

ECOLOGICAL RELATIONSHIPS AT MONK BOTANICAL GARDENS

Senior Thesis Presentation
Biomedical Art
Chyna LaPorte

A Special Thanks To My Committee

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Problem Statement

The Monk Botanical Gardens is a nonprofit located in Central Wisconsin. This facility lacks educational resources that detail ecological relationships on the grounds. The majority of the educational programs would benefit from having an in-depth interactive tool that explains the biodiversity of flora and fauna and the symbiotic relationships presently active on the grounds.



Thesis Statement



Visitors are unaware of the biodiverse ecosystem found at the Monk Botanical Gardens, limiting their full understanding of conservation. As a result, these individuals would greatly benefit from an illustrated interactive narrative, linked to the garden's website, that explores the five ecological relationships: mutualism, commensalism, parasitism, predation, and competition.

The Project

- 2D interactive illustration
- Examines the ecological relationships:
 - Commensalism
 - Mutualism
 - Parasitism
 - Predation
 - Competition
- A varied audience
- Final website, link on the garden's website, and a sign for the garden

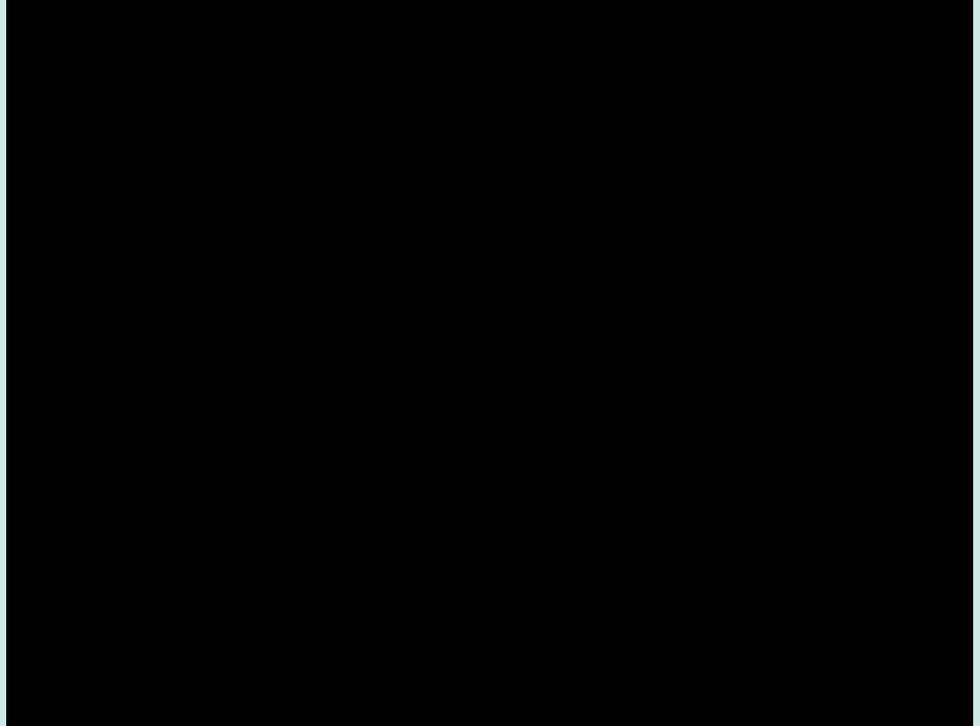


The Website

To use the interactive during this presentation, scan the QR code or visit the URL below



tinyurl.com/ecologicalmonk



Side note: It may take a few minutes to load :)



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ECOLOGICAL RELATIONSHIPS AT MONK BOTANICAL GARDENS



Great Blue Heron

Ardea herodias



North America, Central America, the Caribbeans, and the Galapagos



Height: 3.2 - 4.5 feet

Weight: 4.6 - 5.5 pounds



Predation and competition



Saltwater and freshwater habitats, open fields and grasslands



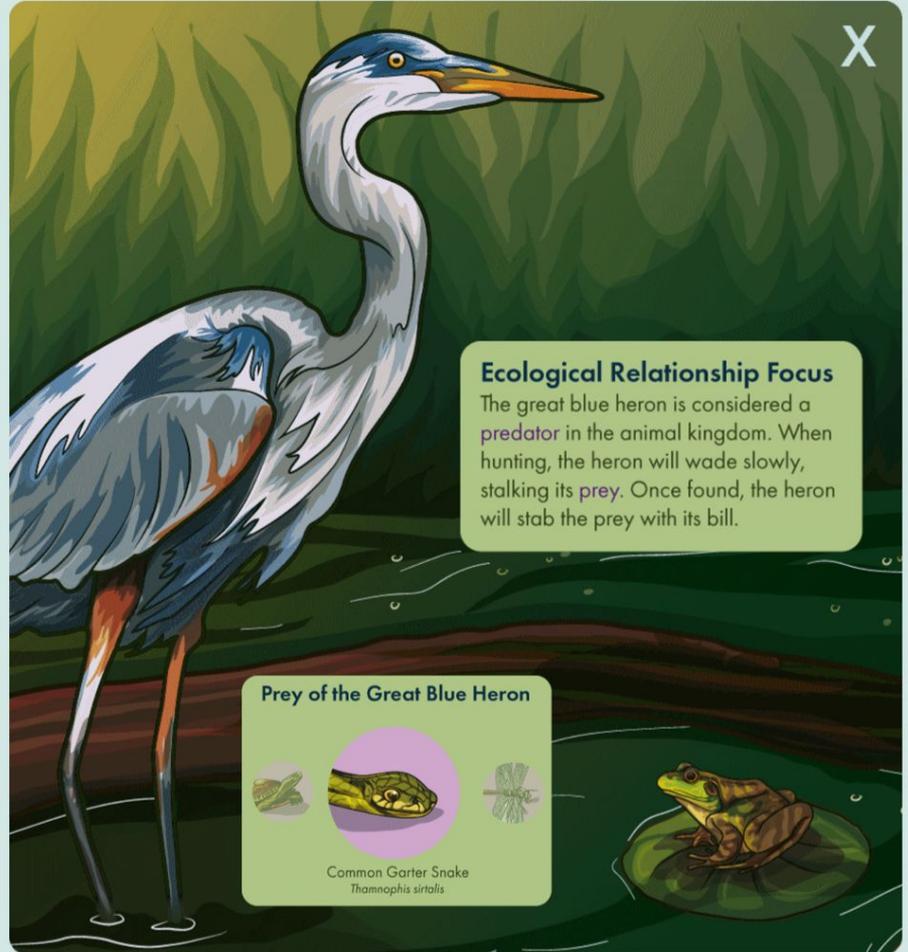
Least concern, with some of their populations rising due to numerous conservation efforts



Phalacrocorax

Ecological Relationship Focus

Cormorants typically inhabit the same wetlands and grasslands as Great Blue Herons. Herons and cormorants will **compete** for resources such as nesting sites and food. In addition, cormorants have acidic feces that can destroy the vegetation herons use as nesting sites.



X

Ecological Relationship Focus

The great blue heron is considered a **predator** in the animal kingdom. When hunting, the heron will wade slowly, stalking its **prey**. Once found, the heron will stab the prey with its bill.

Prey of the Great Blue Heron



Common Garter Snake
Thamnophis sirtalis



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Mank's Botanical Gardens

Common Buckthorn

Rhamnus cathartica



Native to Europe and western Asia
Invasive species in North America



Height: 20 - 25 ft tall
Diameter: 10 inches



Competition



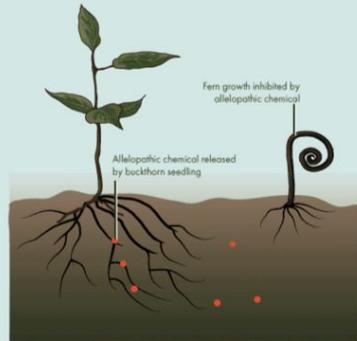
Forested habitats and grasslands



Least concern, highly invasive species that can destroy and outgrow native vegetation

Ecological Relationship Focus

Many plants release chemicals that block the germination or growth of other plants. This process is called allelopathy. Invasive plants have been found to produce more of these chemicals than other plants, which helps them **compete** and wipe out native plants.

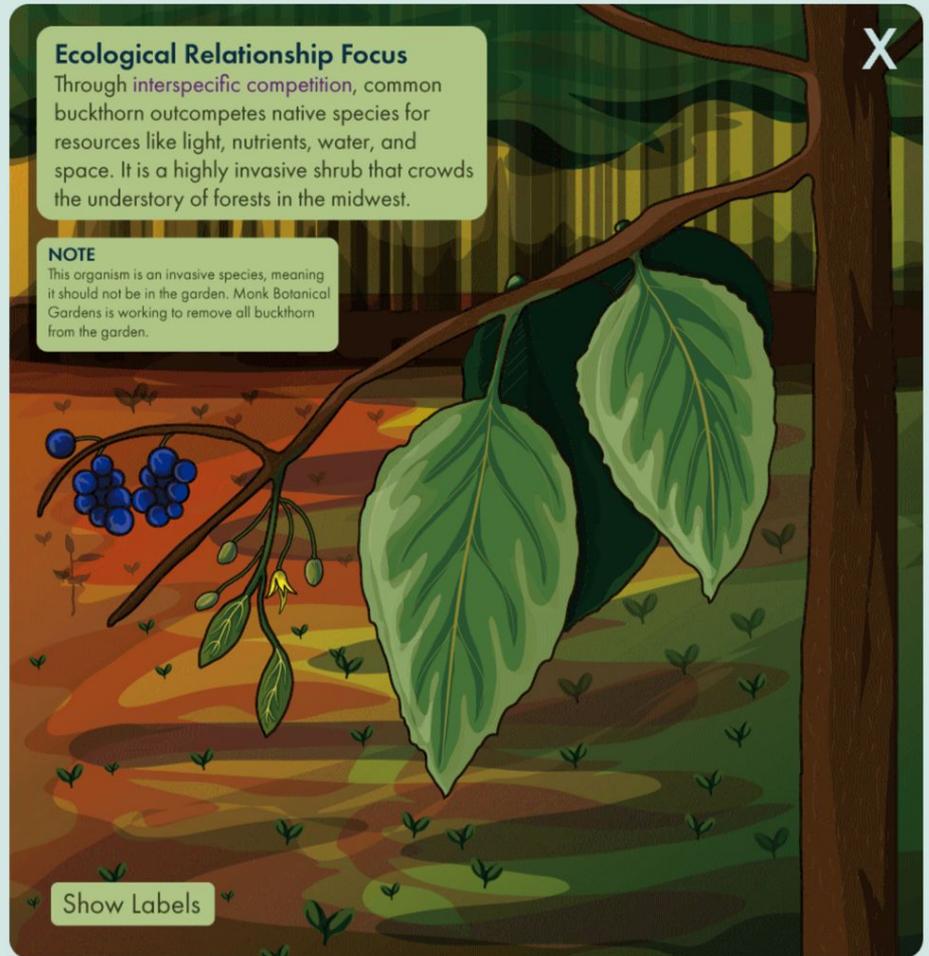


Ecological Relationship Focus

Through **interspecific competition**, common buckthorn outcompetes native species for resources like light, nutrients, water, and space. It is a highly invasive shrub that crowds the understory of forests in the midwest.

NOTE

This organism is an invasive species, meaning it should not be in the garden. Mank Botanical Gardens is working to remove all buckthorn from the garden.



Turkey Vulture

Cathartes aura



Southern Canada, United States, and South America



Height: 2.1 - 2.7 feet tall
Weight: 1.8 - 5.3 pounds



Commensalism and mutualism



Countryside, subtropical forests, shrublands, grasslands, and wetlands



Least concern, with some of their populations rising due to numerous conservation efforts

Ecological Relationship Focus



The turkey vulture shoves their entire head into easily accessible body cavities of decaying carrion. The turkey vultures have a [mutualistic relationship](#) with the bacteria in their gut. The bacteria get nutrients from what is being ingested and the turkey vulture gets protection from harmful diseases.



Ecological Relationship Focus

Turkey vultures use their complex sense of smell to locate roadkill. Turkey vultures will locate roadkill or carcasses that have been left behind by other animals. This is a commensalistic relationship.



Barred Owl

Strix varia



Eastern and Midwest United States



Height: 16.9 - 20.0 inches tall
Weight: 1.0 and 2.5 pounds.



Predation, commensalism and competition



Dense, mature forests that have a thick overhead canopy



Least concern, with some of their populations rising

Strix occidentalis

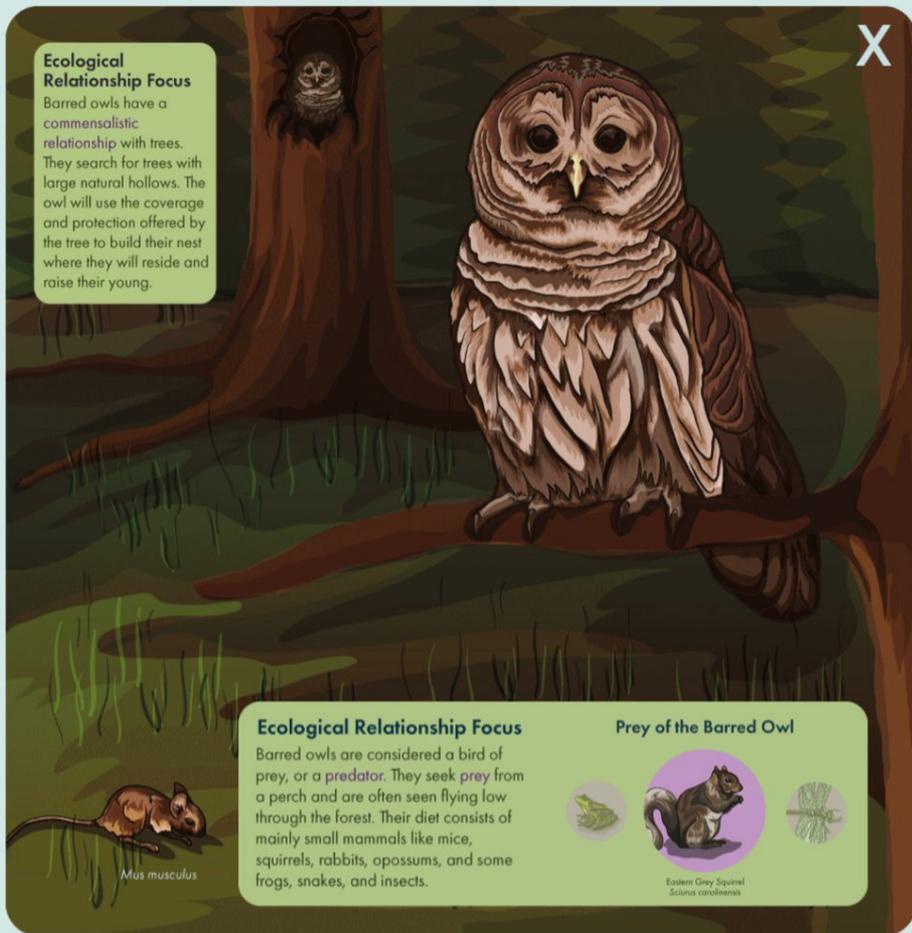


Ecological Relationship Focus

Spotted owls share nesting sites and have the same prey as barred owls. But, barred owls can be aggressive and will compete out spotted owl populations. This relationship is an example of interspecific competition.

Ecological Relationship Focus

Barred owls have a commensalistic relationship with trees. They search for trees with large natural hollows. The owl will use the coverage and protection offered by the tree to build their nest where they will reside and raise their young.



Ecological Relationship Focus

Barred owls are considered a bird of prey, or a predator. They seek prey from a perch and are often seen flying low through the forest. Their diet consists of mainly small mammals like mice, squirrels, rabbits, opossums, and some frogs, snakes, and insects.

Prey of the Barred Owl



Eastern Gray Squirrel
Sciurus carolinensis

Mus musculus

Common Greenshield Lichen

Flavoparmelia caperata



North and South America, Europe, Asia, and Australia



0.1 in to 0.3 in



Mutualism and commensalism

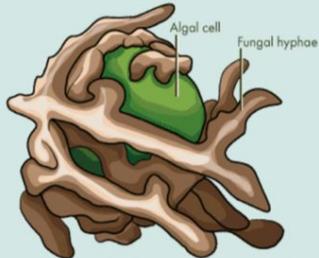


Forests and temperate woodlands on trees and rocks

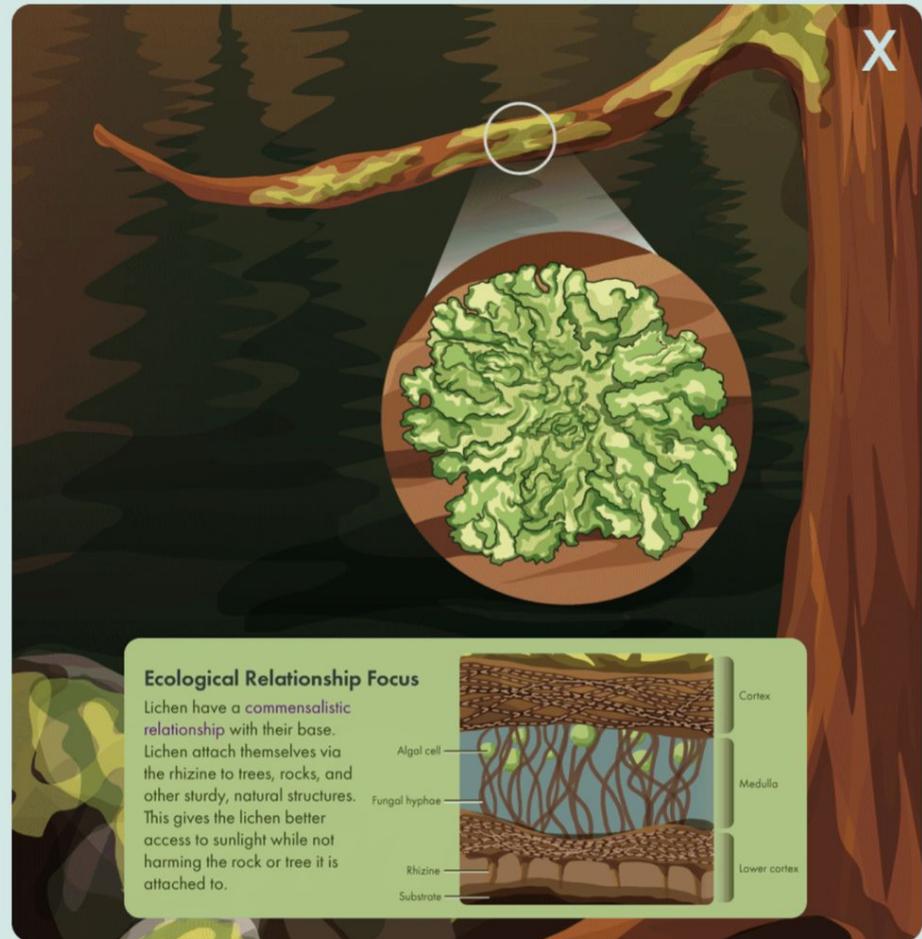


Threatened by pollution, habitat loss, and climate change

Ecological Relationship Focus

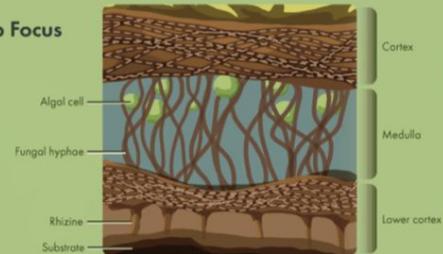


Lichen are made up of a fungus and a photosynthetic organism, like algae or a cyanobacterium. The fungus grows around the algal cell, receiving a constant supply of food produced by the algae. The algae receives water and nutrients absorbed by the fungus. Both organisms benefit from this **mutualistic** relationship.



Ecological Relationship Focus

Lichen have a **commensalistic** relationship with their base. Lichen attach themselves via the rhizine to trees, rocks, and other sturdy, natural structures. This gives the lichen better access to sunlight while not harming the rock or tree it is attached to.



Ghost Pipe

Monotropa uniflora



North America except for the Rocky Mountains



4.0 - 8.0 inches tall



Parasite



Shaded woods with moist soil



Least concern with stable populations

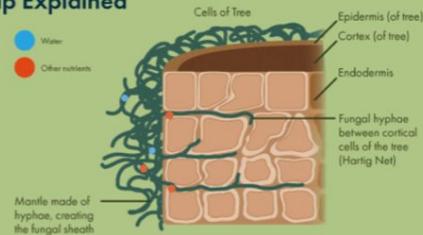


Ecological Relationship Focus

Ghost pipes are considered a **parasitic** plant. Since they do not undergo photosynthesis, they take their water and nutrients from connections to fungi, like *Lactarius fumosus*. The fungi is a **host** for the ghost pipe. The fungi that ghost pipes associate with are **ectomycorrhizal**, meaning they do not penetrate their host's cell wall.

Ecological Relationship Explained

Mycorrhizal association is a symbiotic relationship between a fungus and a plant. They create a net out of hyphae, small hairs coming off of the fungus. This allows the fungus to take up nutrients and water.



Groundhog

Marmota monax



North America



Length: 16.0 - 20.0 inches
Weight: 6.0 and 14.0 pounds



Commensalism



Terrestrial habitats, primarily in forests and grasslands



Least concern, with a stable population.



Habitat Focus

Groundhogs use their sturdy claws to dig through the earth, building complex underground burrows. These burrows can be identified by a large mound of dirt at the entrance of the hole. There are several rooms, including a bathroom and a den. They use these burrows for sleeping, raising young, and hibernating.

Ecological Relationship Focus

Groundhogs have a commensalistic relationship with multiple organisms. They build complex burrows that other organisms, like snakes, frogs, opossums, skunks, and foxes, use as shelter in times of need or the presence of a predator. One organism benefits while the other is not affected.

Burrow Borrowers



Common Garter Snake
Thamnophis sirtalis



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Monk Botanical Gardens

Giant Water Bug

Lethocerus americanus



Southern Canada and North America



2.0 - 2.4 inches in length



Predation

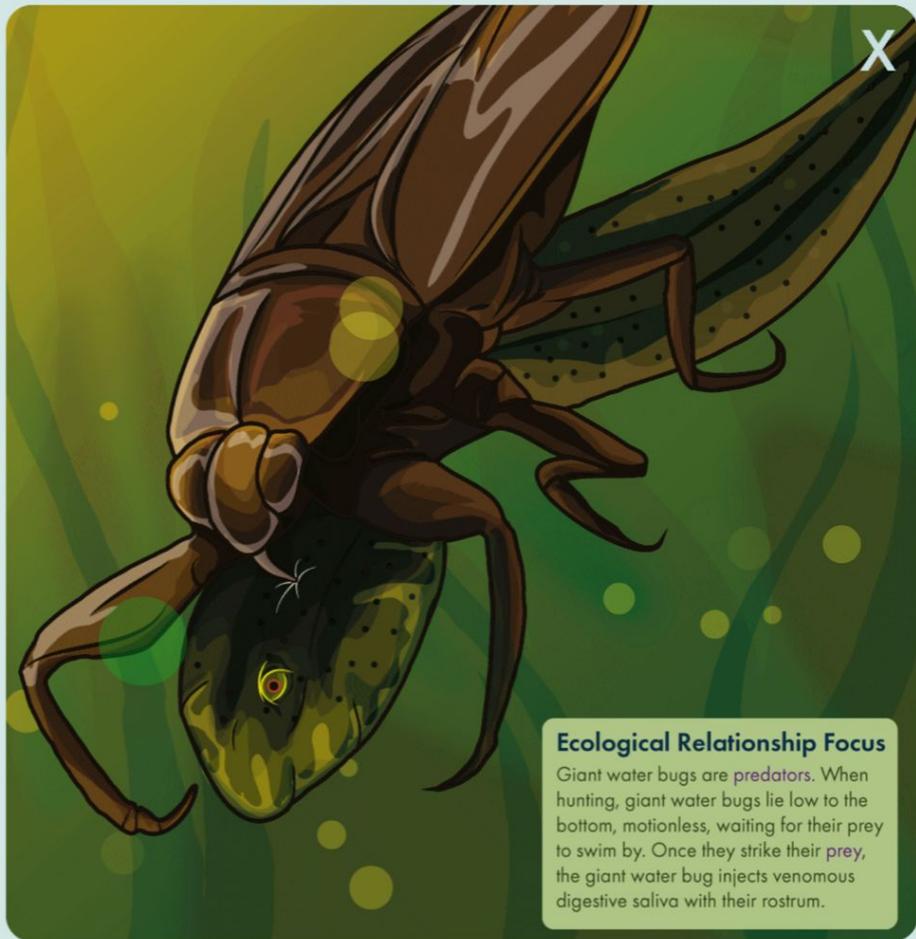
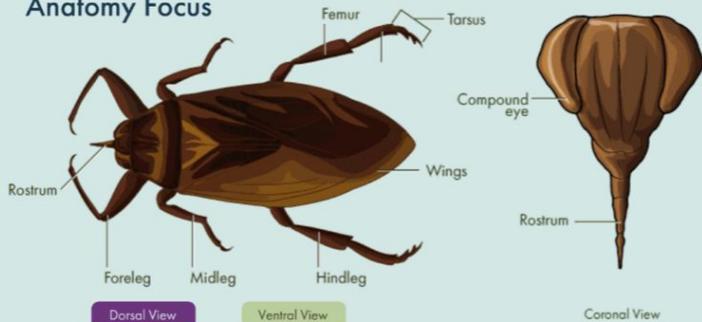


Ponds, marshes, the edge of lakes, and slow-moving creeks



Least concern with steady populations

Anatomy Focus



Ecological Relationship Focus

Giant water bugs are **predators**. When hunting, giant water bugs lie low to the bottom, motionless, waiting for their prey to swim by. Once they strike their prey, the giant water bug injects venomous digestive saliva with their rostrum.



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Monk Botanical Gardens

Painted Turtle

Chrysemys picta



North America, Southern Canada, and Northern Mexico



Length: 3.5 - 10.0 inches

Weight: 11.0 - 18.0 ounces



Predation and mutualism



Ponds, lakes, marshes, and slow-moving rivers with muddy bottoms



Least concern, with some populations rising due to conservation efforts

Ecological Relationship Focus



Chelydra serpentina

Painted turtles have a **mutualistic relationship** with the common snapping turtle. Common snapping turtles frequently are covered in algae and leeches. As omnivores, painted turtles frequently eat the algae and leeches off the common snapping turtle. The painted turtle gets a meal and the snapping turtle gets a cleaned shell or body. Both species benefit from this relationship.



X

Ecological Relationship Focus

Painted turtles are considered **predators** in the animal kingdom. They are omnivores, so their **prey** includes both plants and other animals, like tadpoles, insects, small fish, crustacean, and algae.

Prey of the Painted Turtle



Canada Darter Dragonfly
Aeshna canadensis

Monarch Butterflies

Danaus plexippus



North and South America



Wingspan of 3.0 to 4.0 inches



Mutualism, and parasitism



Open fields and meadows with a dense flower presence



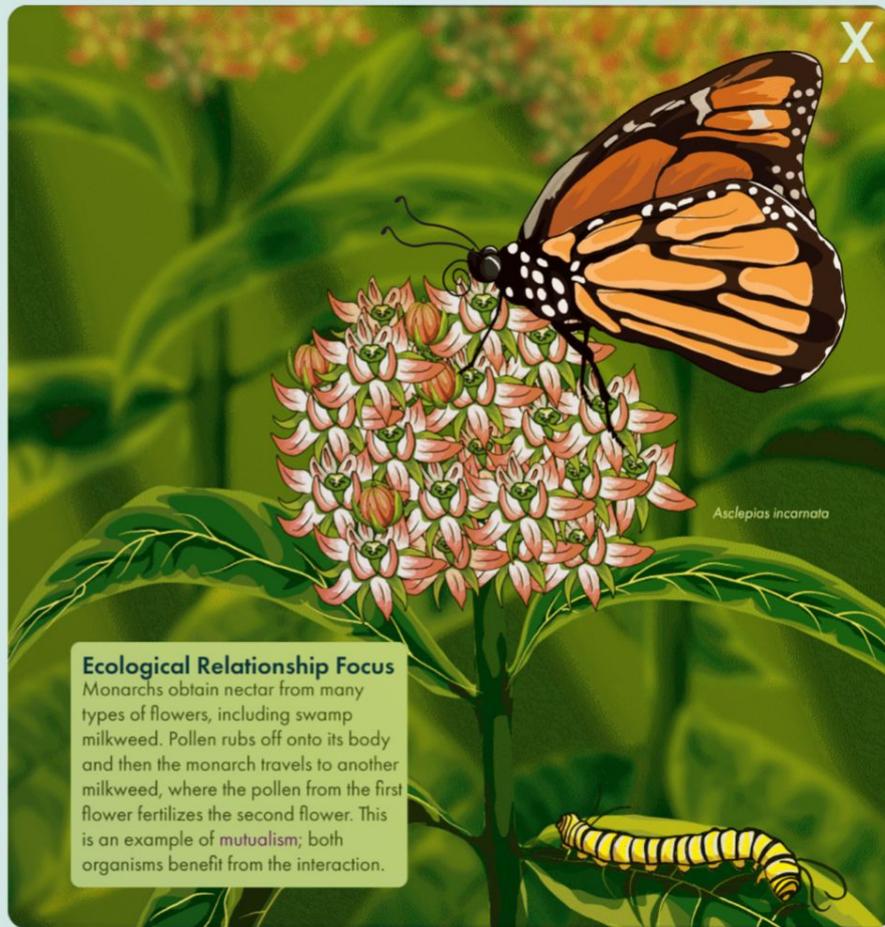
Endangered, with numerous conservation efforts in place to try and increase their populations

Ecological Relationship Focus



Lespesia archippivora

There are multiple **parasitic** species that use monarch caterpillars as their **host**, like tachinid flies. The fly injects its eggs into the monarch caterpillar, growing inside the caterpillar. The tachinid larva will eat the caterpillar from the inside out. Eventually, when the caterpillar goes to make its chrysalis, it dies and the fly larva emerge.



Asclepias incarnata

Ecological Relationship Focus

Monarchs obtain nectar from many types of flowers, including swamp milkweed. Pollen rubs off onto its body and then the monarch travels to another milkweed, where the pollen from the first flower fertilizes the second flower. This is an example of mutualism; both organisms benefit from the interaction.

Smooth Turtle Leech

Placobdella parasitica



North America



Length: 0.3 to 3 inches



Parasite



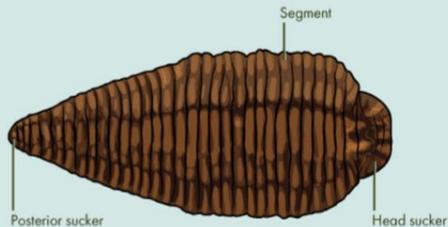
Freshwater sources, mainly staying low to the murky bottom of ponds



Least concern, reproducing rapidly and in high numbers

Anatomy Focus

When the leech goes to feed, it anchors itself to the host by pressing its mouth against the surface of the host's body. It then releases an anesthetic that desensitizes the surface so it can go unnoticed for a longer period of time.



Dorsal View

Ventral View

Mouth Parts



X

Ecological Relationship Focus

The smooth turtle leech is a segmented **parasite** that spends most of its time on the bottom of murky ponds. The common snapping turtle glides along the bottom of ponds, making it the perfect **host** for leeches.



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American Bullfrog

Lithobates catesbeianus



North America, parts of Canada, parts of Mexico, and Cuba.



Length: 3.5 - 8.0 inches
Weight: 1.5 lbs



Predation and competition



Freshwater habitats, like lakes, ponds, and marshes



Least concern, invasive in certain parts of the world

Ecological Relationship Focus

When two organisms from different species compete for resources, they exhibit **interspecific competition**. American Bullfrogs compete with other organisms, like painted turtles, for resources in their ecosystem.



Chrysemys picta

American bullfrogs may also compete with other amphibians, birds, and fish.

Ecological Relationship Focus

When organisms of the same species compete for resources, like mates, they exhibit **intraspecific competition**. Male American bullfrogs will croak during late spring and summer to attract females to their territory.

Press play to hear their mating call.



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If a button stops working, email chynalaporte@gmail.com with specific details concerning what is not working.

Confused about a specific biological term used? Visit the glossary tab.

Want to see a full food web? Visit the food web tab.

Want to learn more? Check out the sources tab to find out more about a specific topic.

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Elise Schuler: Education and Event Coordinator of the Monk Botanical Gardens, Wausau, WI
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Glossary

The terms listed here are found throughout the project, "Ecological Relationships of Monk Botanical Gardens". Most processes are defined within the project but for more information, refer to this glossary.

A	E	O
Aggressive A species that grows rapidly or takes over native habitats of native organisms.	Ecological relationship The interactions between and among organisms in a specific environment.	Omnivore An animal that eats plants and other animals.
Algal cell Algal cell.	Ecosystem A community found within nature.	P
Allotrophy Chemical inhibition of one plant by another, due to the release of chemicals.	Ecotomycorrhiza Hyphae of the fungi do not penetrate the cells within the soil.	Parasite An organism that lives on or in a host organism; gains nutrients or food at the expense of the host.
Anesthetic A substance that reduces or eliminates pain.	Endomycorrhiza Hyphae of the fungi penetrate the cell wall / cell membrane.	Photosynthetic organism An organism that uses sunlight to make food from carbon dioxide and water.
C	G	Predation One animal feeding on another.
Canopy The upper layer of a habitat, formed by tree crowns.	Germination The process by which an organism grows.	Predator An animal higher on the food chain that eats animals lower on the food chain.
Canyon Decaying flesh of dead animals.	Host An animal or plant that a parasite lives on or in.	Prey An animal lower on the food chain.
Chrysalis Hardened, outer layer that a pupa forms around itself during metamorphosis.	Hyphae Branching structures of the fungus, comparable to a root system in plants.	S
Commensalism One organism involved benefits while the other is not affected.	I	Salivary cell Produces saliva.
Competition Multiple organisms "fighting" for resources, recognition, or a group/social status.	Inferior Bottom of the animal.	Saprotrophic Top of the animal.
Conical Head of the animal.	Interspecific competition Competition between different species (see backhoof).	Symbiotic Interaction between two different organisms living in close relation to each other.
Crop Used for storage of blood, anatomical structure found in a variety of invertebrates.	Intraspecific competition Competition between the same species (see ballfish).	T
Cyanobacterium AKA blue green algae; found in all types of water.	Invasive species A species that does not belong to a specific environment; typically crowds out native species.	Temperate A zone that has wider temperature ranges throughout the year and distinct seasons changes.
D	M	Terrestrial habitat Habitats that are found on land, like forests, grasslands, deserts, shorelines, and wetlands.
Ductile A small duct/tube.	Mutualism Both organisms involved benefit.	Threatened Any species that may become endangered within the foreseeable future.
	Mycorrhiza Symbiotic relationship between a green plant and a fungus.	U
		Underside Layer of vegetation below the main canopy of a forest.

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Trophic Levels

Trophic levels determine the position an organism may be on in a food web. Some organisms, like parasites, do not occupy a specific level.

Tertiary consumers

Third level consumers are organisms that feed off organisms on lower levels. Typically, they have no predators.



Turkey Vulture Screech Owl

Secondary consumers

Secondary consumers get their energy from primary consumers and sometimes producers. They are commonly called omnivores.



Great Blue Heron Giant Water Beetle American Bullfrog Painted Turtle

Primary consumers

Consumers on this level get their nutrition from only producers. They are commonly called herbivores.



Monarch Butterfly Groundsquirrel

Producers

A producer has the ability to create its own food and carry out daily life functions. A plant will almost always be a producer.



Common Buckhorn Common Greenfield Lichen

Parasites

Parasites are neither decomposers nor are they producers. Since parasites feed off other organisms, they are a type of consumer.



Common Turtle Leech Glass Pipe

Monk
Botanical Gardens



Want to learn more about
the wildlife at the garden?

Scan this QR Code



or type in this URL: tinyurl.com/ecologicalmonk

There are a variety of organisms at the
garden. This activity will give you a little
more insight into the life of these organisms
and what you can do to help them.

This project was created by Chyna LaPorte for her senior thesis project.

American Bullfrog

Lithobates catesbeianus

North America, parts of Canada, parts of Mexico, and Cuba

Length: 3.5 - 4.0 inches
Height: 1.5 ft.

Habitat and competition:
Marshes, swamps, lakes, bays, ponds, and rivers

Conservation:
Least concern, increases in certain parts of the world

Ecological Relationship Focus
When you compare the life cycles of different frog species, you can see how they are similar. Frogs are amphibians. American Bullfrogs compete with other amphibians, like toads and salamanders.

Ecological Relationship Focus
American Bullfrogs are also competing with other amphibians, like toads and salamanders.



Smooth Turtle Leech

Piscobdella parasitica

North America

Length: 0.2 to 0.3 inches

Habitat and competition:
Freshwater streams, mostly staying low to the water's surface

Conservation:
Least concern, reproducing rapidly and in high numbers

Antony Focus
When the leech begins to feed, it anchors itself to the host's body. It uses its suckers to attach to the host's body. It then releases an anesthetic, so the host does not feel the leech's presence. It can go on attaching for a longer period of time.

Ecological Relationship Focus
The smooth turtle leech is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Giant Water Bug

Psephenus hyalinus

Eastern Canada and North America

Length: 2.0 - 2.4 inches in length

Habitat and competition:
Fresh, running, the edge of lakes, and slow-moving creeks

Conservation:
Least concern with steady populations

Antony Focus
The giant water bug is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The giant water bug is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Common Greenshield Lichen

Flavoparmelia caperata

North and South America, Europe, Asia, and Australia

0.1 to 0.3 m

Habitat and competition:
Rocks and boulders, woodlands on trees and rocks

Conservation:
Threatened by pollution, habitat, and climate change

Ecological Relationship Focus
Lichens are made up of a fungus and a photosynthetic organism. The fungus provides the structure and protection, while the photosynthetic organism provides the food produced by the algae. The algae receive water and nutrients from the fungus. Both organisms benefit from the symbiotic relationship.



Great Blue Heron

Ardea herodias

North America, Central America, the Caribbean, and the Galapagos

Height: 2.0 - 4.0 feet
Height: 4.0 - 5.0 pounds

Habitat and competition:
Marshes and freshwater habitats, open fields and grasslands

Conservation:
Least concern, with some of their populations declining due to human conservation efforts.

Ecological Relationship Focus
Cormorants typically inhabit the same wetland and grassland as Great Blue Herons. Herons and cormorants will compete for resources such as nesting sites and food. It is difficult for cormorants to compete with herons for nesting sites.

Ecological Relationship Focus
The great blue heron is considered a predator in the marshland region. When hunting, the heron will wade slowly, wading through. One Great Blue Heron will eat the eggs with its bill.



Monarch Butterflies

Danaus plexippus

North and South America

Wingspan: 0.10 to 0.14 inches

Habitat and competition:
Open fields and meadows with a diverse flora presence

Conservation:
Endangered, with numerous conservation efforts in place to try to increase their populations

Ecological Relationship Focus
There are many parasitic species that can harm monarch butterflies. One of the most common is the monarch fly. The fly is a parasitic species that can harm monarch butterflies. The fly is a parasitic species that can harm monarch butterflies.

Ecological Relationship Focus
The monarch butterfly is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Groundhog

Marmota monax

North America

Height: 9.0 - 20.0 inches
Height: 0.5 - 2.0 lbs

Habitat and competition:
Grasslands, primarily in forests and grasslands

Conservation:
Least concern, with a steady population

Habitat Focus
Groundhogs are parasitic organisms that feed on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The groundhog is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Turkey Vulture

Cathartes aura

Eastern Canada, United States, and South America

Height: 2.1 - 2.7 feet tall
Weight: 1.0 - 2.0 pounds

Habitat and competition:
Countryside, subtropical forests, shrublands, grasslands, and wetlands

Conservation:
Least concern, with some of their populations rising due to human conservation efforts.

Ecological Relationship Focus
The turkey vulture does not feed on birds but it does consume dead animals. Turkey vultures are a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The turkey vulture is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Common Buckthorn

Rhamnus cathartica

North America, Europe, and Western Asia

Height: 20 - 25 feet
Height: 10 - 15 inches

Habitat and competition:
Marshes, swamps, lakes, bays, ponds, and rivers

Conservation:
Least concern, highly invasive species that can destroy and change native vegetation

Ecological Relationship Focus
The common buckthorn is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The common buckthorn is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Painted Turtle

Chrysemys picta

North America, Southern Canada, and Northern Mexico

Length: 5.5 - 10.0 inches
Height: 1.0 - 1.8 inches

Habitat and competition:
Freshwater streams, mostly staying low to the water's surface

Conservation:
Least concern, with some populations declining due to human conservation efforts.

Ecological Relationship Focus
Painted turtles have a parasitic relationship with the common snapping turtle. Common snapping turtles are parasitic organisms that feed on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The painted turtle is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Ghost Pipe

Monotropa uniflora

North America except for the Rocky Mountains

Height: 4.0 - 8.0 inches tall

Habitat and competition:
Shaded woods with moist soil

Conservation:
Least concern with steady populations

Ecological Relationship Focus
The ghost pipe is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The ghost pipe is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.



Barred Owl

Strix varia

Eastern and Midland United States

Height: 16.0 - 20.0 inches tall
Weight: 1.0 - 2.0 pounds

Habitat and competition:
Diverse, wooded forests that have a rich wooded canopy

Conservation:
Least concern, with some of their populations rising

Ecological Relationship Focus
The barred owl does not feed on birds but it does consume dead animals. Turkey vultures are a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.

Ecological Relationship Focus
The barred owl is a parasitic organism that feeds on the blood of aquatic turtles. The leeches are found in the water, and they attach to the turtles' bodies.





Thank you!



Chyna LaPorte
IME402 - Biomedical Art
Artist Statement

“Ecological Relationships at Monk Botanical Gardens” Artist Statement

Up to this point, my professional career as a Scientific Illustrator has been marked by a fascination with life science, environmental education, and science communication. I have spent the last two summers interning at the Monk Botanical Gardens where I was first their horticulture intern and then their education intern. I spent the entire summer digging in dirt, finding bugs, watching snakes slither by, and at the same time, showing children from the ages of 3-12 all of these fascinating critters. I got to explain to them what makes a plant an invasive species and show them how buoyancy works with leaf boats. During all of this, I was creating interactive booklets and signage for the garden. I had the opportunity to educate a wider audience verbally and through my illustrations, while sharing my passion for nature and the environment.

For my senior thesis project, I combined my passion for nature, the environment, and my experiences with my scientific illustration techniques to create a unique interactive experience for visitors of the Monk Botanical Gardens. I explain the five main ecological relationships (mutualism, commensalism, parasitism, predation, and competition) through twelve interactive asset pages, alongside an opening mural of the garden. This establishes a setting for the project that is familiar to the users and is visually stunning. In addition, a sign was created that features an image from the project, a qr code, and a link to the interactive, that can be installed alongside the pond at the garden.

Each asset page has an explanation of the ecological relationship, in addition to information on the geographic range, size, habitat, and conservation status of the species. The twelve asset pages featured are: great blue heron, common buckthorn, turkey vulture, barred owl, groundhog, monarch butterfly, bullfrog, ghost pipe, lichen, giant water beetle, painted turtle, and common turtle leech. Along the side, there are 8 buttons that take the user home, to a glossary, to the garden's website, to a map of the garden, to the credits page, a help page, the sources, and a trophic level illustration. The trophic level illustration features all organisms in this project and where they fall in a food web.

Throughout the project, I used my skills as a scientific illustrator to research, illustrate, and code a complex topic, making it approachable for a wider audience. The illustrations have a whimsical feel while being scientifically accurate and educational all while representing the garden.