males will defend territories and attract females with their calls. Come winter, the tree frog freezes, but circulates glucose through its body, to stay alive.

Wood Frog  
*Lithobates sylvaticus*

**Call:** [http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/woodfrog.mp3](http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/woodfrog.mp3)

Wood frogs are brown with a darker “mask” over their eyes ([http://www.biokids.umich.edu/critters/Lithobates_sylvaticus/](http://www.biokids.umich.edu/critters/Lithobates_sylvaticus/)). These frogs need forests and fish-free waters to survive. Great numbers of wood frogs gather in water bodies in late winter and early spring to breed. Warmer waters cause their eggs to hatch faster. Males call to attract females and sound like quacking ducks. Wood Frogs are active in the day and night, migrate together to ponds and can recognize their own siblings. They can’t recognize each other’s gender by sight, though. Wood Frogs are well adapted to cold and produce an antifreeze to protect their cells while they hibernate ([https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Wood-Frog.aspx](https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Wood-Frog.aspx)).
Pickerel Frog
Lithobates palustris
Call: http://www.in.gov/dnr/fishwild/files/pickerel2.MP3
Pickerel Frogs are light brown with dark rimmed, brown spots (http://www.nhptv.org/wild/pickerelfrog.asp). Toxic skin secretions that Pickerel Frogs produce can kill small animals and irritate human skin (http://srelherp.uga.edu/anurans/ranpal.htm). The call of male Pickerel Frogs sounds like a human snoring. These frogs spend more time on land than in the water (http://www.arkive.org/pickerel-frog/lithobates-palustris/). It will dive into water to avoid predators or to breed. Hibernation takes place in the mud on the bottom of water bodies (http://www.biokids.umich.edu/critters/Lithobates_palustris/).

Spring Peeper
Pseudacris crucifer
Call: http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/spring_peeper.mp3
Spring Peepers are a type of tree frog (https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Spring-Peeper.aspx). Spring Peepers are small, under an inch long, and have a grayish, brown coloring (http://www.feps.edu/islandcreekes/ecology/spring_peeper.htm). It's hard to spot these frogs, but easy to hear the calling in early spring. Spring Peepers are usually out and about at night and prefer woods that border water bodies. Eggs are laid underwater on vegetation. In the woods, these frogs climb shrubs to hunt for insects and spiders. They hibernate under logs in the winter. These frogs have short lives and many predators such as salamanders, birds and insects.
American Bullfrog

Rana catesbeiana

Call: http://www.umesc.usgs.gov/terrestrial/amphibians/armi/frog_calls/bullfrog.mp3

Bullfrogs are the biggest North American frog (up to 1.5 pounds heavy and 8 inches long) and are named because the males sound like a cow when they call (http://animals.nationalgeographic.com/animals/amphibians/american-bullfrog/). These frogs are green and brown with a big tympanum or ear. They’re native and widespread throughout North America and have become invasive to Asia, Europe and South America. Bullfrogs aren’t picky eaters; they’ll eat mice, insects and even snakes. Tadpoles can take up to 2 years before they metamorphose into a frog (http://www.feps.edu/islandcreekes/ecology/bullfrog.htm). To hibernate over winter, bullfrogs bury themselves in mud. Bullfrogs actually benefit from the fact that climate change is causing warmer, more vegetated water bodies (http://www.biokids.umich.edu/critters/Lithobates_catesbeianus/). In the wild, bullfrogs have been found to live up to 9 years. Bullfrogs are important research animals for the medical field, because they’re body makeup is similar to humans.
• Section 5  Aquatic Life •

Fish

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What Makes an insect and insect?

1. Insects all have a hard external covering made of something called chitin.

2. Their bodies are made up of three sections called the head, the thorax, and abdomen.

3. All insects will have a pair of antennae on their head.

4. They all have six legs connected to the thorax (arachnids will have eight legs).

5. Some insects have wings connected to the thorax and can fly.

6. Read more at: http://www.ducksters.com/animals/bugs.php

Section 6 Insects & Arachnids

Spider Parts: Answers

- Prosoma
- Chelicerae
- Pedipalp
- Eyes
- Spinnerets
- Abdomen

Insects & Arachnids
Virginia Ctenucha
Ctenucha virginica (Esper, 1794)
Family: Erebidae
Subfamily: Arctiinae
Wing Span: 4-5 cm.
Life History: Diurnal.
Flight: May-July.
Caterpillar Hosts: Grasses, irises, sedges.
Azure Damselfly

The side of the thorax has a short black line on it.
The male is blue and black and has a 'U' marking at the top of its abdomen.
The female is easily confused with other species so it is best to double check.
Flight period: May – September
**Woodlouse**

*Genus Armadillidium*  
*Family Armadillidae*

Woodlouse is crustacean that is closely related to lobsters and crabs. There are over 3,500 species of woodlice that can be found around the world. Woodlouse inhabits moist and dark habitats and usually hides under the stones and logs in the forests, jungles and areas near the shore. Woodlice are occasionally classified as pest due to ability to destroy young seedlings. On the other hand, woodlice are beneficial for the humans because they eliminate decaying plant material and increase fertility of the soil.

**Red Stinkbug Nymph**

*Order Name: Hemiptera*  
*Family Name: Pentatomidae*

Stink bugs are large, oval or shield-shaped insects. They are members of the insect order Hemiptera and the family Pentatomidae. They get their common name from the odor of the chemical that they produce in glands on their abdomen. Scientists suspect this odor might be a defense against predators.
The Viceroy Butterfly is a black-and-orange poisonous butterfly that is very similar to the Monarch; it is a Mullerian mimic of the poisonous Monarch. It can be distinguished from the Monarch by the black line that crosses its wings. Also, the undersides of its wings are quite similar to the topside (unlike the Monarch, whose underside is much lighter).

The Viceroy is a strong flier; it has a wingspan of 2.75 to 3 inches (7 to 7.5 cm). It has a black, fuzzy body.

The pearl crescent is a butterfly of North America. It is found in all parts of the United States except the west coast, and throughout Mexico and parts of southern Canada, in particular Ontario. Its habitat is open areas such as pastures, road edges, vacant lots, fields, open pine woods. Its pattern is quite variable. Males usually have black antennal knobs. Its upperside is orange with black borders; postmedian and submarginal areas are crossed by fine black marks. The underside of the hindwing has a dark marginal patch containing a light-colored crescent.
Cabbage White Butterfly (Pieris rapae)

Giant Swallowtail Butterfly (Papilio cresphontes)
Bronze Copper
Lycaena hyllus (Cramer, 1775)
Family: Lycaenidae
Subfamily: Lycaeninae
Identification: Upperside of male iridescent copper-brown; female forewing yellow-orange with black spots. Underside forewing of both sexes orange with black spots; underside hindwing is gray-white with black spots and a broad orange outer margin.
Wing Span: 1 1/4 - 1 7/8 inches (3.2 - 4.8 cm).
Pollination is crucial to the growth of wildflowers.

Movie 2.5 Pollination
The Gratiot County 213 MW Wind Project which has been fully operational 2012 is the largest in Michigan. The project involves 100 landowners and covers 16,000 acres of land.

https://youtu.be/U95rNgnTV4I
1. Leonardo Did It — While solar panels are a very 21st century thing, did you know Leonardo Da Vinci conceptualised the use of solar power back in his day? He conceived using solar power heated water for industrial use even in the 15th century!

2. More Energy Than We Need — More energy hits the earth from the sun in one hour that the whole world uses all year. If you’re a numbers person – approximately 120,000 terawatts (TW) hits the earth’s surface each day. Over the course of a year, the world uses a mere 15 TW of energy.

3. The Largest Solar Plant The largest solar power plant is located in the Mojave Desert in California. The solar plant generates 90 percent of the world’s commercially produced solar power!

4. Not All Panels Are The Same — There are two types of solar panels: Photovoltaic or PV panels. These panels convert sunlight into energy; Solar Thermal panels. These panels work by absorbing the heat. Water is then circulated through it to heat for domestic use purposes and even swimming pools.
What is wind power?

Wind power captures the natural wind in our atmosphere and converts it into mechanical energy then electricity. People started using wind power centuries ago with windmills, which pumped water, ground grain, and did other work. Today's wind turbine is a highly evolved version of a windmill. Modern wind turbines harness wind's kinetic energy and convert it into electricity. Most wind turbines have three blades and sit atop a steel tubular tower, and they range in size from 80-foot-tall turbines that can power a single home to utility-scale turbines that power hundreds of homes.

Major Types of Wind Power

1. Utility-scale wind, wind turbines larger than 100 kilowatts are developed with electricity delivered to the power grid and distributed to the end user by electric utilities or power system operators;

2. Distributed or "small" wind, which uses turbines of 100 kilowatts or smaller to directly power a home, farm or small business as it primary use;

3. Offshore wind which are wind turbines erected in bodies of water around the world, but not yet in the United States.
What It Is:
Windspire is a vertical wind turbine, similar to the Quiet Revolution. This 30-foot tall, 4-foot wide turbine generates 2000 kilowatts per hour given 12-mph winds, and it can survive winds up to 105 mph.

How It Works:
Windspire has a tall, thin propellerless rotor. It generates power when wind spins its vertical airfoils.

Where To Find It:
These wind turbines have been installed across the county in homes, museums, businesses and schools. For example, the Michigan governor's residence has a wind turbine, and Quinnipiac College in Connecticut is planning to use the turbines on campus to help power its buildings.
Forest Hill, in coordination with Alma College, the Dow Grant Foundation and the Gratiot-Isabella RESD, has put together 6 longitudinal data collection stations. Feel free to head on out to the data trail and record your observations and join the study or use the data to help enhance your area of research.
Focal Tree

Trees have life cycles that include birth, growth, aging and death. The life cycle of a tree can help scientist learn many things about an ecosystem.

Look at the boxelder tree in front of you. Study its leaves and report which stage of life the tree is in today. (Click your choice)
GREBE POND

Pond ecology is how a pond gets along with its environment. One of the things that scientists observe is the amount of pond covered by aquatic vegetation.

Let us know how much of Grebe Pond is covered today with plant life.

- No Vegetation
- Moderately Covered
- Heavily Covered
- Ice Covered
CATTAIL MEASUREMENT

Many **abiotic (non-living)** factors affect the growth of **biotic (living)** things. We have placed sensors in the soil and water to record the non-living factors (temperature, PH, oxygen levels).

Use your scientific eye and record the height of the cattail using the measuring pole. Record your answer below.

The cattail is approximately [ ] meters
TREE CIRCUMFERENCE

The distance around a tree trunk can help indicate if the tree is growing at the right speed. The growth rate (speed) can be affected by many factors. Your measurement today will help us discover if this tree is growing at the correct speed.

Use the attached measuring tape and measure the tree’s circumference (distance around). Measure at the top of the marker. Record your answer below.

The tree measured __________ cm.
WILDFLOWERS

Flowers evolved to attract pollinators with color and nectar. The pollinators spread pollen and help new flowers grow.

Look around the marked area and click on the different wildflowers that you see in bloom today.

Aster  Thistle  Hawkweed  No Wildflowers seen today
Forest Hill is host to a variety of ecosystems. Living things find refuge in grasslands, meadows, aquatic systems (ponds and vernal ponds), wetlands, shrubland, hardwood forest as well as coniferous forests. With the diverse ecosystems Forest Hill offers a living laboratory for all levels of scientists and nature lovers alike.
Forest Hill Nature Area was once a farmstead. When Gratiot Isabella Regional Education Service District leased the property, field tiles were removed and that resulted in the formation of Grebe Pond: part of the restoration of natural wetlands. This pond supports a lot of winged life from the loud and territorial red-winged blackbirds to the quiet and secretive wood duck.

Ponds support far more than birds; they are important to the lives of many invertebrates, reptiles, fish and mammals (http://precedings.nature.com/documents/3596/version/1).

In farm country especially, ponds provide a rare break from surrounding monocultures that can’t
support all native wildlife. Humans are part of the food chain, just like all biotic or living things. Biodiversity, variance in life forms, is important for our survival (http://nwf.org/Wildlife/Wildlife-Conservation/Biodiversity.aspx). An all corn diet would not be very healthy to live on. In the same way that we’re reliant on a variety of plants and animals to sustain us, those plants and animals are reliant on other parts of the food chain. For example, cattails feed muskrats and when muskrats die they are decomposed by feeding worms which get eaten by fish. The chain is continuous and has many branches.
In the early 1800s Michigan’s natural vegetation was documented and maps have been developed from those surveys to show whether any given county was made up of swamp, forest or prairie, for example (https://mnfi.anr.msu.edu/data/veg1800.cfm). Efforts have been made through the years to restore prairie land and natural grasses to Forest Hill. Gratiot County’s vegetation map shows that the Forest Hill area was likely dominated by black ash swamp, mixed hardwood swamp and beech/sugar maple forest (https://mnfi.anr.msu.edu/data/veg1800/gratiot.pdf). It’s suspected that prairie areas in the Lower Peninsula were often destroyed before they could be documented (http://quod.lib.umich.edu/cgi/p/pod/dod-idx/prairie-and-savanna-in-southern-lower-michigan-history.pdf?c=mbot;idno=0497763.0047.101). Before many other landscapes can take place, grasslands must take root and make a sustainable habitat (http://urbaneologycenter.org/blog/plant-community-highlight-prairie-ecological-succession.html). Changes in

Types of Prairies

1. Prairie - Grasslands in North America are called the prairies. They cover around 1.4 million square miles of the central United States including some of Canada and Mexico.

2. Steppes - The steppes are grasslands that cover southern Russia all the way to the Ukraine and Mongolia. The steppes stretch over 4,000 miles of Asia including much of the fabled Silk Road from China to Europe.

3. Pampas - The grasslands in South America are often called the pampas. They cover around 300,000 square miles between the Andes Mountains and the Atlantic Ocean.


Section 2 Prairie & Grasslands

Prairie

In the early 1800s Michigan’s natural vegetation was documented and maps have been developed from those surveys to show whether any given county was made up of swamp, forest or prairie, for example (https://mnfi.anr.msu.edu/data/veg1800.cfm). Efforts have been made through the years to restore prairie land and natural grasses to Forest Hill. Gratiot County’s vegetation map shows that the Forest Hill area was likely dominated by black ash swamp, mixed hardwood swamp and beech/sugar maple forest (https://mnfi.anr.msu.edu/data/veg1800/gratiot.pdf). It’s suspected that prairie areas in the Lower Peninsula were often destroyed before they could be documented (http://quod.lib.umich.edu/cgi/p/pod/dod-idx/prairie-and-savanna-in-southern-lower-michigan-history.pdf?c=mbot;idno=0497763.0047.101). Before many other landscapes can take place, grasslands must take root and make a sustainable habitat (http://urbaneologycenter.org/blog/plant-community-highlight-prairie-ecological-succession.html). Changes in
environment over a long time, called succession, allow shrubs and then trees to grow and transforms a prairie into a forest.

Not only do grasslands provide food and shelter for many birds and rodents such as the rare bobolink and the common muskrat, but they prepare soil for more “needy” vegetation. Grasses can survive harsh conditions such as wildfire and flooding thanks to traits such as their deep roots and quick growth. In turn, they’re deep roots help penetrate soil and introduce water and nutrients that larger plants such as shrubs and trees require. Natural prairies have declined because grazing animals such as bison and natural agriculture or industry. Succession can be helped along by removing plants that aren’t from Michigan and helping plants that are native to Michigan. Mowing, controlled fires and chemicals are tools used in this process. Shrublands are often a temporary landscape; they usually grow into forests or are removed by human events such as wildfire have been halted by settlers in Michigan while agriculture has been introduced.

Shrubland Succession

The growth of shrubs, a stage in succession, brings diversity in food and wildlife to the habitat. Shrub growth brings more opossums, deer, raccoons and songbirds. Succession can be helped along by removing plants that aren’t from Michigan and helping plants that are native to Michigan. Mowing, controlled fires and chemicals are tools used in this process. Shrublands are often a temporary landscape; they usually grow into forests or are removed by human...
Before logging in the industrial period, Michigan was covered in old deciduous (regularly lose their leaves) and coniferous (bearing cones) trees (https://www.michigan.gov/dnr/0,4570,7-153-10370_22664-61596--,00.html). Before these trees could grow, a succession had to occur. You can find lichen, a symbiosis between an algae and a fungus, as well as moss on these trees. After Michigan’s glaciers receded, lichen and moss took hold of the landscape and introduced nutrients that allowed grasslands to develop, which allowed savannas to develop which allowed forests to take root. This succession cycle has been repeated because of agricultural disturbances, so this is a young forest with immature trees and a light canopy. Few
stands of “old growth” forest remain in Michigan consisting of white pines over 300 years old (https://www.michigannature.org/home/sancts/estivant/ estivant.shtml).
Ponds age like humans; instead of accumulating more grey hairs, ponds acquire more vegetation over years (http://extension.psu.edu/natural-resources/water/ponds/pond-management/pond-construction/pond-ecology). Eutrophication is the buildup of nutrients such as nitrogen and phosphorous which leads to more plant and algae growth. This “aging” is sped along if the pond is shallow, lacks water flow and receives a lot of sun. Naturally for a pond to become entirely vegetated hundreds to thousands of years must pass (http://www.carvinstitute.org/sites/default/files/public/downloads/curriculum-project/4C3_eutrophication_reading.pdf). Humans can speed this process through Confined Animal

**Marsh Facts**

1. Provide a habitat for wide variety and number of wildlife and plants
2. Filter, clean and store water
3. Collects and hold flood water
4. Absorb wind and tidal forces
5. Provides places of beauty

**Mallard Marsh**

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Feeding Operations or factory farms for example. When thousands of livestock are kept on one farm, a lot of waste is produced that indirectly or directly is dumped into waterways. Mallard Marsh faces a lot of cattail growth. These plants provide food, shelter and structure to a pond and its organisms (http://cortland.cce.cornell.edu/agriculture/rural-land-use/ponds/controlling-cattails). They grow so thick and fast though, that they may turn Mallard Marsh into a field one day. Red-winged blackbirds are one species the cattails of Mallard Marsh support. These territorial birds breed in Michigan for the summer, migrate as far as Mexico for winter and are one of the first to return and herald in spring (https://www.allaboutbirds.org/guide/Red-winged_Blackbird/lifehistory). Though a male will keep a territory and spend most of his day defending the various females that nest in it, 100% success is not common. Often, some of the eggs laid in a given male’s territory were from a different father that snuck in.
Migratory Act

makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations.
Non migratory

An animal that does not move its habitat based on the season.

Related Glossary Terms
Drag related terms here

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