



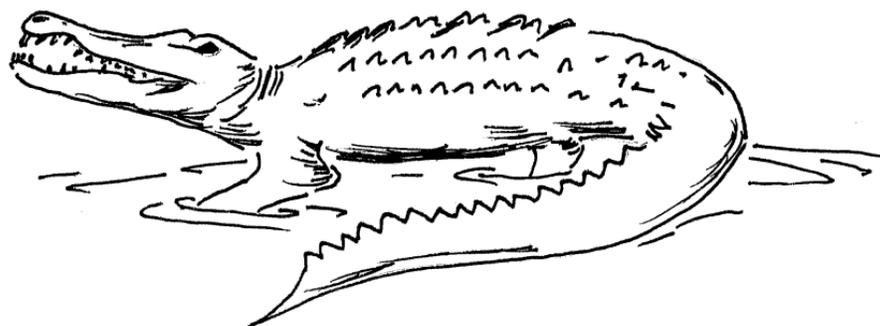
Living with Wildlife 7th Grade Curriculum



Designed to teach students
about living harmoniously alongside
the native wildlife in South Florida



Created and illustrated by Amy Washuta





Living with Wildlife Curriculum Introduction

Residents of Southwest Florida must learn to live side-by-side with wildlife unlike anywhere else in the United States. Encounters with alligators, venomous snakes, coyotes, bobcats, raccoons, opossums and skunks, bears and panthers are increasing as the human population continues to grow. These animals pose potential challenges and possible threats to people, pets, property, and livestock in urban-fringe areas that abut protected public lands throughout Southwest Florida. In addition, a recovering panther population is contributing to increased panther-human encounters. In order to protect both people and the native wildlife, efforts must be made to educate residents and visitors about living safely and respectfully with wildlife.

This curriculum aims to train students to think critically about wildlife and themselves through a variety of activities. By introducing students to the history, ecology, and politics of wildlife in Southwest Florida, we can create informed decision-makers for the future. In order to do this, we must not simply teach students *what* to think, but *how* to think critically and then offer them the opportunity to practice these skills. Folklore, fears, and misconceptions are difficult to overcome, but by leading students through the Living with Wildlife curriculum, a new paradigm for viewing nature and their place in it can be obtained.

The Living with Wildlife Curriculum is intended for both classroom and non-formal educators. This interdisciplinary guide is flexible for use in a 7th grade classroom, across a variety of subject areas and educational settings. Each activity write-up includes a box indicating the recommended subject areas, duration, key vocabulary and Sunshine State Standards addressed. Additionally, some activities include suggested extensions and connections that can be made to other subject areas.

The materials provided in the Living with Wildlife Activity Guide provide a starting place for discussing wildlife and wildlife encounters. Ideally, student and/or teacher interest will guide further exploration into these topics and generate a deeper understanding of the uniquely beautiful ecosystem of Southwest Florida.



Acknowledgements

Thank you to Amy Washuta and the help of all the individuals who assisted in the completion of this project. Ranger Amy researched and wrote the material in this curriculum, designed the layout and created all the illustrations during her time working as an Education Ranger at Big Cypress National Preserve.

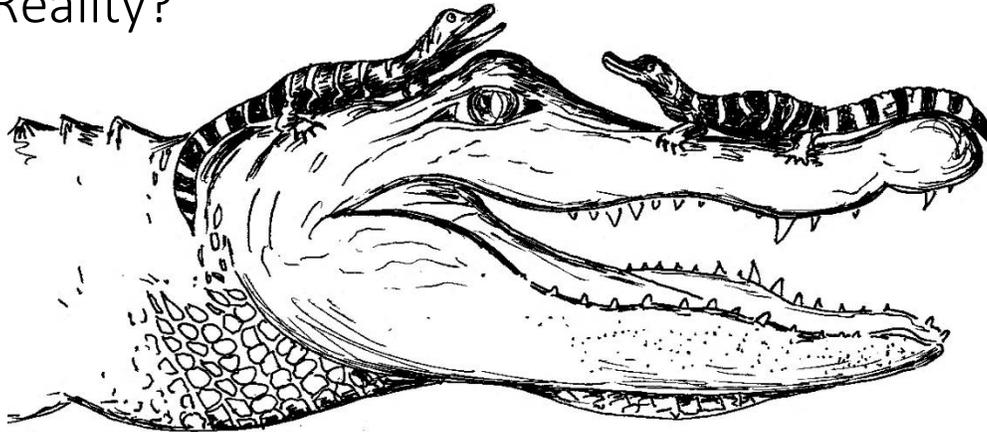
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Lesson One

Myth or Reality?



Key Questions

What misconceptions do people have about Florida's wildlife? How can these misconceptions be corrected?

Subjects

Science, Language Arts

Time Estimate

Two 30 minute classes + independent research

Key Vocabulary

Misconception, predator

Sunshine State Standards

Science

SC.7.L.17.1 Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

Language Arts

LA.7.6.2.2 Assess, organize, and check the validity and reliability of information in text, using a variety of techniques by examining several sources of information, including both primary and secondary sources.

Objectives

In this activity, students will:

1. Brainstorm what they already know (or think they know) about the predators of Florida.
2. Take a quiz as a class to see how much they actually know about predators.
3. Research the quiz material and retake it as a class to see how much new information they found about Florida's predators.
4. Discuss changes in their attitudes towards Florida's predators.

Materials

- A copy of the worksheet for each student.
- One copy of the class answers sheet.

Background

Florida is a state rich in wildlife. In fact, Florida has one of the richest fossil records in the world from the Pleistocene time period. As recently as 12,000 years ago, short-faced bears, saber-toothed cats, glyptodonts, mammoths, mastodons, giant ground sloths, and wolves called Florida home. Since then, these creatures have either gone extinct or been hunted to extinction in the state.

Fortunately, South Florida remains a home to a variety of amazing **predators** today. Predators are animals that hunt other animals to supply at least part of their diet. Unfortunately, there are many **misconceptions** that people tend to have about each of our predators in Florida. This leads to unnecessary fears about our predators and sometimes to inappropriate behavior towards them.

Most wildlife species have a natural fear of humans and only pose a threat when we interfere with them or feed them. Predators like bears and alligators can lose their fear of humans if fed and then become dangerous to us. We can live in harmony with these wildlife species if we respect them and avoid feeding either by leaving out trash and other possible food or by leaving our domestic animals outside without proper enclosures.

Florida Panthers

Florida panthers are one of the most endangered mammals in the world, with an estimated 100-180 remaining in South Florida. These cats used to range throughout the Southeastern United States, but were pushed out of their habitat by development and hunted to near extinction. They are the same species as the Western mountain lion, but are a unique subspecies. All Florida panthers are tan in color and are most active at dawn, dusk and during the night, which is referred to as a crepuscular species. They are carnivores that hunt by silently stalking their prey on the ground until they are close enough to run and pounce on it. They most commonly prey on deer and feral hogs, but can also eat small mammals and even alligators. To survive, an adult panther needs to consume the equivalent of a deer each week. Because panthers are territorial and require large prey, they need plenty of space to roam – 200 square miles for a male and 75 square miles for a female. Panthers are naturally afraid of people and there has never been a documented attack of a Florida panther on a human. Mountain lion attacks have occurred but are rare – in fact, deer are responsible for far more human deaths each year than Pumas due to vehicular collisions. Panthers will depredate livestock and pets if they are left unprotected outside.

Bobcats

Bobcats are found throughout most of the continent and are widely adaptable to a variety of habitats. They weigh between 15-30 pounds and are most active at dawn, dusk and during the night. On an average night they travel between 2 and 7 miles in search of food. They hunt by sight and most commonly capture small mammals such as squirrels, rabbits, rats, opossums, and raccoons. They will also eat birds that nest on the ground and can hunt adult deer. They will depredate pets and domestic animals if available. Bobcats are fearful of humans and rarely pose a threat.

Coyotes

Coyotes belong to the dog family and weigh between 20-30 pounds. They have long inhabited the Southwestern United States, but recently expanded their range and moved into Florida in the 1970s, though the first documented coyote appeared by 1925 in the state. Coyotes therefore are considered a “naturalized” species in Florida. They are highly adaptable, opportunistic creatures that took advantage of declining predators to populate the Eastern United States. They can live in almost any habitat from suburbs to farmland to forests. Coyotes have a generalist diet that consists of a variety of plant and animal foods such as birds, deer, mice, rabbits, carrion, berries, and insects. They have been known to feed in populated areas on pet food, trash, poultry and livestock, and garden vegetables. Most active at night and dawn and dusk, coyotes usually hunt alone but rarely in a pack. Coyotes are fearful of humans and are not usually a threat.

Florida Black Bears

The Florida black bear is a sub-species of the American black bear used to range throughout Florida. Today, they are only found in fragmented areas across the state where they can find large enough contiguous habitats. They are the largest land mammal in the state, with adult males averaging 250-350 pounds and females 130-180 pounds. Bears are excellent climbers and mother bears send their cubs up trees to avoid dangers. The Florida black bear is a capable predator if

provoked, but 80% of its diet is plant material like berries and acorns, 15% is insects like ants and termites, and only 5% of its diet is meat such as carrion or small mammals. They have an extraordinary sense of smell far better than that of a bloodhound and can smell food from miles away. Bears are curious, smart and inquisitive animals, and it is normal for bears to wander into human-inhabited areas and investigate their surroundings. The most dangerous bears to humans are those which we have fed by leaving our food and garbage somewhere accessible to them. Bears can lose their natural fear of humans in these cases and may need to be relocated or euthanized.

American Alligators

The American Alligator ranges throughout the wetlands of the Southeastern United States. In the Southern tip of Florida in saltwater and brackish environments, the American Crocodile also can be found. Florida is the only place in the world where alligators and crocodiles live side-by-side. Alligators are opportunistic carnivores that prey on whatever animals are in the water and are abundant and relatively easy to catch. They can eat fish, snakes, turtles, small mammals, birds, and occasional deer or other larger animals near or in the water. Because they are cold-blooded, alligators have very slow metabolisms and only eat one to a few times a month. They need warm air temperatures to digest their food and won't normally eat when temperatures drop below 70 degrees F. They cannot breathe underwater, but they can hold their breath and rest beneath the surface for over an hour. Alligators have a natural fear of humans but can become a danger when they have been fed by us. When an alligator learns to associate people with food, it may become a threat and need to be removed. It is a myth that the best way to escape a charging alligator is to run zigzag. Humans are not suitable prey for alligators and a charge would be unlikely. Second, alligators hunt by surprise acceleration – a single lunge out of the water. It would be extremely rare for an alligator to chase prey for any distance on land. Therefore, if an alligator approaches you aggressively on land, you should run fast and straight away from it as it will probably not go very far.

Advance Preparation

1. Make a copy of the worksheet for each student.
2. If desired, print background information or find books to help students research answers to the quiz questions (optional).

Procedure

1. Ask students to tell you what they already know about the behavior of Florida panthers, Florida black bears, coyotes, American alligators, and bobcats. Write a list of their ideas on the board for each animal. Encourage them to think about how and when each animal hunts, what it eats, and how it responds to humans as well as other behaviors.
2. Open the PowerPoint presentation called "Myth or Reality Quiz". Explain to students that you are going to test their knowledge of Florida predators. Take the quiz as a class. For each question, have each student record their personal answer on their worksheet in the "First Answer" column.

Then, take a class vote to determine the class's answer to the question. Record the class answer on the Class Answers Sheet.

3. Once the quiz is completed, have students conduct research either at home or on computers or mobile devices in the classroom to help them find answers to the questions they were unsure about (or you may choose to have students research every question). Instruct students to cite evidence they find for each question and the source they used in the "Research" column on their worksheet.
4. After students have finished their research (perhaps the next class period), retake the same "Myth or Reality Quiz" as a class. Use the second half of the PowerPoint presentation that will reveal the answers upon a click of the mouse. This time, for

each question, have a student cite evidence they found to help the class answer the question.

For instance, for question 1, you could call on a student to tell you that he/she discovered that according to a National Park Service webpage, there is only one species of panther in North America: Puma concolor.

5. For each question, have the student record their “New answer” on the worksheet. Tally a class vote to obtain a new class answer and record it on the Class Answers Sheet. Then reveal the correct answer to the question.
6. After the quiz is completed and you’ve discussed the answers, compare the class score on the quiz before and after the students conducted research. Did the class score improve?
7. Have a class discussion using the following questions as prompts:
 - Were you surprised by any of the answers to the quiz?
 - Why do you think so many people have misconceptions about predators?
 - Do you feel any differently about the predators of Florida after learning more information about them? How so?

Myth or Reality

Worksheet

Your Name: _____

True or False?	First Answer	Research	New Answer
1. A mountain lion, a cougar, a puma and a panther are all different species of cat.			
2. The Florida black bear eats mostly meat.			
3. Coyotes usually hunt in packs.			
4. Bobcats travel mostly during nighttime hours and can walk up to a mile each night.			
5. Alligators are naturally afraid of humans.			
6. A Florida panther track doesn't usually show claw marks.			
7. Florida black bears don't climb trees.			
8. Coyotes are native to Florida.			
9. Bobcats and panthers are most active during the day.			

<p>10. Alligators can hold their breath to stay underwater for an hour or more.</p>			
<p>11. Florida panthers hunt by jumping out of trees onto their prey.</p>			
<p>12. Florida black bears have a better sense of smell than a bloodhound.</p>			
<p>13. Coyotes will eat carrion (dead animal meat).</p>			
<p>14. Bobcats can hunt and take down an adult deer.</p>			
<p>15. Alligators and crocodiles can both be found in South Florida.</p>			
<p>16. Florida panthers roar before they attack.</p>			
<p>17. Panthers and bears are naturally curious about humans, and it is normal for them to wander past and watch us.</p>			
<p>18. Pumas, including Florida panthers and mountain lions in the West, kill more people than deer do in North America.</p>			

19. You should run zigzag if you come across an alligator.			
20. Florida panthers eat more frequently than large alligators.			

Myth or Reality

Class Answers Sheet

True or False?	Class First Answer	Class New Answer
1. A mountain lion, a cougar, a puma and a panther are all different species of cat.		
2. The Florida black bear eats mostly meat.		
3. Coyotes usually hunt in packs.		
4. Bobcats travel mostly during nighttime hours and can walk up to a mile each night.		
5. Alligators are naturally afraid of humans.		
6. A Florida panther track doesn't usually show claw marks.		
7. Florida black bears don't climb trees.		
8. Coyotes are native to Florida.		
9. Bobcats and panthers are most active during the day.		
10. Alligators can hold their breath to stay underwater for an hour or more.		
11. Florida panthers hunt by jumping out of trees onto their prey.		
12. Florida black bears have a better sense of smell than a bloodhound.		
13. Coyotes will eat carrion (dead animal meat).		
14. Bobcats can hunt and take down an adult deer.		
15. Alligators and crocodiles can both be found in South Florida.		
16. Florida panthers roar before they attack.		
17. Panthers and bears are naturally curious about humans, and it is normal for them to wander past and watch us.		
18. Pumas, including Florida panthers and mountain lions in the West, kill more people than deer do in North America.		
19. You should run zigzag if you come across an alligator.		
20. Florida panthers eat more frequently than large alligators.		



Lesson Two

Being a Predator



Key Question

What adaptations do predators of Florida have to survive? How can we improve the relationship between humans and predators by understanding their adaptations?

Subjects

Science, Arts: Theatre

Time Estimate

45-60 minutes + independent research

Key Vocabulary

predator, adaptation, carnivore, omnivore

Sunshine State Standards

Science

SC.7.L.15.3 Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.

SC.7.L.17.1 Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

Arts: Theatre

TH.68.C.1.1 Devise an original work based on a community issue that explores various solutions to a problem.

Objectives

In this activity, students will:

1. Research the adaptations of a Florida predator and complete a worksheet
2. Work as a team to develop a skit that showcases the adaptations of a Florida predator and negative interactions that can occur with humans
3. Discuss ways to prevent negative interactions between humans predators

Materials

- A copy of one of the predator research sheets for each student (you may decide which students get which predators).
- Props for student skits

Background

Predators, which are animals that hunt and consume other animals for at least part of their diet, are an important part of every major ecosystem on Earth. They play an important role in nutrient cycling and keep prey populations healthy and in balance. Predators possess a special suite of **adaptations** - traits that allow them to effectively

capture prey, defend themselves, and survive. Predators are often feared by people because they can potentially pose a threat to us and our property. We can minimize negative interactions between people and predators by understanding their biology.

Florida panthers

The Florida panther is a **carnivore**, which means that its diet is made up entirely of meat. The panther's main sources of food in South Florida are white-tailed deer and feral hogs. Other common foods include raccoons, armadillos, and other small mammals. Panthers hunt by silently stalking their prey. They have retractable claws that allow them to walk very quietly through the brush and a keen sense of smell to follow a prey's scent. They are built for speed and surprise attack prey from behind by biting and grabbing it by the neck and tackling it to the ground. They are capable of jumping very high and far to surmount obstacles, which makes them capable of depredating on people's domestic animals if they are not properly enclosed. Their claws make them efficient at taking down prey and excellent at climbing trees. Their teeth are typical for carnivores and are all pointed and sharp for tearing meat. They lack flat, grinding molars because they do not eat plants.

Florida black bears

The Florida black bear is the largest land mammal in the state, with adult males averaging 250-350 pounds and females 130-180 pounds. Bears are excellent climbers and mother bears send their cubs up trees to avoid dangers. They have sharp claws and sturdy, large paws to help them climb and rip apart tough plants like cabbage palms. The Florida black bear is a capable predator if provoked, but is an **omnivore**, with 80% of its diet being plant material like berries and acorns, 15% is insects like ants and termites, and only 5% of its diet is meat such as carrion or small mammals. Florida black bears have sharp canine teeth for tearing meat and for defense, but they also have flat, grinding molars in the back of their mouths for chewing plants. They have an extraordinary sense of smell far better than that of a bloodhound and

can smell food from miles away. Bears are curious, smart and inquisitive animals, and it is normal for bears to wander into human-inhabited areas and investigate their surroundings. The most dangerous bears to humans are those which we have fed by leaving our food and garbage that they can access. Bears can lose their natural fear of humans in these cases and may need to be relocated or euthanized.

Bobcats

Bobcats are found throughout most of the continent and are widely adaptable to a variety of habitats. They are carnivores who are most active at dawn, dusk and during the night. On an average night they travel between 2 and 7 miles in search of food. They hunt by silent stalking in the same manner as the panther and most commonly capture small mammals such as squirrels, rabbits, rats, opossums, and raccoons. They will also eat birds that nest on the ground and can hunt adult deer. Their teeth are like that of the Florida panther and are pointed and specialized for tearing meat. Also like the panther, they have retractable claws that allow them to walk quietly. They will depredate pets and domestic animals if available. Bobcats are fearful of humans and rarely pose a threat to people directly.

Coyotes

Coyotes belong to the dog family and weigh between 20-30 pounds. They have long inhabited the Southwestern United States, but recently expanded their range and moved into Florida in the 1970s, though the first documented coyote appeared by 1925 in the state. They are highly adaptable, opportunistic creatures that took advantage of declining predators to populate the Eastern United States. They can live in almost any

habitat from suburbs to farmland to forests. Coyotes are omnivores and have a generalist diet that consists of a variety of plant and animal foods such as birds, deer, mice, rabbits, carrion, berries, and insects. They have been known to feed in populated areas on pet food, trash, poultry and livestock, and garden vegetables. Most active between dawn and dusk, coyotes usually hunt

alone but rarely in a pack. Coyotes are fearful of humans and are not usually a threat.

American alligators

Alligators are opportunistic carnivores that prey on whatever animals are in the water and are abundant and relatively easy to catch. They can eat fish, snakes, turtles, small mammals, birds, and occasional deer or other larger animals near or in the water. Alligators have extremely powerful tails used to propel them through the water, defend themselves, and help them catch prey. Alligators hunt by surprise acceleration – a single lunge out of the water propelled by their tail. They catch food that is in or immediately next to water. It would be extremely rare for an alligator to chase prey for any distance on land. They have a mouth full of pointed, sharp teeth for biting into prey and then slowly swallowing it whole. When they lose teeth, they simply grow back.

Alligators have specialized eyes for hunting underwater and in the dark. They have multiple sets of eyelids, which act like swim goggles and allow them to see clearly beneath the water. Behind their retina's they have a thin tissue called the *tapetum lucidum*, which reflects and concentrates more light into their eyes, enhancing their night vision. When they are threatened or when they are attacking prey, the alligator can pull its eyes down into its skull and pop them back up later.

Because they are cold-blooded, alligators have very slow metabolisms and only eat one to a few times a month. They cannot breathe underwater,

but because their metabolism is so slow, they can hold their breath and rest beneath the surface for well over an hour. Alligators have very thick skin that helps to protect them and prevent them from drying out. On their back, they have rows of scutes, which are bony plates that house large concentrations of capillaries. This allows the alligator to absorb maximum heat while it basks in the sun.

Alligators have a natural fear of humans but can become a danger when they have been fed by us. When an alligator learns to associate people with food, it may become a threat and need to be removed.

Procedure

1. Ask students to explain the concept of **adaptations**. If you have already introduced the theory of evolution, have students explain how adaptations arise over time through natural selection.
2. Assign each student one of five predators in South Florida: a Florida panther, Florida black bear, bobcat, coyote, or American alligator. Give each student the corresponding research sheet to match their predator and ask students to research their predator and complete the sheet either in class or for homework. Try to have roughly equal numbers of students researching each predator.
3. After students have completed their research, group students who researched the same predator together to create 5 total groups, one for each predator. For instance, all students who researched the bobcat will be one group.
4. Instruct each group to develop a skit that showcases the adaptations of their predator and how negative interactions with humans can occur. Give a Predator Skit sheet to each group to aid in preparation. Tell students that their skit must include:
 1. 4 adaptations of their predator
 2. A demonstration of their predator capturing/eating food
 3. A demonstration of their predator in a negative interaction with a human or human property

5. Have student groups perform skits in front of the class. After each skit, ask the class to identify the predator, its adaptations, and how the negative interaction happened. Discuss ways that the negative interaction could have been avoided.

Optional Writing Assignment

Have students take what they have learned about the adaptations of their predator and write a newspaper advertisement aimed to “sell” people on the effectiveness of their predator. For instance:
“Panthers are built for speed and can jump up to 10 feet in the air, allowing them to get over almost any fence.



Predator Research Sheets: Florida panther

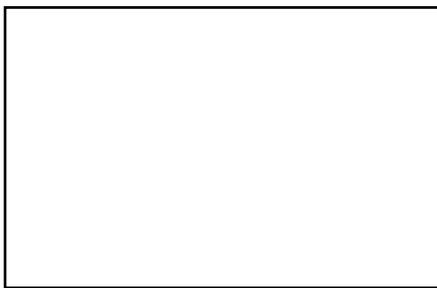
Your Name: _____

1. What are four common foods for the Florida panther?

_____, _____, _____, _____

2. Describe the method by which the Florida panther captures it's prey:

3. Sketch the teeth of the Florida panther. How are they adapted to its diet?



4. Sketch the paw print of a Florida panther. How is the its paw adapted to help it survive and hunt?



5. At what times of the day are Florida panthers most active? How is this an adaption to their survival?

6. How might the adaptations of the Florida panther allow it to depredate domestic animals?



Predator Research Sheets: Florida black bear

Your Name: _____

1. Fill in the blanks: The Florida black bear's diet is composed of 80% _____, 15% _____, and 5% _____.

2. Name four of the favorite food plants of the Florida black bear:

_____, _____, _____, _____

3. What adaptations does the Florida black bear have for finding food?

4. Sketch the teeth of the Florida black bear. How are they adapted to its diet?



5. Sketch the paw print of a Florida black bear. How is the its paw adapted to help it survive?



6. How can people minimize negative encounters with Florida black bears by understanding their diet and behavior?



Predator Research Sheets: bobcat

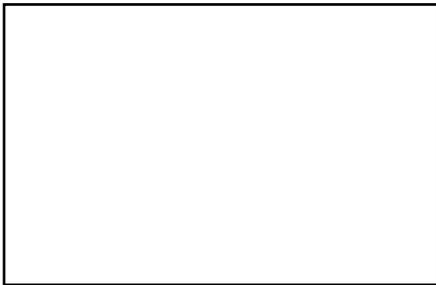
Your Name: _____

1. What are four common foods for the bobcat?

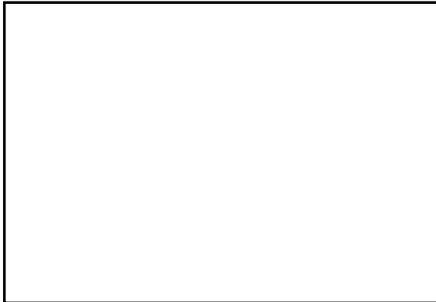
_____, _____, _____, _____

2. Describe the method by which the bobcat captures it's prey:

3. Sketch the teeth of the bobcat. How are they adapted to its diet?



4. Sketch the paw print of a bobcat. How is the its paw adapted to help it survive and hunt?



5. At what times of the day are bobcats most active? How is this an adaptation to their survival?

6. How might the adaptations of the bobcat allow it to depredate domestic animals?



Predator Research Sheets: coyote

Your Name: _____

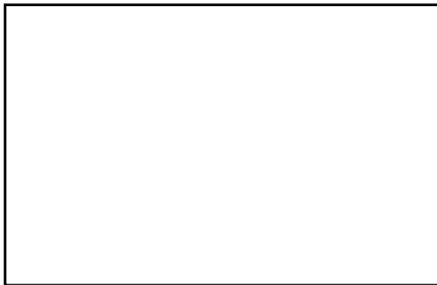
1. Name eight food sources for the coyote:

_____, _____, _____, _____
_____, _____, _____, _____

2. Coyotes recently expanded their range into Florida. Describe four characteristics of coyotes that make them able to adapt to Florida easily:

A. _____
B. _____
C. _____
D. _____

3. Sketch the teeth of the coyote. How are they adapted to its diet?



4. At what times of the day are coyotes most active? How does this behavior help them survive?

5. List two more ways that coyotes can damage human property. For each way, write a way we can prevent the problem:

A. attack pet cats how to prevent: _____
B. _____ how to prevent: _____
C. _____ how to prevent: _____



Predator Research Sheets: American alligator

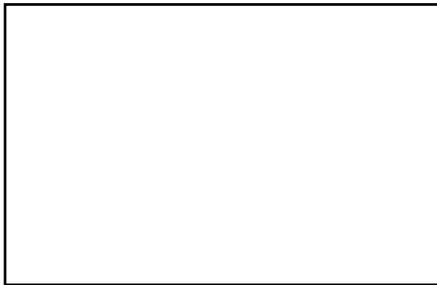
Your Name: _____

1. Name six food sources for the American alligator: _____, _____

_____, _____, _____, _____

2. Describe the method by which the American alligator catches its prey:

3. Sketch the teeth of the American alligator. How are they adapted to its diet?



4. Alligators are cold-blooded. How does this help them to survive?

5. Describe how the following parts of the alligator help it to survive:

Tail: _____

Eyes: _____

Scutes (on their back): _____

6. What can people do to prevent alligators from becoming a threat to humans and pets?



Predator Skit

Names of students in your group: _____

Your predator is: _____

For your Skit:

1. Include at least 4 adaptations of your predator to show in your skit and write these below:

_____, _____, _____, _____

2. Illustrate how your predator captures and eats food. Write how you will show this:

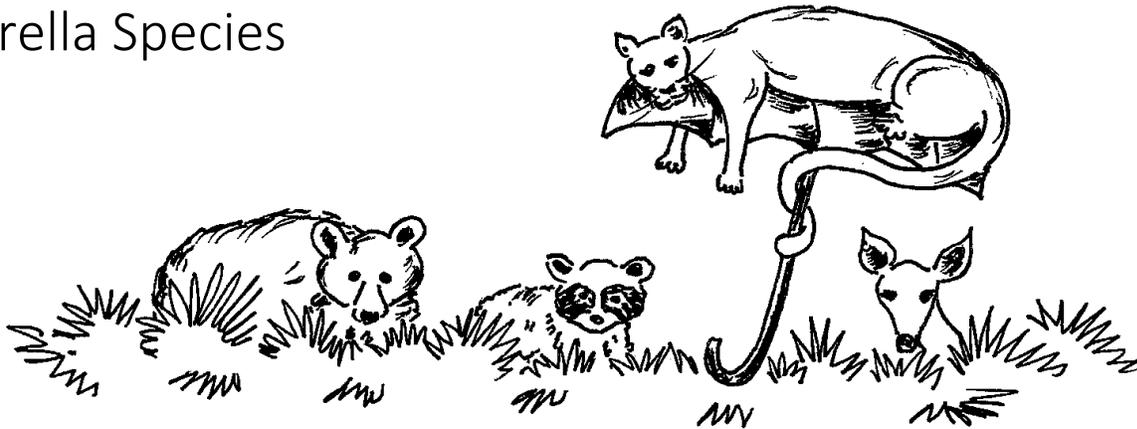
3. Play out a negative interaction between your predator and a human or human property. Write how you will show this:

4. Use the remainder of this sheet to write an outline for your skit:



Lesson Three

Umbrella Species



Key Questions

Why is the Florida panther considered an umbrella species and a flagship species? What are the advantages and disadvantages to using the concept of umbrella species to manage large areas of land?

Subjects

Science, Reading/Language Arts

Time Estimate

30 minutes + 60 minutes writing time

Key Vocabulary

Umbrella species, flagship species, land management

Sunshine State Standards

Science

SC.7.N.1.7 Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

Reading/Language Arts

LA.7.4.1.2 Write a variety of expressive forms (e.g., realistic fiction, one-act play, suspense story, poetry) that according to the type of writing employed, incorporate figurative language, rhythm, dialogue, characterization, plot, and appropriate format.

Objectives

In this activity, students will:

1. Decorate a piece of a large puzzle and then assemble the puzzle as a class to reveal a secret umbrella species
2. Discuss the concepts of umbrella species and similar terms as it applies to the Florida panther and to other species across the country
3. Compose a poem that addresses the umbrella species concept using the class puzzle as inspiration

Materials

- One copy of each piece of the puzzle
- Paints, markers, or colored pencils
- One copy of the Worksheet

Background

The term “**umbrella species**” refers to a species that usually needs a large area and variety of habitats, and when protected, leads to the protection of other species that share its habitats. In other words, the umbrella species theoretically holds an umbrella over the habitat allowing other organisms there to be protected. The Florida panther is considered an umbrella species because it needs large areas of land to roam (males need 200 square miles and females need 75 square miles) and uses a mosaic of habitats. By protecting large areas of land that support panthers, we are presumably protecting enough quality habitat for most other species that live in in these protected areas. The term is believed to have been first used in the early 1980s by a number of ecologists including Frankel, Soule, and Wilcox. Umbrella species are usually large, land mammals, but there are exceptions such as the bay checkerspot butterfly in California.

The umbrella species concept has been used as a tool for land managers. In theory, managers can simply monitor for that one species and be automatically conserving quality habitat for other species. But, there is some controversy of the effectiveness of using this concept for land management. Some conservationists argue that it is not enough to look at just one species when protecting large areas of land. Instead, multiple species should be considered to ensure that proper amounts of each habitat are preserved. However, the umbrella species concept does have merits in its simplicity and ability to get people excited about conserving land in order to conserve a charismatic animal.

Importantly, the Florida panther is more than just an umbrella species. That is simply one way of highlighting their importance to South Florida. The panther prompted the protection of some of our wild lands, but it also became a well-known symbol of

South Florida. This gives the Florida panther another title, a **flagship species**. Flagship species are symbols that promote conservation efforts by attracting the attention of the public. For example, the polar bear has become a flagship species highlighting the impact of climate change in the Arctic. Similarly, the Florida panther is a symbol of remaining wilderness in a state that is burgeoning with people.

There is some subjectivity in the assignment of terms like umbrella and flagship species to particular species. Some species may be considered flagship by some people, but not others. Additionally, there are a number of similar terms for significant species in any habitat:

The term “**keystone species**” refers to a species whose presence in a habitat is important to its function and to many other species there – if it were to disappear, many other species would also suffer. For example, Florida’s gopher tortoise is considered a keystone species because it creates large, underground burrows that are used by hundreds of other species for protection from disturbances like fire.

The term “**indicator species**” refers to a species whose presence or absence indicates certain environmental conditions. For example, some amphibian species indicate healthy water because they cannot survive in polluted areas. The presence of the Northern spotted owl indicates quality old growth forests because it requires this type of habitat to survive.

All of these terms serve as tools to highlight and recognize important species. This allows us to use them as proxies to manage land and help gain public support for their conservation.

Procedure

1. Give each student a different puzzle piece. If you do not have 25 students, give some students multiple pieces until all pieces are used. Instruct students color their piece and cut it out carefully. You may allow students to use smartphones or computers to look up their organism to color it correctly. Tell them that there may be objects in their piece that

don't look like anything, and that's because the puzzle will have to be put together to see the larger picture. They should just color the piece as they see fit.

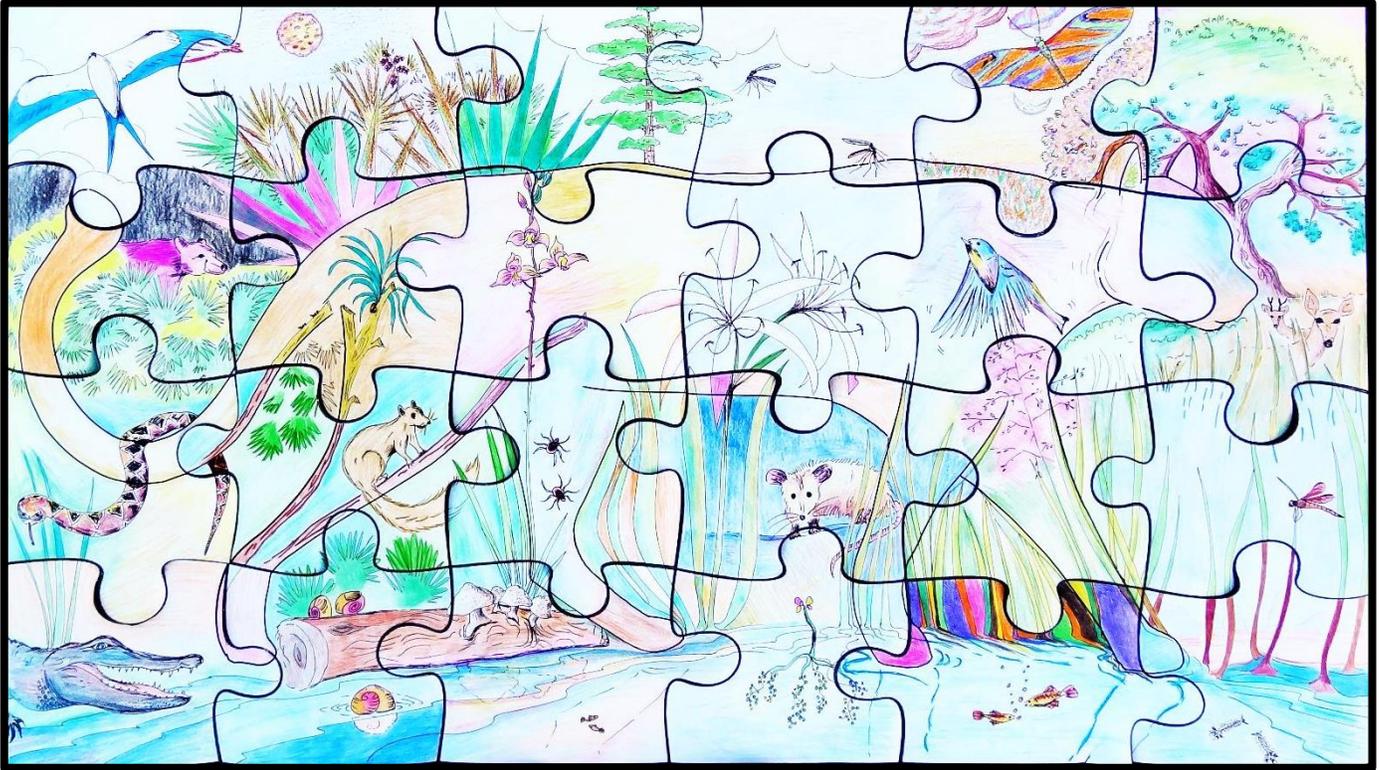
2. Complete the puzzle by having students tape the pieces together or glue them to a large sheet of paper. Have students stand back from the puzzle and find the large Florida panther!
3. Begin a discussion/lesson the concept of umbrella species and flagship species. Does the puzzle offer any clues to the meaning of the terms? After defining the terms, ask students what characteristics of the Florida panther make it an umbrella species? What characteristics make it a flagship species?
4. Discuss using the umbrella species concept as a way to manage land. What are the advantages? Disadvantages?
5. Give each student a copy of the "Umbrella Species" worksheet. Instruct them to complete the worksheet. Then, have each student show the class which organism on the puzzle they had and brainstorm about how it may affect and be affected by the Florida panther (*Some organisms like the white-tailed deer are directly affected by panthers because they are a food source, while others have only indirect connections. For example, a cardinal airplant isn't obviously related, but by protecting land for the panther, you protect the airplant. Many of the species are related through the umbrella species concept*).
6. Have students observe the puzzle, discuss how it illustrates the umbrella species and flagship species concepts. Then, instruct students to use the puzzle as inspiration to compose a poem about the Florida panther as an umbrella and flagship species. You may specify a certain poem style or length. You may have students include particular words in the poem such as umbrella, protect, etc. This could be a homework assignment.

7. Students may then share their poetry with the class and display their poems alongside the puzzle.

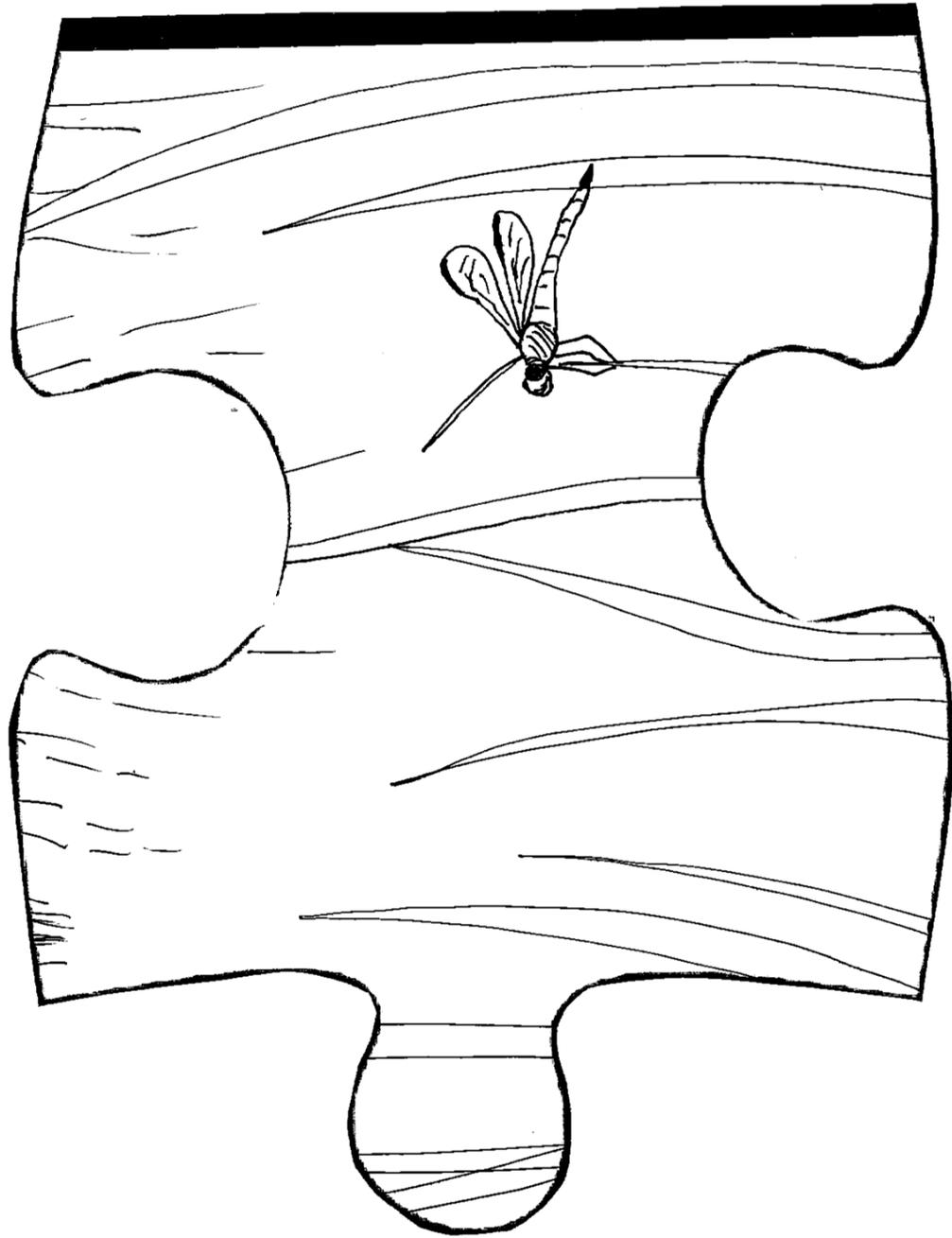


Adapted from "Bear Neighbors" in the Florida Black Bear Curriculum Guide by Linda Cronin-Jones

 Finished Puzzle



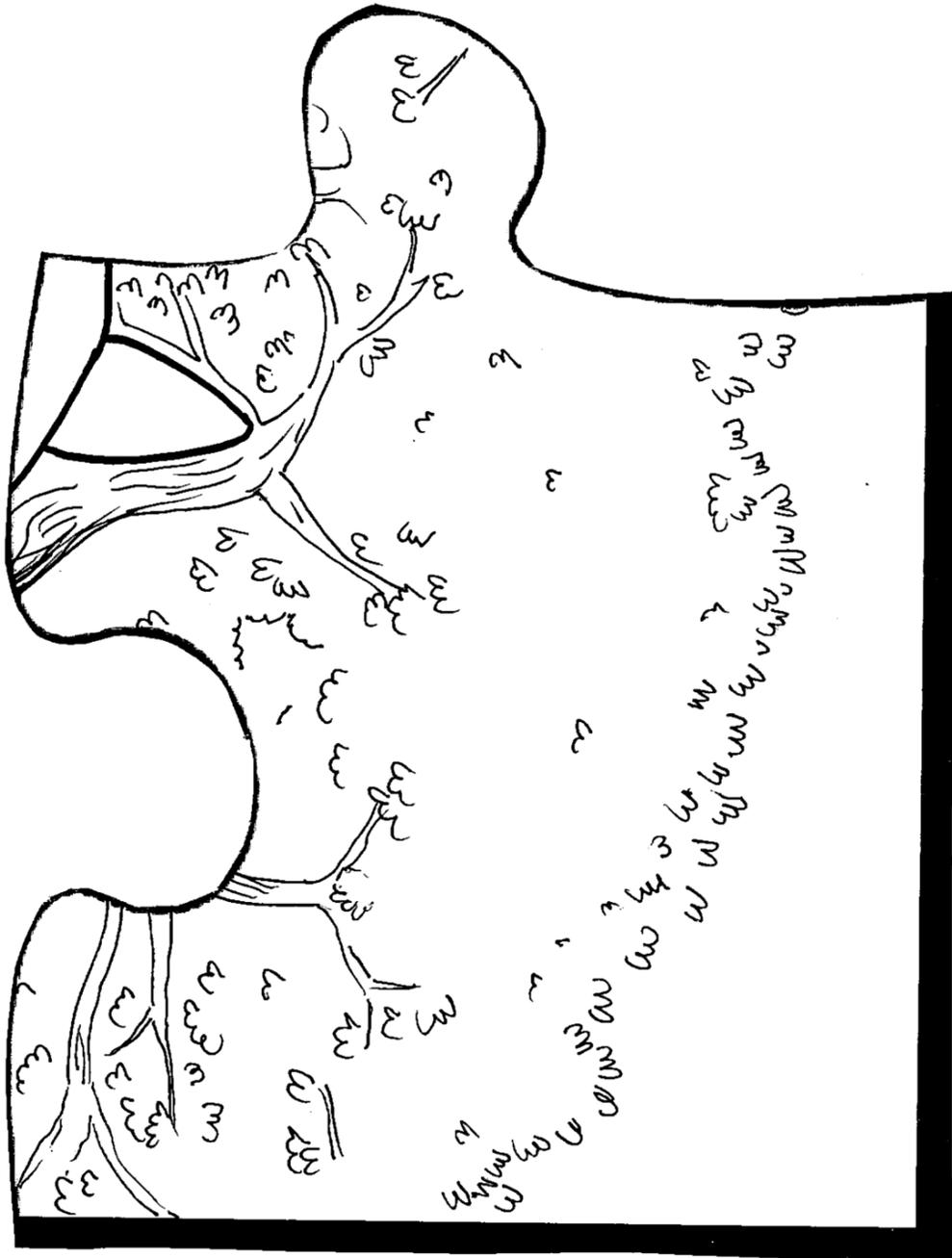
 Puzzle Piece: Dragonfly



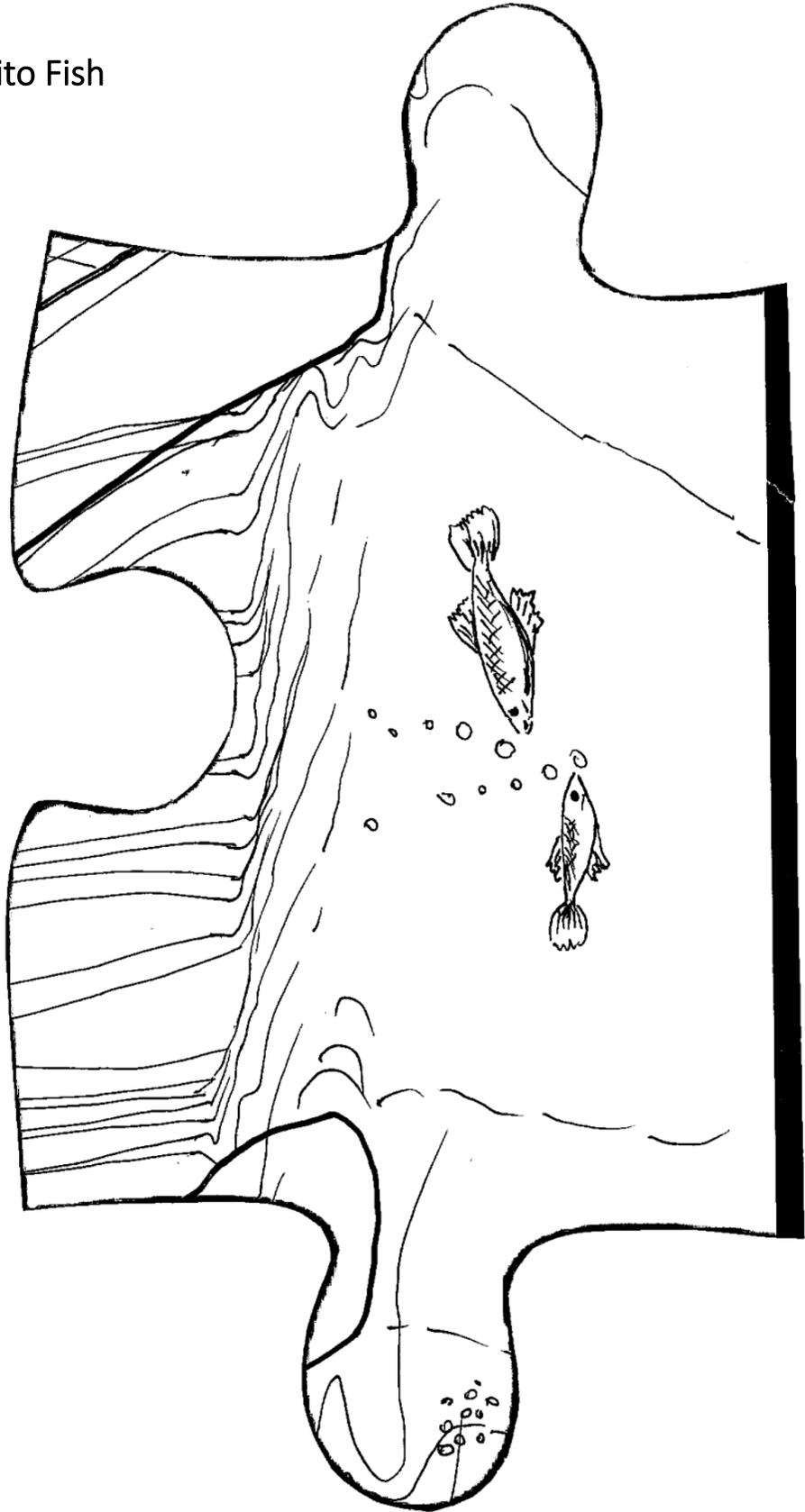
 Puzzle Piece: White-tailed Deer



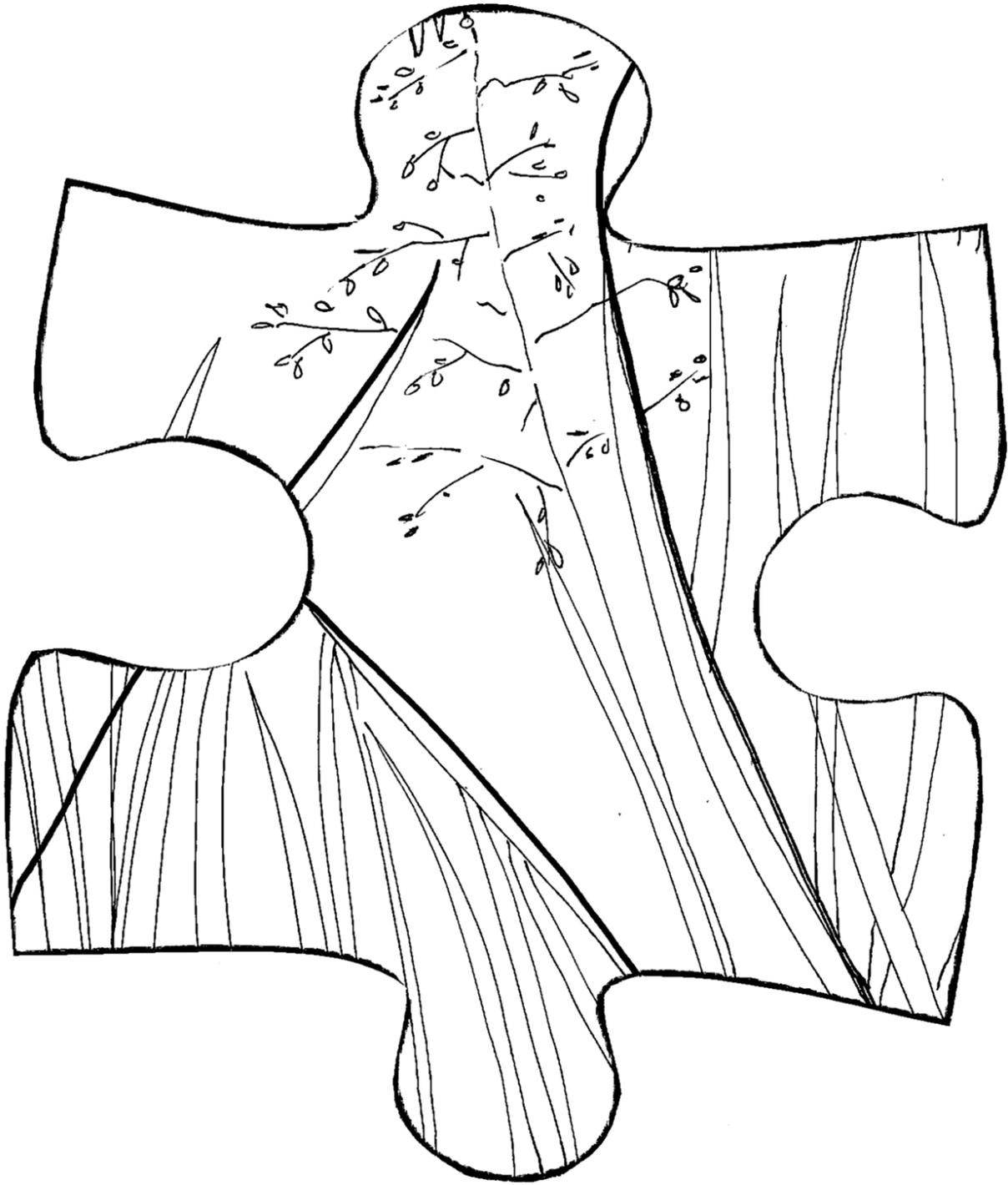
 Puzzle Piece: Live Oak Tree



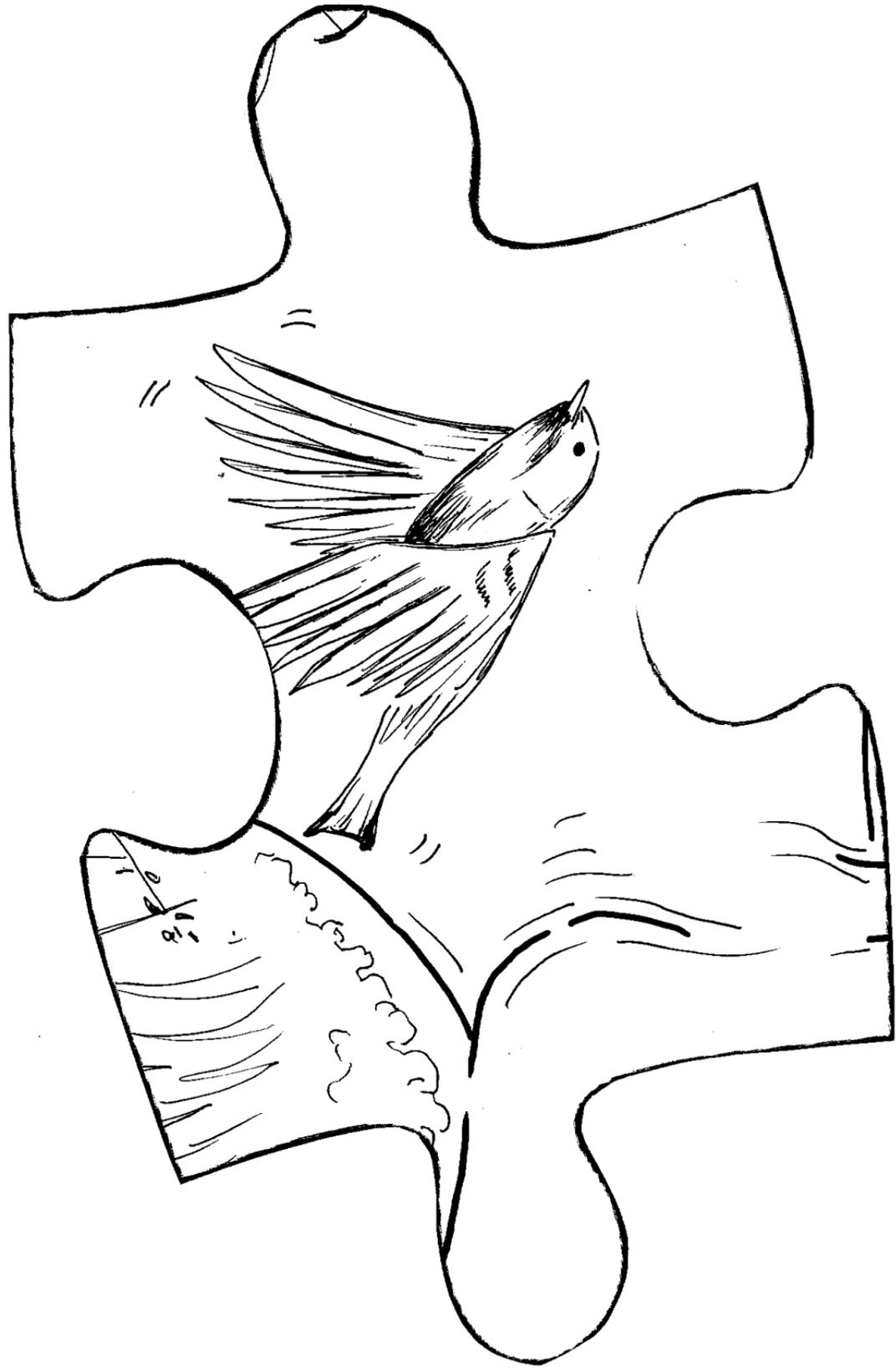
 Puzzle Piece: Mosquito Fish



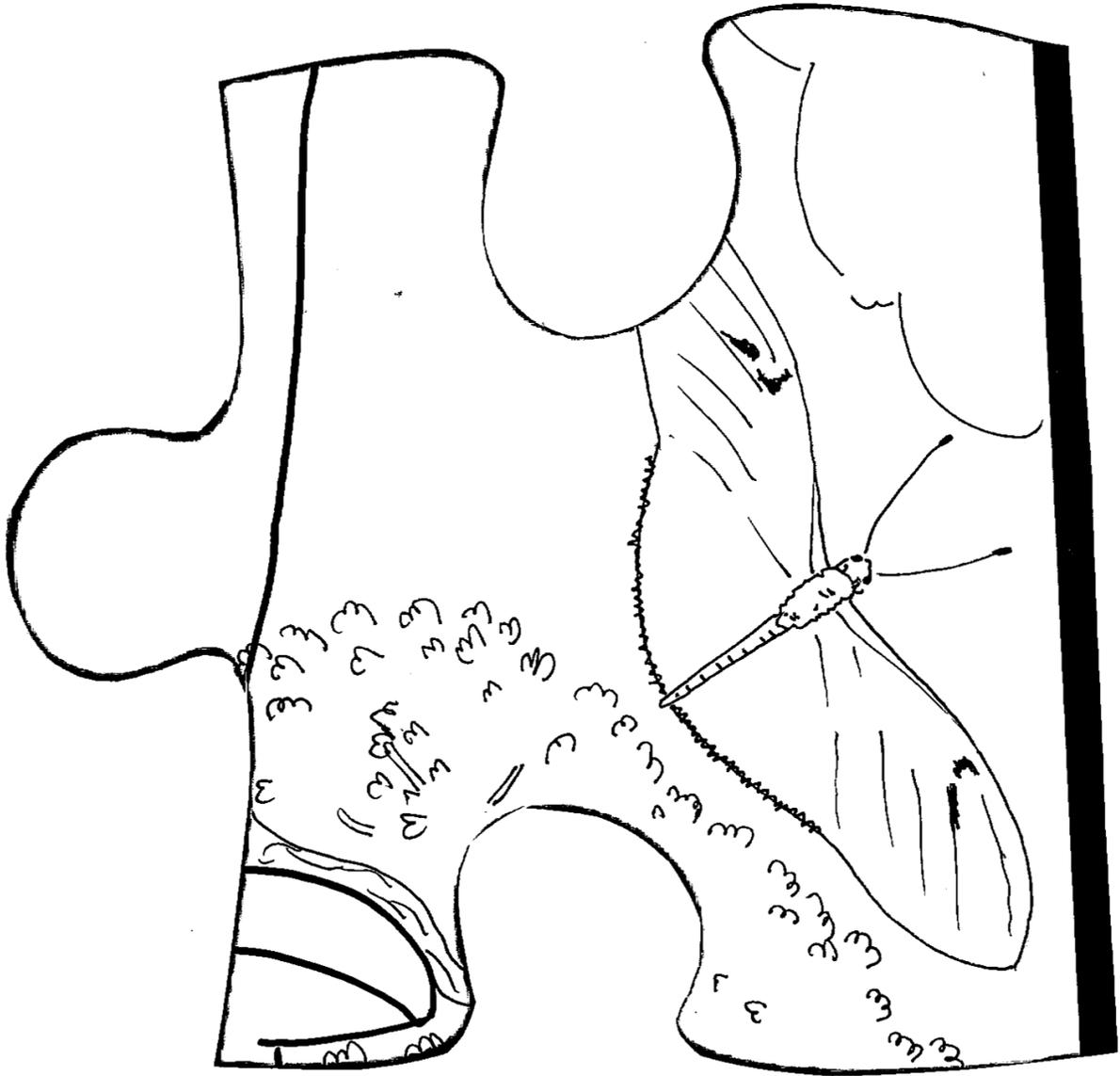
 Puzzle Piece: Gulf Muhly Grass



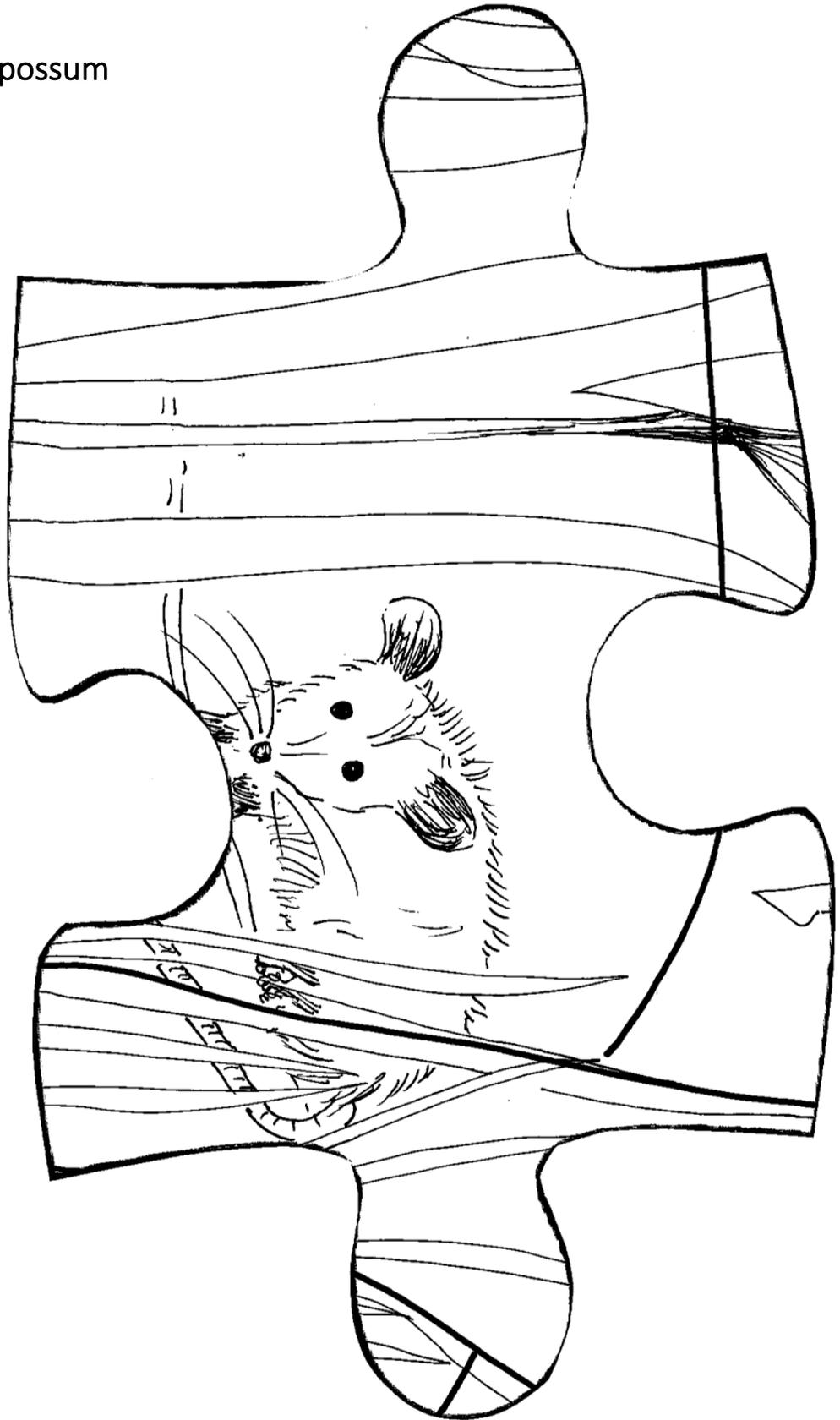
 Puzzle Piece: Yellow-rumped Warbler



 Puzzle Piece: Julia Butterfly



 Puzzle Piece: Opossum

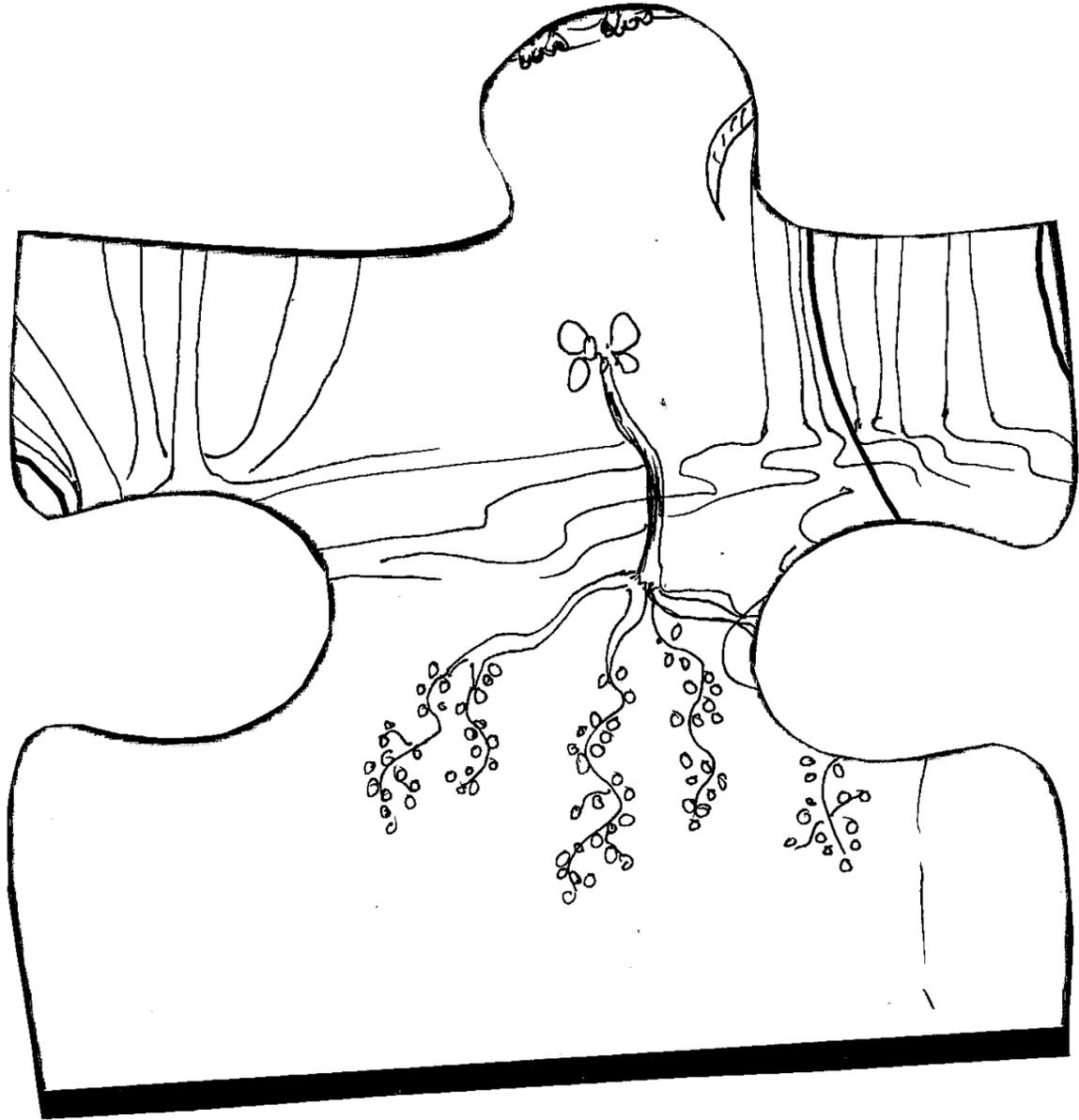




Puzzle Piece: Swamp Lily



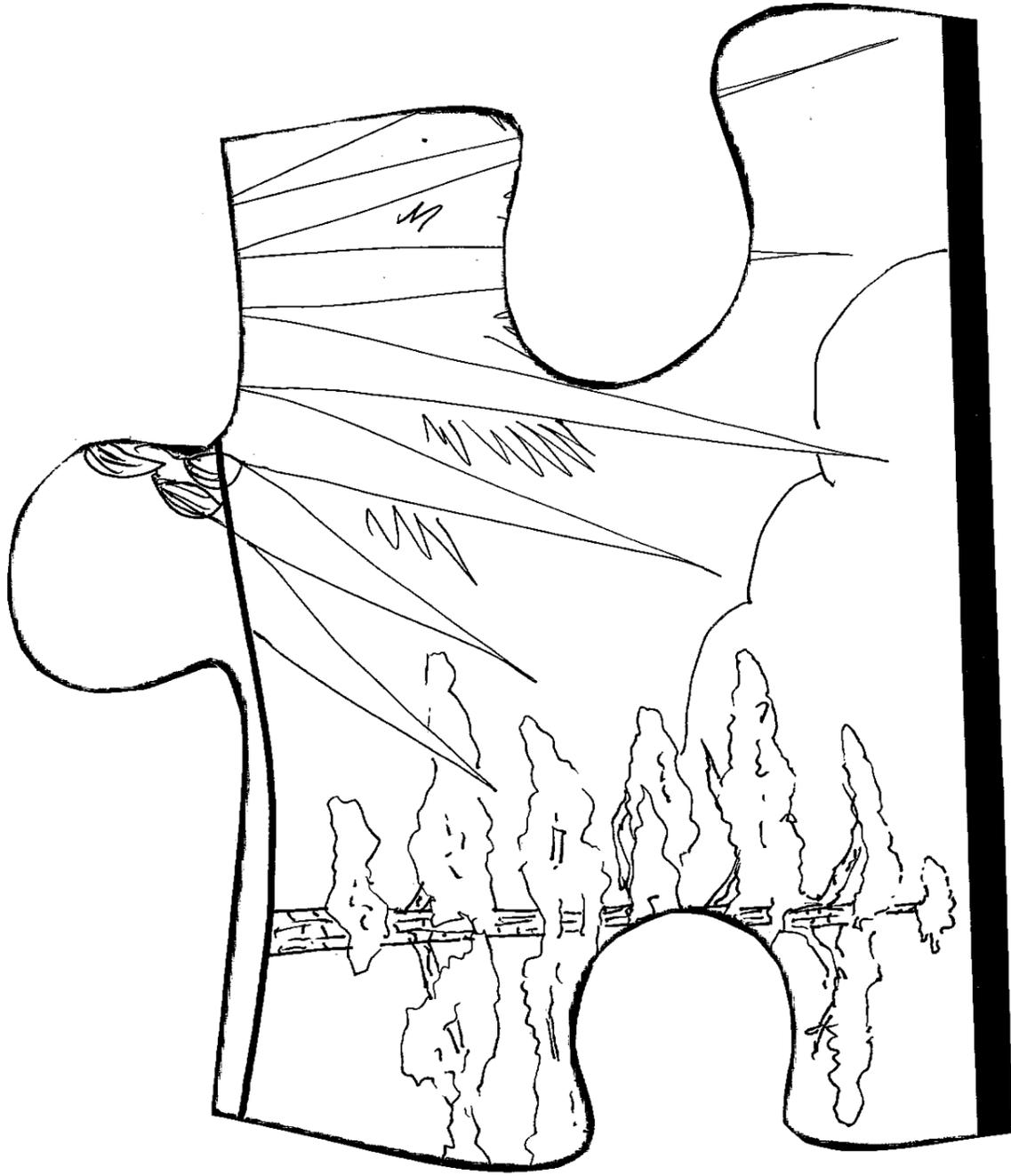
 Puzzle Piece: Floating Bladderwort



 Puzzle Piece: Mosquito



 Puzzle Piece: Slash Pine



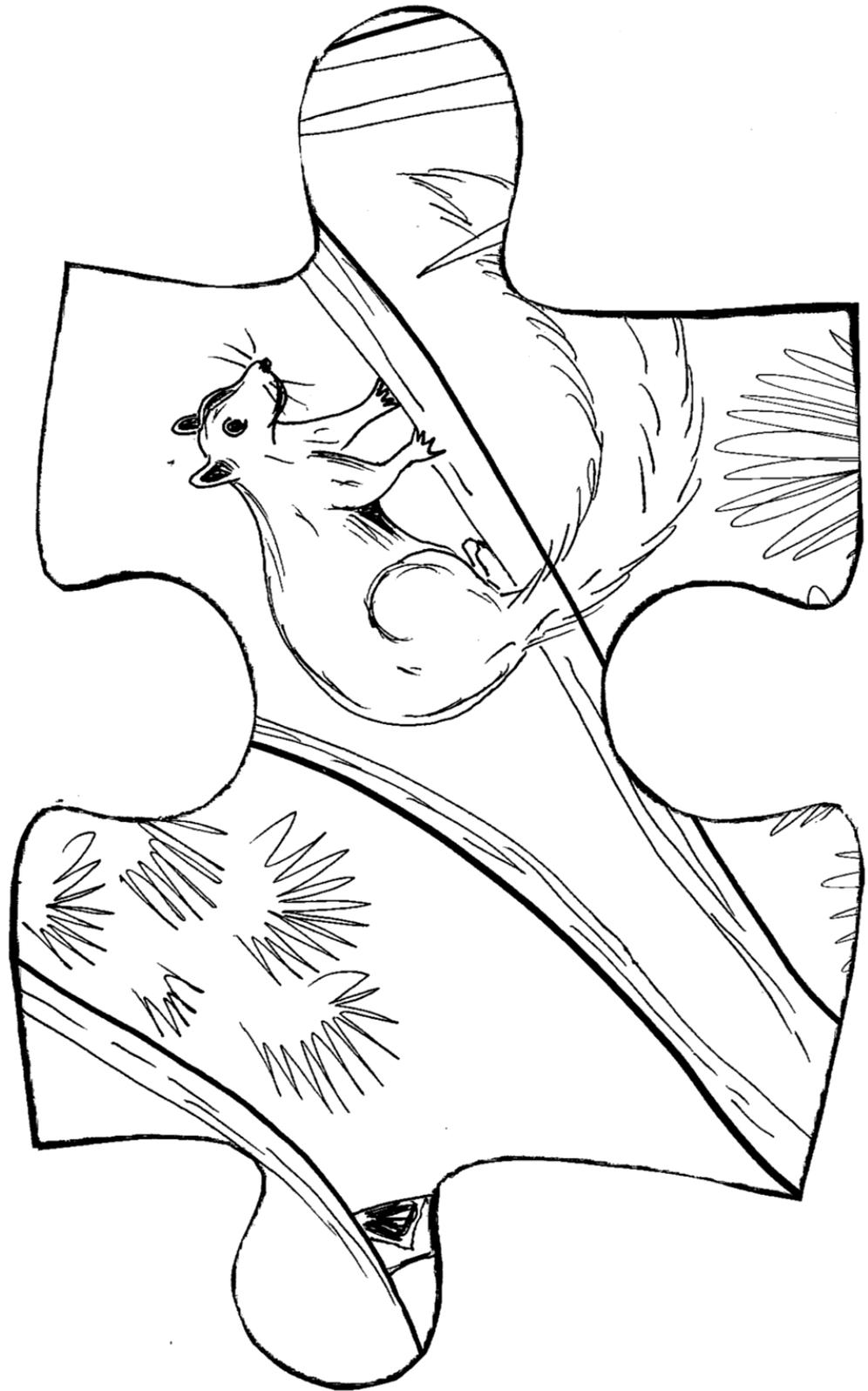
 Puzzle Piece: Deer Tick



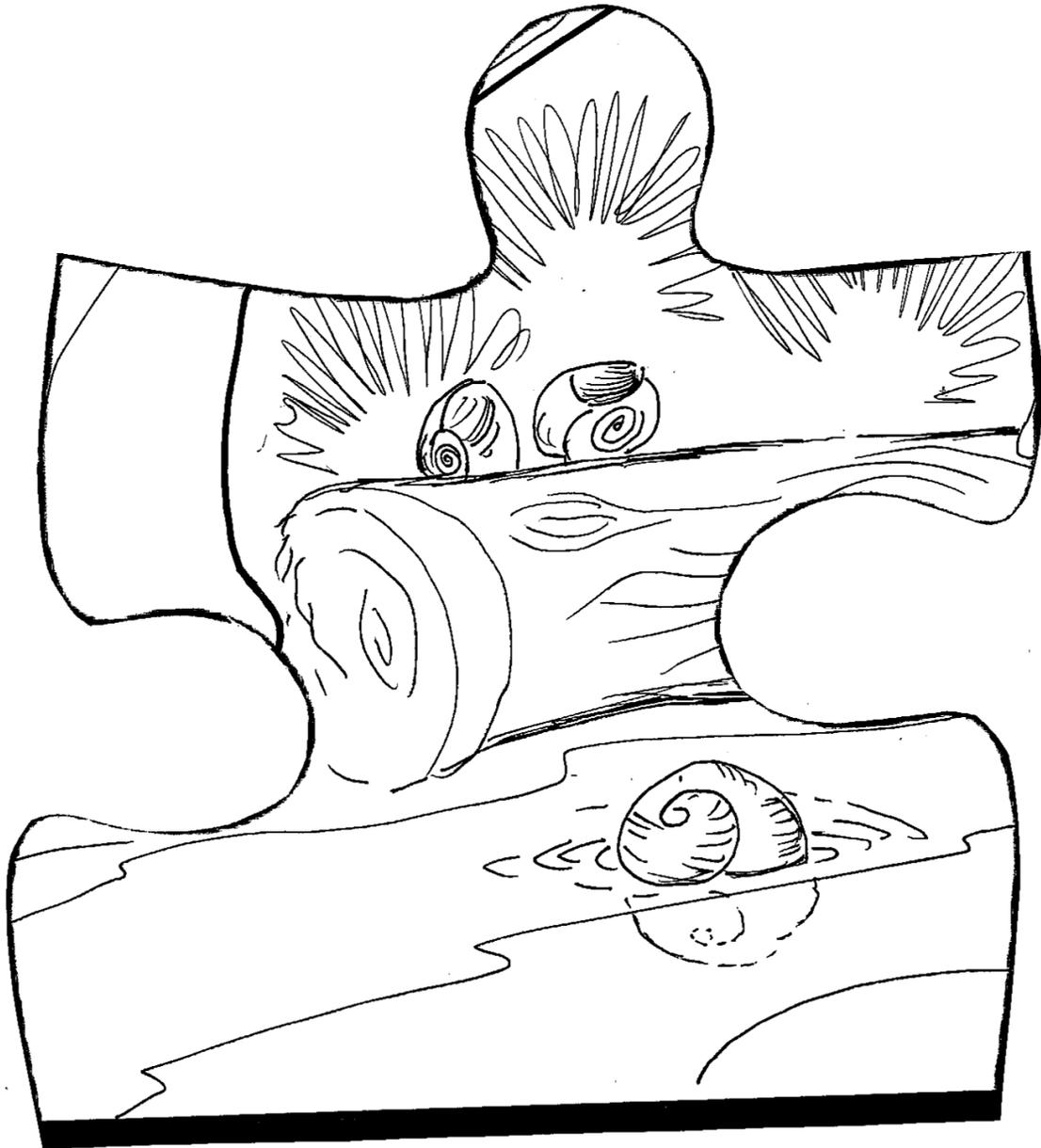
 Puzzle Piece: Dirty Tricholoma Mushroom



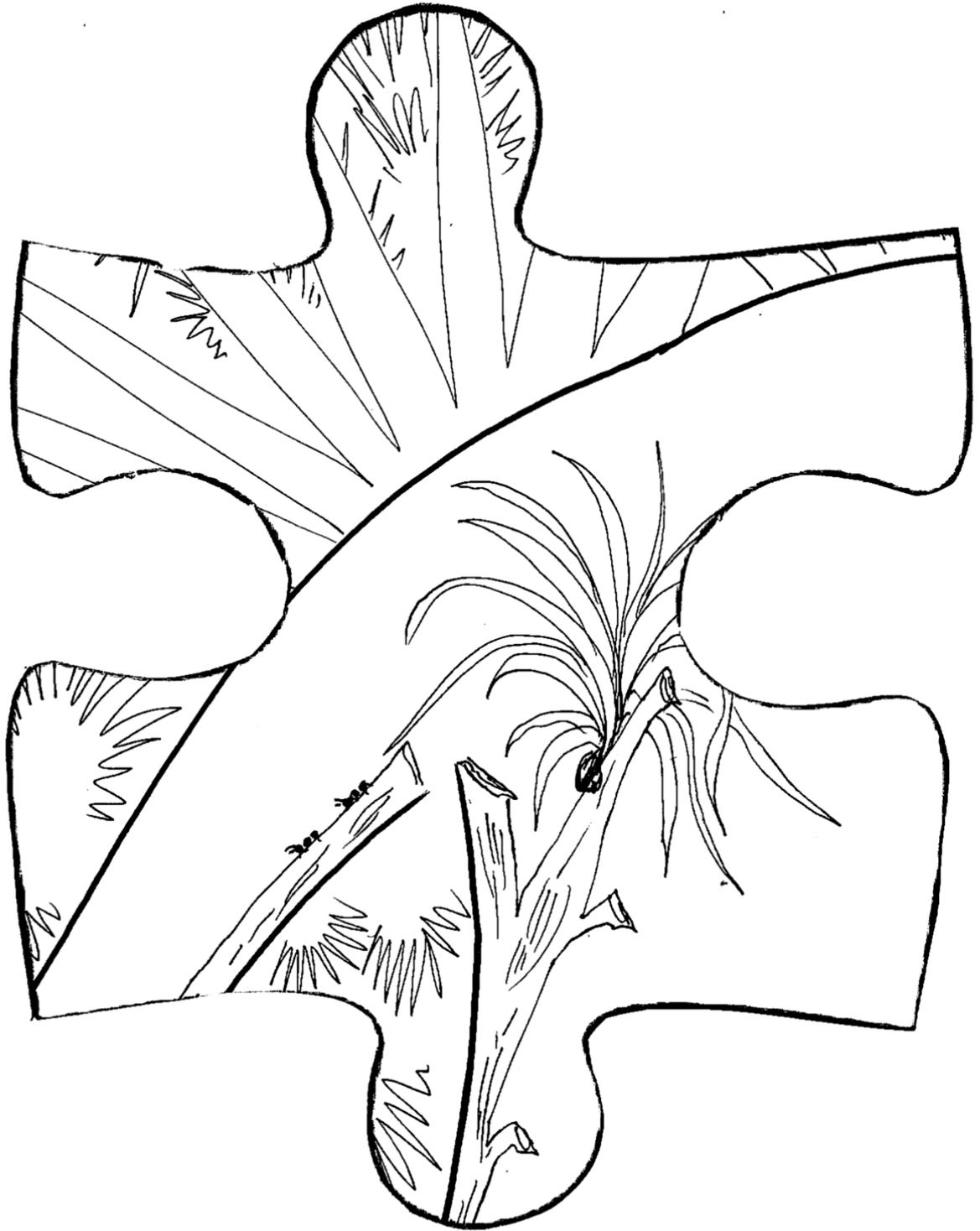
 Puzzle Piece: Big Cypress Fox Squirrel



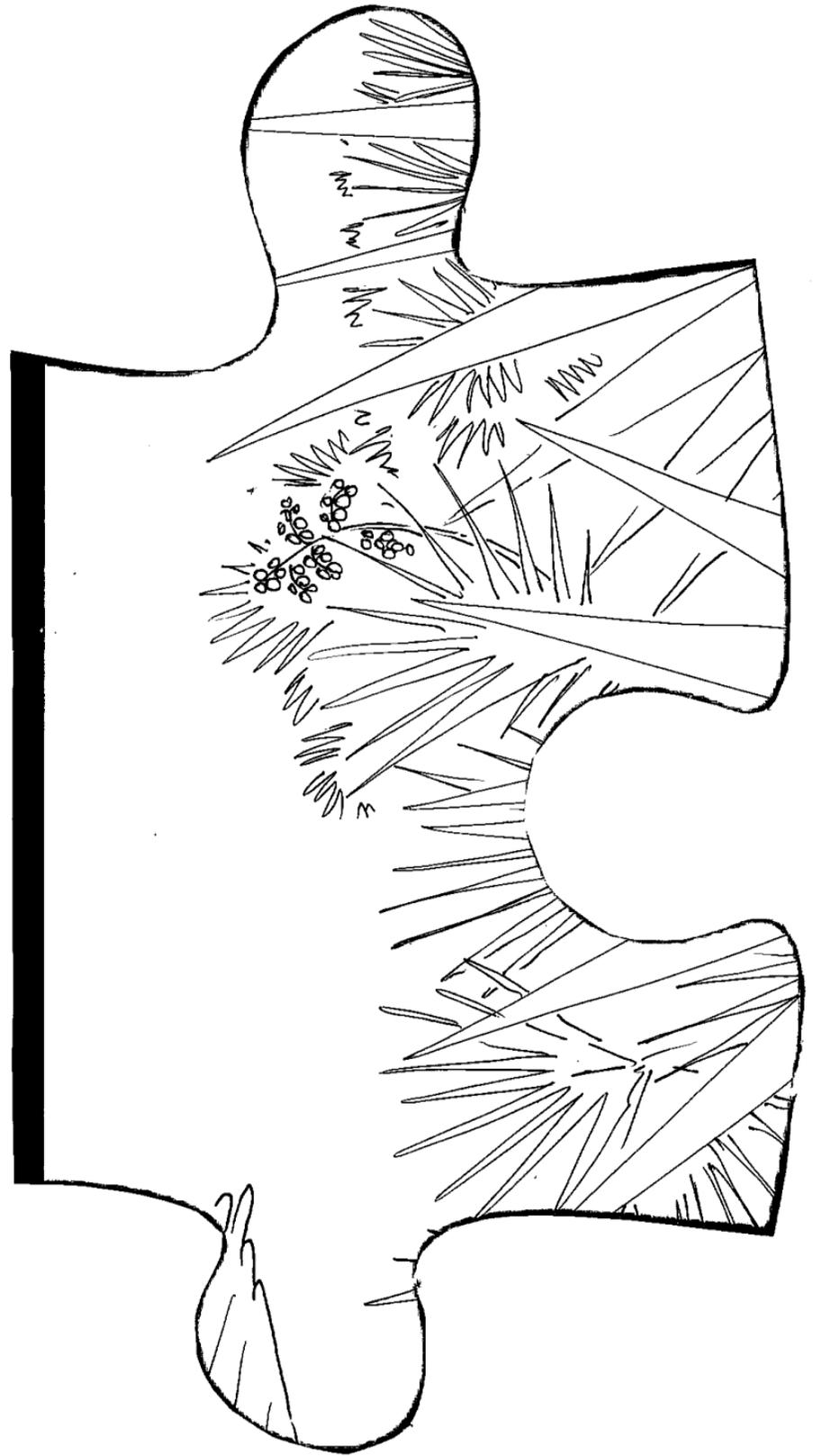
 Puzzle Piece: Apple Snail



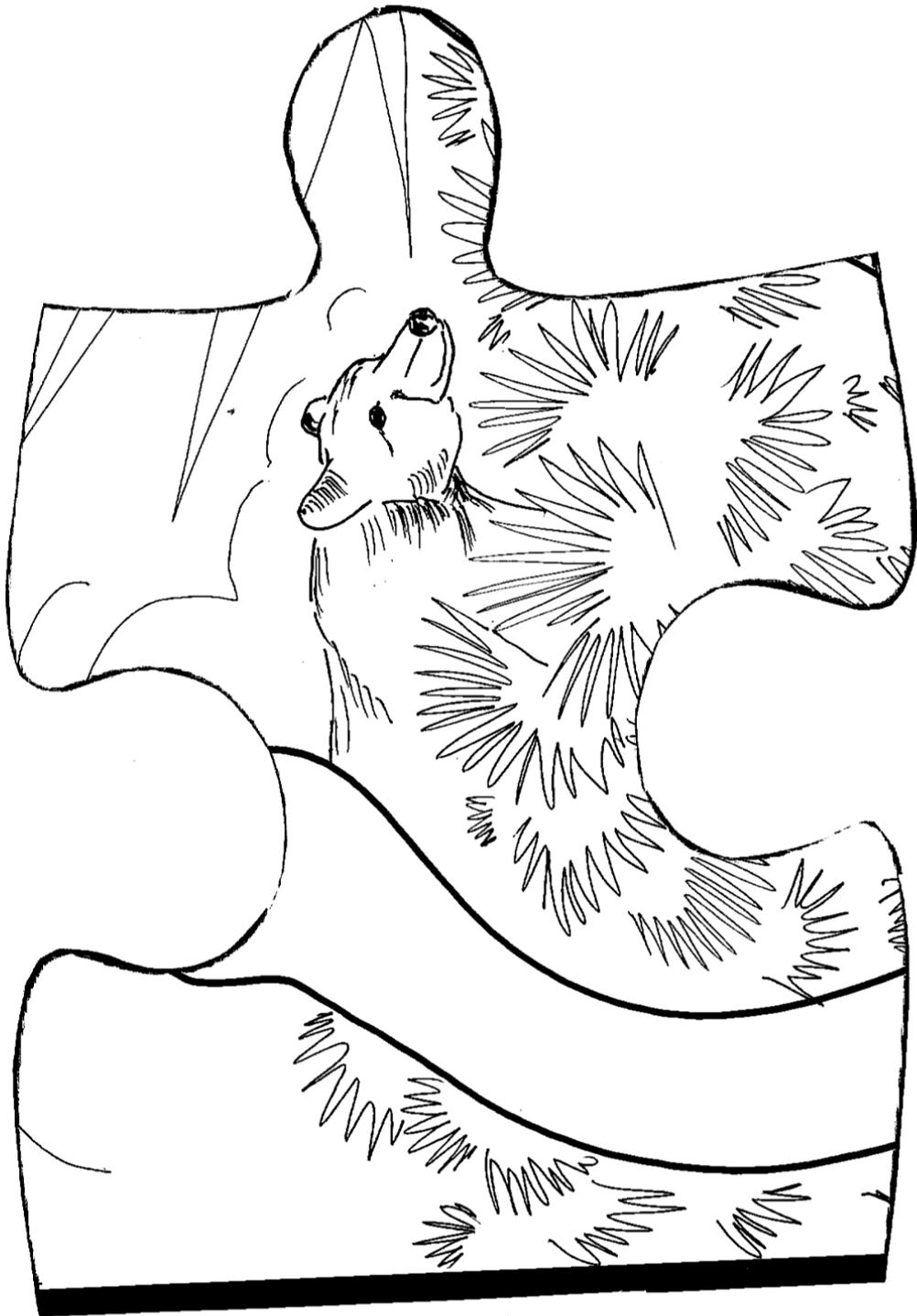
 Puzzle Piece: Cardinal Airplant



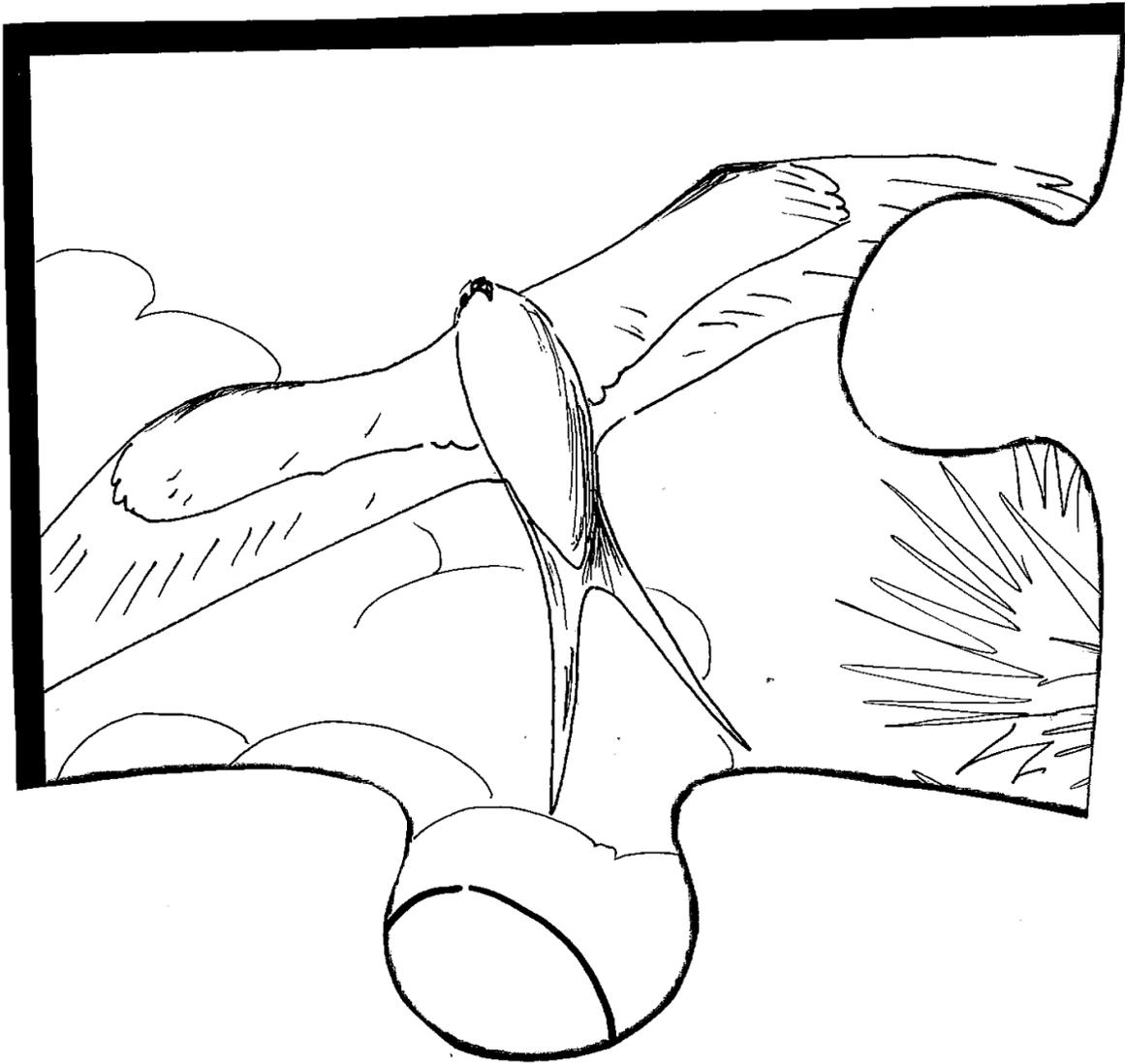
 Puzzle Piece: Saw Palmetto



 Puzzle Piece: Florida Black Bear

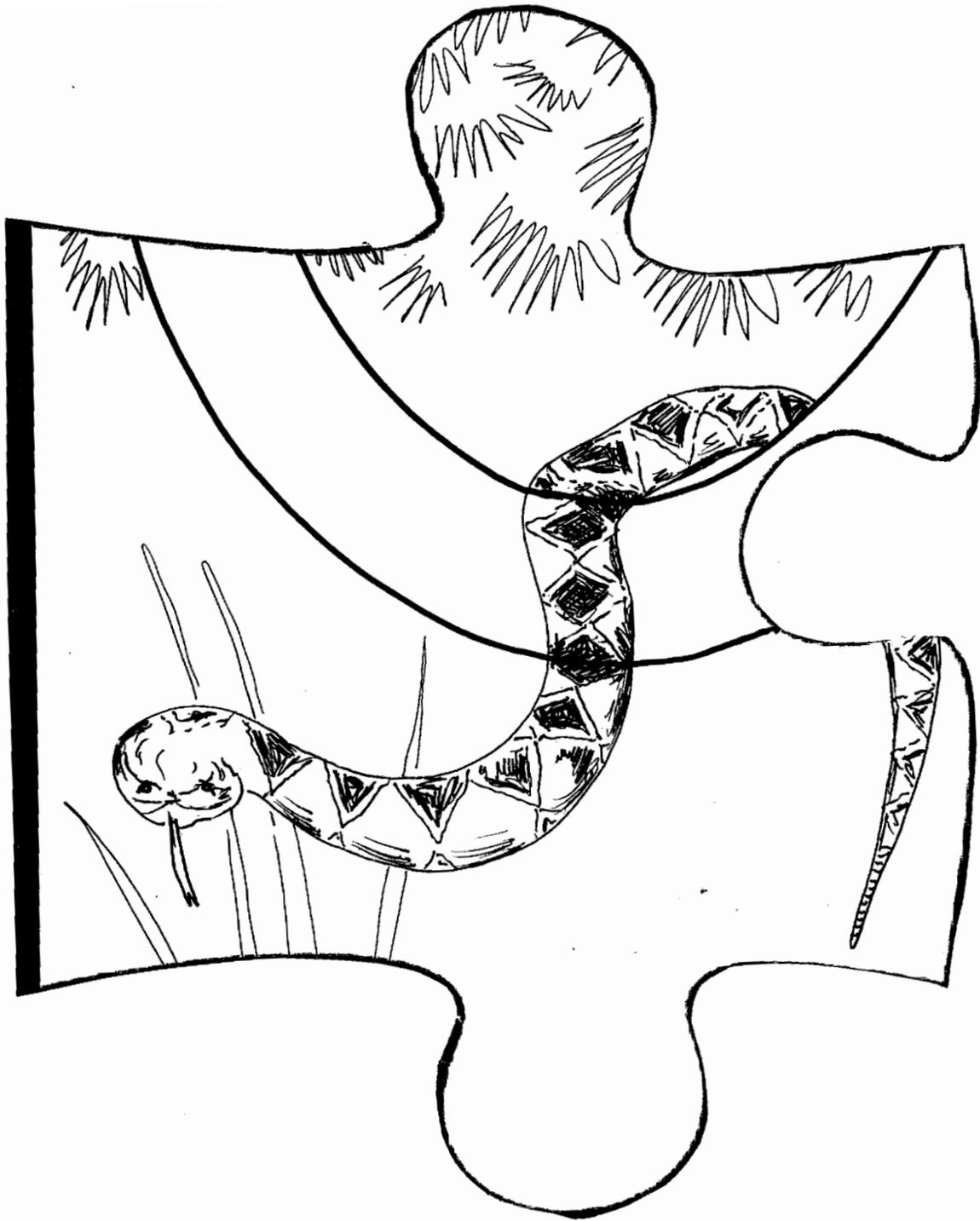


 Puzzle Piece: Swallow-tailed Kite

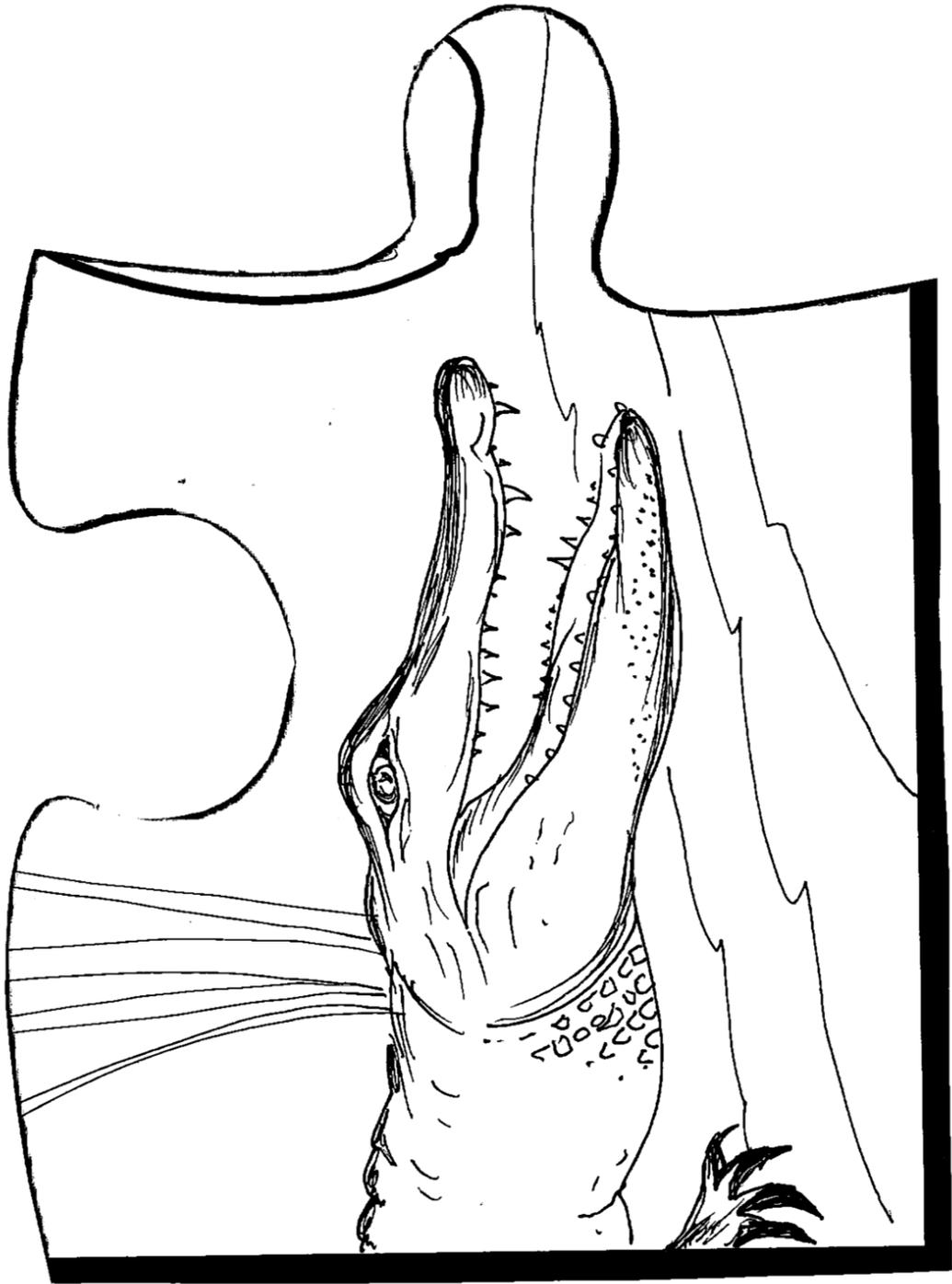




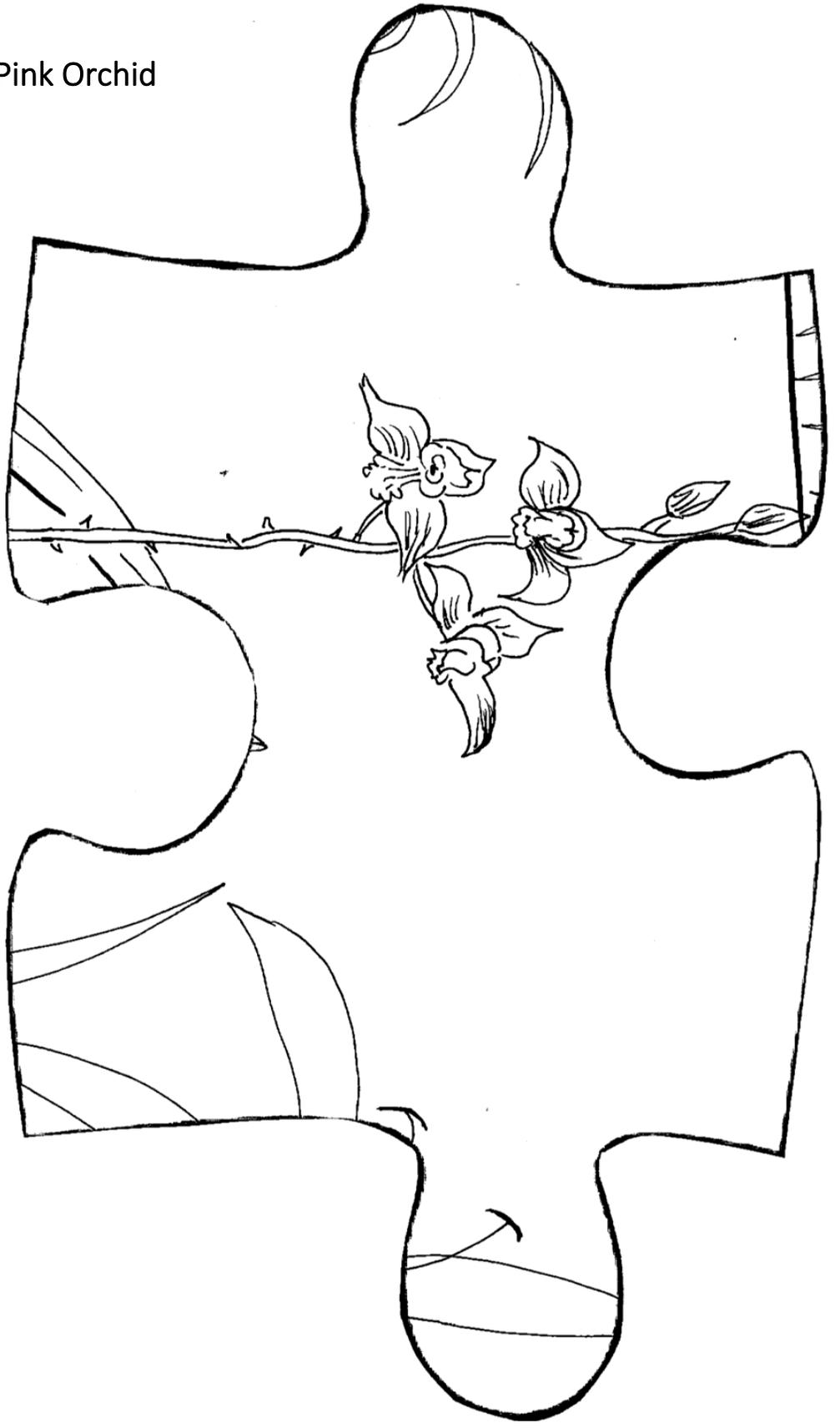
Puzzle Piece: Eastern Diamondback Rattlesnake



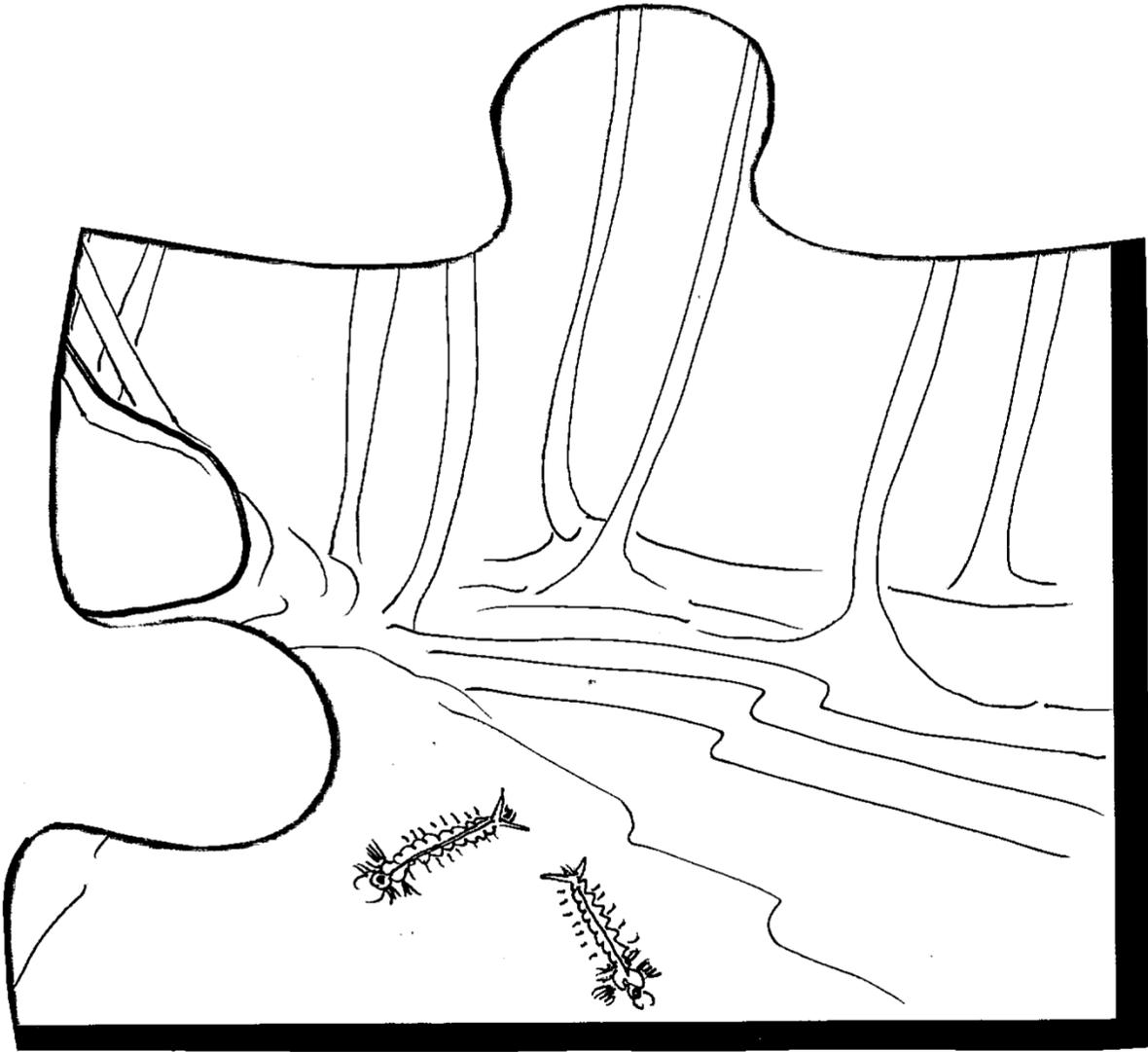
 Puzzle Piece: American Alligator



 Puzzle Piece: Pine Pink Orchid



 Puzzle Piece: Mosquito Larvae





Umbrella Species Worksheet

Your Name: _____

1. What organism was on your puzzle piece? _____

2. In what way(s) might your organism be effected by the presence of the Florida panther?

3. In what way(s) might your organism *affect* the Florida panther?

4. What does the term “umbrella species” mean?

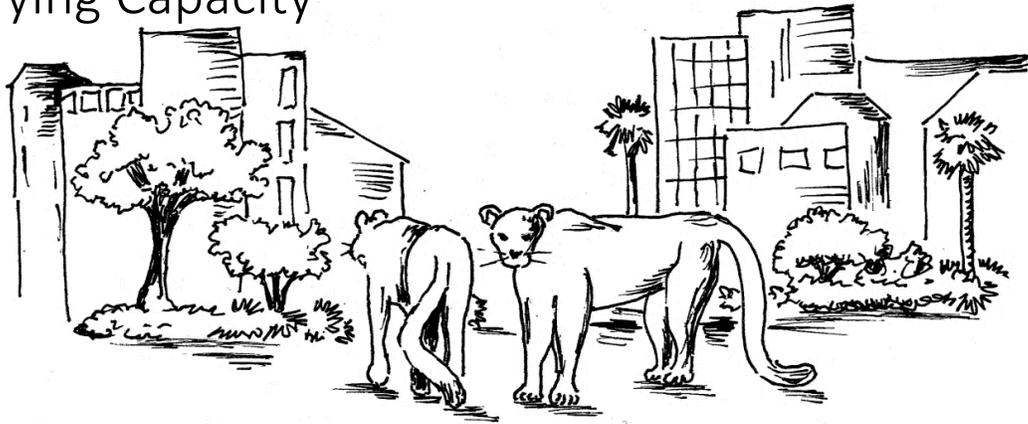
5. Why is the Florida panther considered both an umbrella species and a flagship species?

6. Discuss one advantage and one disadvantage to using the umbrella species concept to manage land:



Lesson Four

Cat Carrying Capacity



Key Question

What factors affect the carrying capacity of the Florida panther?

Subjects

Science

Time Estimate

60-90 minutes

Key Vocabulary

Carrying capacity

Sunshine State Standards

Science

SC.7.N.1.1 Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.



Objectives

In this activity, students will:

1. Discuss factors that might limit a species' population size in an area and develop hypotheses.
2. Play multiple rounds of panther population simulations as limiting factors to carrying capacity are manipulated
3. Record results and interpret the effects of limiting factors on carrying capacity



Materials

- Copies of food resource cards appropriate for the size of the class, cut out
- A copy of the Discussion Questions for each student
- A portable whiteboard or large paper to draw a chart
- Tape or rope
- Meter stick
- Cones or flags to delineate boundaries



Background

Carrying Capacity

Florida panthers roamed the entire Southeast United States long before Europeans settled here. They had a large, healthy population that was limited in size by the amount food, water, space,

and shelter found in their range. The region had a **carrying capacity**, or a number of panthers that the area could support. Through time, limiting factors caused panther populations to continuously fluctuate around the carrying capacity, sometimes going over and other times falling below. As more and more people settled in the area, the population of Florida panthers began to decline. Many people hunted them or shot them because they feared for their pets and livestock or simply disliked panthers.

At the same time, cities and roads were encroaching further and further into their habitat, shrinking the amount of space and thus also food and water and shelter available to panthers. All of these factors contributed to a large drop in the carrying capacity of Florida panthers.

The Florida panther was eventually pushed into the swamps and forests of South Florida, which was the only place remote enough to allow a few cats to escape humans. By 1970, panthers were believed to be extinct in Florida.

Beginning in the 1980s, conservation efforts, which later included a genetic restoration, brought panther numbers to over 100 by 2007. As of May 2020, the number of panthers in South Florida was estimated to be between 120 and 230. Their numbers may be leveling off, meaning that panthers are near carrying capacity given the available habitat remaining.

However, the habitat available to the Florida panther is still shrinking as development continues to encroach on the edges of their range. Additionally, as more people inhabit South Florida and more panthers roam, vehicular deaths continue to rise, killing more and more panthers each year. The future of the Florida Panther will depend on protecting their habitat. In order to increase the carrying capacity, we will have to give them more space, more food, and fewer threats like vehicles.

Finite Food Supply

This game explores the concept of a finite food supply as one of the factors determining the carrying capacity of Florida panthers. Panthers feed primarily on deer and hogs, and often take smaller animals as well such as raccoons, armadillos, and

rabbits. Panthers will occasionally eat alligators. To survive, an adult panther needs to consume about 1 deer or 1 hog per week. Panthers that consume smaller prey tend not to be as healthy as those consuming larger animals. A panther would have to consume at least 10 or more raccoons or armadillos per week to equal a small deer. Female panthers that are nursing kittens will need to eat about twice as much food as a single panther. The numbers used in this activity are based on this information.

Feline Leukemia

In addition to shrinking habitat, shrinking food supply, and increased road mortality, panthers face other threats. One possible danger that always lurks in South Florida is a disease known as feline leukemia. This disease spreads among feral cats and can sometimes infect Florida panthers. There have been a small handful of cases so far in panthers, and incidence of this disease could change in the future. It is deadly if contracted.

Advance Preparation

1. Find an open space outside or use an indoor or outdoor sports court. Use rope or cones to outline a large box (approx. 60 x 60 feet). This will represent the habitat available to the Florida panther. Have additional rope and cones ready for when
2. roads are added and the size of the habitat changes.
3. Prepare food cards by printing them and cutting them out. You should have approximately **2 deer, 1 hog, 1 raccoon, and 1 armadillo card per student**. You can include 1-3 alligators in the game because panthers occasionally eat them. *Make sure to include the cards with an "L" printed on the bottom right corner in the game.* Spread the food out on the ground evenly throughout the 60 x 60 square.
4. Prepare to make a large chart with the results of the game so that all students can see it. Draw a chart using the one provided

as a guide that you will fill out as the game is played.

5. Print out a discussion questions sheet for each student.

Procedure

1. Ask students to list factors that might limit the size of a population of Florida panthers or other organisms. Discuss the concept of carrying capacity and factors that influence it.
2. Explain to students that they are going to simulate a population of Florida panthers. Each student will be a panther and will try to gather the necessary resources to survive for 1 month. In order to survive for 1 month, students must collect 40 food points. They may obtain these with any combination of food cards.
3. **Play Round 1:** Ask students to stand on the edge of the square. When you say “GO”, students will enter the square and begin gathering food. The round ends when all the food has been gathered. Students must now count how many food points they earned. If they did not gather 40 or more, they did not survive. Tally how many students survived, and record this number on the large chart. This represents the starting carrying capacity for Florida panthers. Spread all of the food cards back out over the square evenly.
4. **Play Round 2:** Explain to students that this round will proceed as the previous round, but a silent killer lurks. Ask students to stand on the edge of the square. When you say “GO”, students will enter the square and begin gathering food. The round ends when all the food has been gathered. Students must now count how many food points they earned. If they did not gather 40 or more, they did not survive. If they did, now have students check to see if any of their food cards have an “L” on the bottom right

corner. If so, this means they have contracted feline leukemia and will die as well. There was a small outbreak among panthers this year. Tally how many students survived, and record this number on the chart. Explain to students that for the remaining rounds, “L” will not mean anything and these food cards are safe to pick up. Spread the food cards back out over the square evenly.

5. **Play Round 3:** Before this round, add a road that cuts through the square using a rope. Explain that at any time, if the teacher says “FREEZE”, students will have to stop where they are. The teacher (or a helper) will become a car and walk along the road through the square, holding a meter stick in front of him/her. If any student is touched by the stick, they will be hit by a car and will not survive. Ask all students to stand on the edge of the square (all panthers begin alive again each round). When you say “GO”, students will begin gathering food. Say “FREEZE” before the food is gone and walk with the meter stick through the square. Panthers that are hit by the car will die and will move out of the square, keeping the food they gathered so far. Say “GO” again to resume food gathering and continue until food is gone. Tally the number of surviving panthers and record on the chart and
6. spread the food cards back out over the square evenly.
7. **Play Round 4:** Before this round, shrink the size of the square by moving the rope or cones inward by about 10 feet on each side. Some of the food should now be located outside the square. Have students help you pick up food that is outside of the square and give it to you to stow away. The habitat is now smaller and less food is available as a consequence. Ask students to stand on the edge of square, say “GO” and let students begin gathering food. Say “FREEZE” before all the food is gone and walk the road with a meter stick, causing any panther that touches the meter stick to die and leave the round with their food. Resume the round by saying “GO”, and

when all the food is gone, tally the number of surviving panthers and record on the chart. Spread the food cards back out over the smaller square evenly (don't include the extra food from when the habitat was larger).

8. **Play Round 5:** Before the round, add a second road into the area with another piece of rope. Play the round like the others, including a "FREEZE" in the middle in which you drive BOTH roads as a car, causing any panther within the reach of the meter stick on either road to die. Tally the number of surviving panthers.
9. **Play Round 6:** Before this round, remove one of the roads and increase the area of the square by moving the cones or rope out by 5 feet on all sides. Add back in some, but not all, of the food you had stowed away from round 3. Highway underpasses were built under the road which is preventing panther deaths on that road, and a restoration project has provided new suitable habitat for panthers! Play the last round using the same rules, making sure to FREEZE and drive the road during the round. After all the food is gone, tally the number of surviving panthers and add it to the chart.
10. Discuss the results with students using the discussion questions page as a guide. If you'd like, have students break into partners and have discussions amongst themselves while they complete the worksheet.

Optional Extension

Have students develop ideas for additional rounds that can be played to experiment with how other factors might influence the carrying capacity of Florida panthers. For instance, some panthers will have kittens, causing them to require twice the food of a single panther. Some students could be panthers with kittens.

Cat Carrying Capacity

Food Resource Cards



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
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White-tailed Deer
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10 points L



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points



White-tailed Deer
10 points

Cat Carrying Capacity

Food Resource Cards

 <p>Alligator 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>
 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>
 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>
 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points L</p>	 <p>Feral Hog 10 points L</p>
 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>	 <p>Feral Hog 10 points</p>

Cat Carrying Capacity

Food Resource Cards



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
5 points



5 Raccoons
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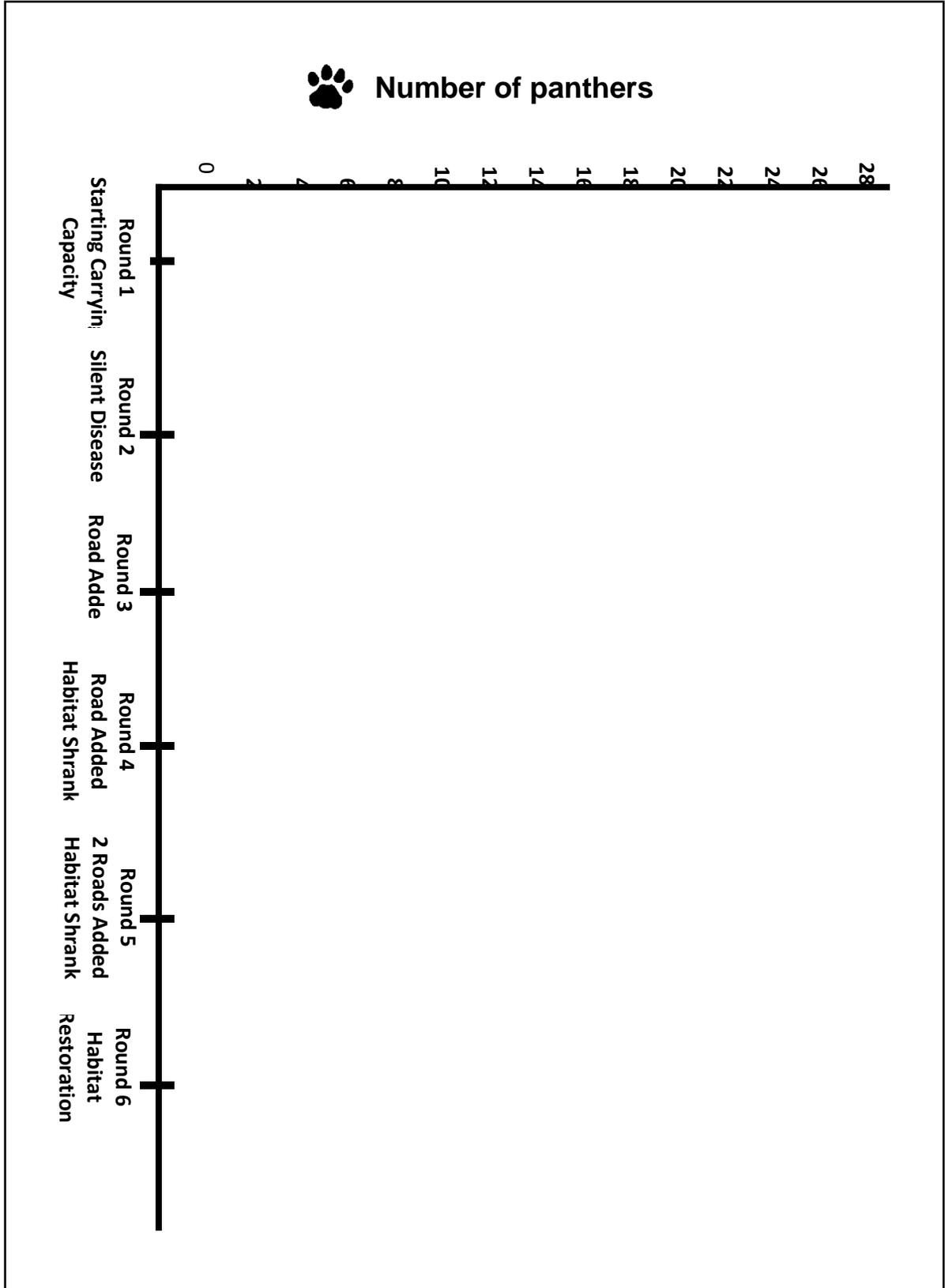
Cat Carrying Capacity

Food Resource Cards

 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>
 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>
 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>
 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points L</p>	 <p>5 Armadillos 5 points L</p>
 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>	 <p>5 Armadillos 5 points</p>

Cat Carrying Capacity

Panther Population Chart



Cat Carrying Capacity

Discussion Questions

Your Name: _____



Directions: Using the results from the simulation game, answer the following questions.

1. Which limiting factors seem to have the largest effect on the panther population? Why?

2. Write at least 3 additional limiting factors that weren't used in the game affecting Florida panthers today:

3. In what specific ways might the introduction of the exotic species like the Burmese Python affect the carrying capacity of Florida panthers?

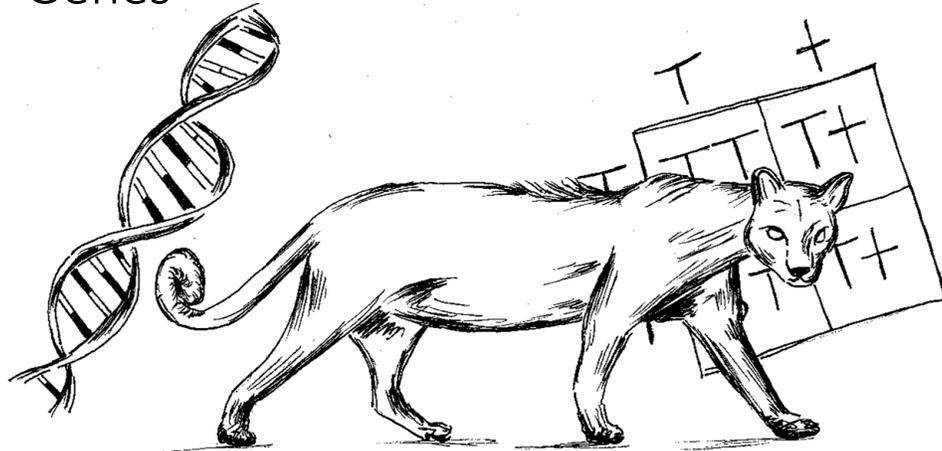
4. In what specific ways might a changing climate affect the carrying capacity of Florida panthers?

5. Name 3 things that could be done in South Florida to increase the carrying capacity of Florida panthers:



Lesson Five

It's in Your Genes



Key Question

How does the size of the Florida panther population affect the genetic health of the species?

Subjects Science

Time Estimate
60-90 Minutes one day

Key Vocabulary
population, genetic diversity, inbreeding, extinction, genetic restoration, inheritance, recessive, dominant, allele

Sunshine State Standards

Science
SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

SC.7.L.16.1 Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.

SC.7.L.16.2 Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.

SC.7.L.16.4 Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.

Reading/Language Arts
LA.7.1.7.3 Determine the main idea or essential message in grade-level or higher texts through inferring, paraphrasing, summarizing, and identifying relevant details.

LA.7.1.7.8 Use strategies to repair comprehension of grade-appropriate text when self-monitoring indicates confusion, including but not limited to rereading, checking context clues, predicting, note-making,

Objectives

- In this activity, students will:
1. Read a case study about genetics and the Florida panther.
 2. Discuss the genetic restoration of the Florida panther.

3. Recreate mock panther breeding seasons with the class before and after a genetic restoration.
4. Discuss the results of the mock breeding seasons.
5. Complete a genetics worksheet.
6. Discuss the future of the Florida panther and other endangered organisms in terms of genetic diversity.

Materials

Each student will need:

- A Case Study to read
- Worksheet

Panther cards for round 1 and 2.

Background

The Florida panther once lived throughout the Southeastern United States, and scientists estimate that there were once at least 1,360 panthers living in Florida. After European settlers came to Florida, the panther population started to decline due to hunting. As Florida's **population** began to boom in the late 1800s and early 1900s, development and continued hunting decimated the numbers of panthers left and the few remaining cats were pushed down into the wilderness of South Florida.

Unregulated hunting of panthers continued until 1958, when so few panthers remained that it was listed by the state of Florida as an endangered species. By the 1970s, despite this protection and the federal endangered species act, there were perhaps fewer than 30 Florida panthers left in the wild and survival of the large cats seemed unlikely.

True conservation of the Florida panther began in the early 1980's when scientists began radio collar studies. The Florida panther was now seen as a crucial component of Florida's habitat and efforts were being made to conserve and increase the remaining population. Large areas of land had been conserved by local, state, and federal government, but the Florida panther did not seem to be recovering.

Scientists realized that the Florida panther was in big trouble. The population was so small that the **genetic diversity** of Florida panthers was dangerously low and **inbreeding** was causing major health problems. Kinked tails and cowlicks (hair standing up on the back) were noticeable signs of inbreeding, though they were not seriously deleterious. Many panthers had more serious issues such as holes in their hearts, and males had un-descended testicles and low fertility. Additionally, the immune system function of the Florida panther population was poor as a result of genetic defects. The Florida panther seemed doomed to **extinction**.

Genetic diversity needed to be increased. In 1995, 8 female Texas cougars were released into Southwest Florida. They were allowed to breed two times with Florida panthers and were then removed from the population. The estimated 30 kittens that these cougars had with male Florida panthers gave the Florida panthers the health boost they needed, and the population began to recover.

Even though more people were living here than ever before, the Florida panther was doing better than it had in decades. In 2001, the panther population grew to around 70 individuals. By 2006, the panther numbers had increased to around 80. It was slow growth, but the panther was recovering. In 2007, it was estimated that there were over 100 panthers.

In 2020 the population was estimated between 120-230 and still too small to sustain itself over the long term without human intervention. Eventually, inbreeding may again become a serious issue and another **genetic restoration** (bringing in cougars from outside of the Florida population) may be needed.

In this activity, students will simulate 2 panther breeding seasons: one before and one after the genetic restoration. They will look at the **inheritance** of 2 hypothetical genes for a kinked tail and a heart defect. In both cases, the defect is caused by a **recessive allele**, while the **dominant allele** is normal. *This is simplified from the actual complexity of genetic defects within Florida panthers. These defects, however, do occur, and they are a result of recessive alleles.*

Advance Preparation

Prepare copies of the Case Study and of the worksheet for students. Print and cut out 1 Florida panther card for every student in the class and 6 Texas cougar cards total.

Procedure

1. Instruct students to read the Case Study carefully. Have a class discussion about the history of the panther and make sure students understand why panthers are endangered. Discuss the concept of inbreeding – why does it occur and what are the consequences?
2. Question students about the genetic restoration of Florida panthers and check comprehension of the concept. Review Punnett Squares with students and discuss their use to predict the offspring outcome of a breeding pair of adults.
3. Play round 1 of the mock panther breeding season. Round 1 will simulate a breeding season prior to the genetic restoration. Hand each student a Florida panther card. Group students into pairs of two. Have partners compare their genotypes and complete Round 1 on the worksheet.
4. As a class, discuss the outcome of round 1 by calculating the class percentage of kittens with kinked tails and the percentage with heart defects. For ease of calculation, suppose that each pair students produces 4 kittens (remind students that panthers average 2 kittens in South Florida but can have up to 4). Leave your calculations on the board.
5. Play round 2 of the mock panther breeding season. Inform students that round 2 will simulate a breeding season after 6 Texas Cougars have been released into the population of Florida panthers. Collect all panther cards back from students and remove 6 Florida panther cards, replacing them with 6 Texas cougar cards. Mix up the cards and pass out 1 card to each student. Group students into pairs of two (can be

different or the same as round 1). Have partners compare their genotypes and complete Round 2 on the worksheet.

6. As a class, discuss the outcome of round 2 by calculating the percentages of genetic defects just as in round 1. Compare the outcome of rounds and instruct students to complete the final questions on their worksheets.
7. Ask students how the activity differed from the actual genetic restoration. How was it similar? Why might another genetic restoration be needed in the future?

The Florida panther once lived throughout the Southeastern United States, and scientists estimate that there were once at least 1,360 panthers living in Florida. After European settlers came to Florida, the panther population started to decline due to hunting. As Florida's population began to boom in the late 1800s and early 1900s, development and continued hunting decimated the numbers of panthers left and the few remaining cats were pushed down into the wilderness of South Florida.

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<p>Texas Cougar</p> <p>Genotype:</p> <p>normal Tail (T), normal tail (T) normal heart (H), normal heart (H)</p>
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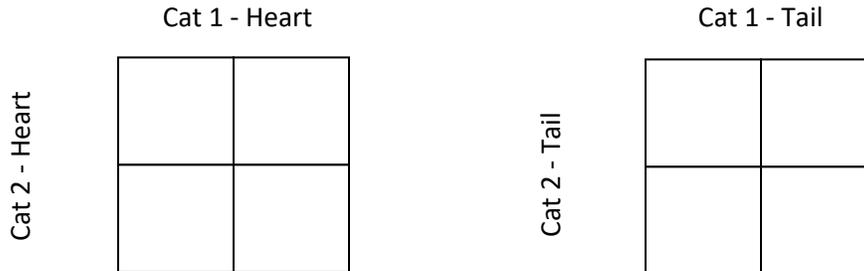


Your Name: _____

Round 1: Breeding Florida Panthers

1. Your genotype = _____ Your partner's genotype: _____

2. Use the Punnett Squares provided to predict your offspring's traits:



3. If you had 4 kittens, how many would be expected to have a kinked tail? _____

4. If you had 4 kittens, how many would be expected to have a heart defect? _____

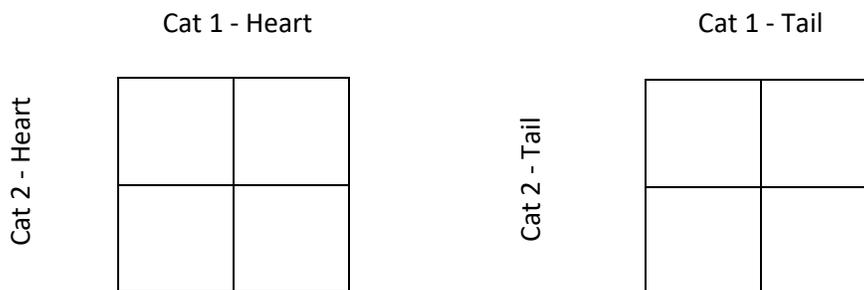
Round 2: Breeding Florida Panthers and Texas Cougars

1. Are you a Florida panther or Texas cougar?

2. Is your partner a Florida panther or Texas cougar?

3. Your genotype = _____ Your partner's genotype: _____

4. Use the Punnett Squares provided to predict your offspring's traits:



5. If you had 4 kittens, how many would be expected to have a kinked tail? _____

6. If you had 4 kittens, how many would be expected to have a heart defect? _____

Compare your results to the rest of the class.

1. How did the outcome of Round 2 differ from Round 1?

2. How did the Texas cougars change the outcome?

Example 1: The following 2 genotypes become partners.

1

Florida Panther	
Genotype:	
normal tail (T), kinked tail (t)	
normal heart (H), heart defect (h)	

2

Florida Panther	
Genotype:	
normal tail (T), kinked tail (t)	
normal heart (H), heart defect (h)	

The resulting Punnett Squares:

		Cat 1 - Heart	
		H	h
Cat 2 - Heart	H	HH	Hh
	h	Hh	hh

		Cat 1 - Tail	
		T	t
Cat 2 - Tail	T	TT	Tt
	t	Tt	tt

If you had 4 kittens, how many would be expected to have a kinked tail? 1

If you had 4 kittens, how many would be expected to have a heart defect? 1

Example 2: The following 2 genotypes become partners.

1 Florida Panther: normal tail (T), kinked tail (t), normal heart (H), heart defect (h)

2 Texas Cougar: normal tail (T), normal tail (T), normal heart (H), normal heart (H)

The resulting Punnett Squares:

		Cat 1 - Heart	
		H	h
Cat 2 - Heart	H	HH	Hh
	H	HH	Hh

		Cat 1 - Tail	
		T	t
Cat 2 - Tail	T	TT	Tt
	T	TT	Tt

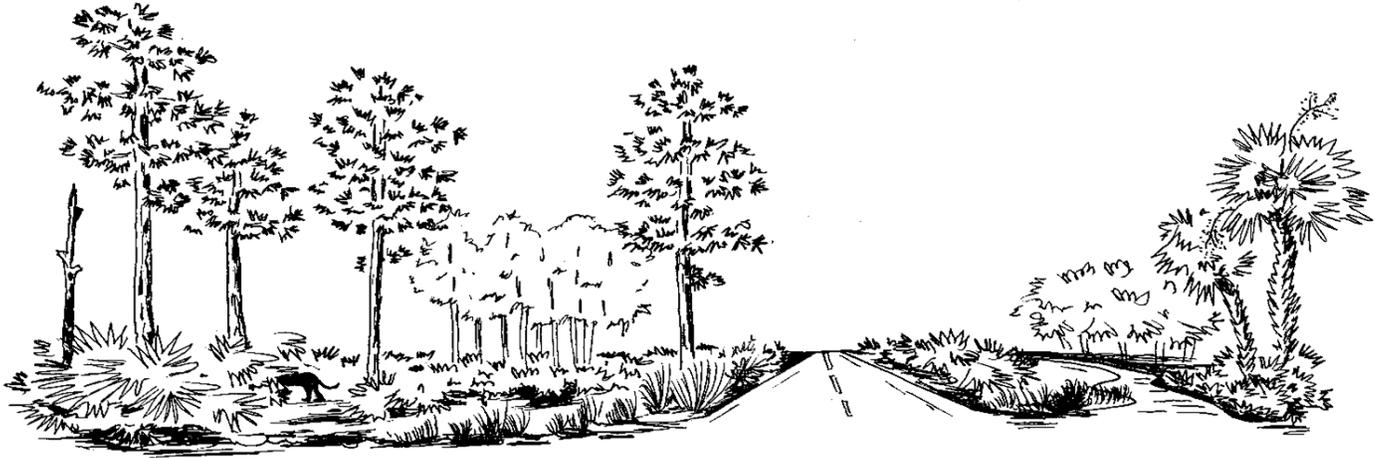
If you had 4 kittens, how many would be expected to have a kinked tail? 0

If you had 4 kittens, how many would be expected to have a heart defect? 0



Lesson Six

A Year in the Life of a Panther



Key Question

How large of a territory do panthers use throughout the year?

SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

Subjects

Mathematics, Science, Social Studies
Big Cypress National Preserve 2020

Time Estimate

60-90 minutes one day

Key Vocabulary

Home range, habitat mosaic, wildlife corridors, square miles, barriers, wildlife crossings

Sunshine State Standards

SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.



Objectives

In this activity, students will:

1. Plot the monthly movements of male and female panthers on a map.
2. Compare the movements and activities between male and female panthers.
3. Calculate the total distance traveled by male and female panthers during a year.
4. Explain the habitat requirements for Florida panthers.
5. Explain why home range size varies among wildlife species.
6. Describe how barriers, both natural and manmade, affect how panthers roam.



Materials

Each pair of students will need:

- Home Range Map
- Clue Sheet
- Worksheet
- Calculator (optional)

Background

Animals that live in Florida have specific habitat needs for survival. Florida panthers are large, apex predators that use a variety of forested and open habitats, called a **habitat mosaic**, to meet their needs. Florida panthers require water, food and cover within their habitat. White-tailed deer are a main food source for the carnivorous Florida panther, though panthers will also eat feral hogs and a number of other animals. Food availability and cover helps determine where Florida panthers range and how much space they need. The area of habitat that a panther uses regularly throughout a year is known as its **home range**.

Home range size varies between individual panthers and varies greatly between male and female panthers. Female panthers typically need 60-75 **square miles** and males need 160-200 square miles. 200 square miles is equal to a rectangle that measures 10 by 20 miles. Young male panthers often range far and wide compared to older, established males and females as they disperse to new areas in search of territory and females.

As panthers roam, they encounter **barriers** that prevent them from traveling further. Barriers can be natural or can be created by people. In South Florida, the Caloosahatchee River is a natural barrier that makes it difficult for panthers to reach the land on the north side. Unsuitable habitat can also act as a natural barrier. In today's populated South Florida, panthers also encounter manmade barriers to travel. Fenced roads and highways as well as unsuitable urban centers can act as barriers.

Roads are not always barriers as many are easy to cross by panthers. The home range of almost every panther in South Florida includes roads within it. While crossing roads, panthers are often struck by vehicles, and this is the leading cause of known panther deaths. In order to decrease the number of panthers killed on roads, the department of transportation in cooperation with state and federal agencies have built a number of **wildlife crossings** below or above roads to allow panthers to cross safely. The future of the Florida panther will depend on our ability to allow for safe movement across their home ranges. This can also be done by linking suitable habitat areas together via **wildlife**

corridors, or crossable links between larger areas of habitat. With our help, the panther will be able to safely roam across South Florida and beyond.

Advance Preparation

Prepare copies of the home range maps, clue sheets, and worksheets for students.

Procedure

1. Introduce this lesson by asking students how far they travel throughout their day, their week, and their year. Introduce the term home range and explain that it is measured in square miles. Compare the student's home ranges and discuss the concept that large animals tend to have larger home ranges than smaller animals. Ask students what they may already know about the panther's home range. Does the home range for male and female panthers differ?
2. Introduce the students to the map by comparing it to a treasure map. Show them the cardinal directions and scale. Explain that they will work in pairs to read 2 sets of clues and draw a map of where a male and a female panther go throughout a year.
3. Divide the students into pairs, and give each pair a home range map, male and female clue sheets, a worksheet, and colored pencils.
4. Explain to students that one student will read the male clue sheet while the other student draws in the movements of the panther on the home range sheet. Panthers typically don't walk in straight lines, so students should draw curvy lines between the destinations on the home range map. After they complete the year, the students will switch roles and repeat for the female panther. Make sure students use a different

colored pencil for the male and female and make note of colors used on their maps.

5. After students have completed their maps, they will answer the questions on their worksheets. When students have completed the worksheet, have a class discussion about the answers.
6. Conclude the lesson by discussing that panthers need space to hunt and roam and a suitable habitat mosaic to find food and water throughout the year. Discuss the impacts of human development on the panther's life, issues with crossing roads, and depredation in neighborhoods. Discuss the limited amount of space here in South Florida as a limiting factor in how many panthers it can support.

 ***Adapted from "Tracking Bears" in the Florida Black Bear Curriculum Guide by Linda Cronin-Jones***

ADULT MALE PANTHER



Dry Season

October

This month the male panther begins in the **large hardwood hammock** in the northeast corner of the preserve. One day he stalks a deer that is foraging in the **large pinelands** to the west, making his kill just east of the major highway. Later in the month, he travels under the **North wildlife crossing** to find a female living in the **saw palmetto thicket** west of the highway. She is not in heat so he moves south to the **small pineland** to rest and eat small prey.

The male travels 200 miles in October.

November

This month the male roams his home range traveling through the **South wildlife crossing** and moving to the southernmost **cypress swamp**. After reaching the swamp, the male makes a large hog kill, which he feasts on for two days. By the end of the month, he moves to the east **cypress swamp** and then heads northwest. He dangerously crosses the highway and rests in the **small hardwood hammock** near the city.

The male travels 145 miles in November.

December

December is a big month for the male. He heads south, but soon encounters a **city**, causing him to turn north. On his way north, he checks on the females in the **small hardwood hammock**, and one female is ready to mate! They mate over a one-week period, hunting and resting together in the **small pinelands**. After that, the male continues on his relentless quest for food and females, traveling north through a **neighborhood** and back across the **North wildlife crossing** to the **large pinelands** by the end of the month.

The male travels 170 miles in December.

January

This month the male roams his territory in search of females. To let them know he is looking to mate, he visits his favorite **scraped logs** and leaves his scent there and on the ground along his travel route. He once again mates, this time with a female in the **prairie**. He spends time with her and makes a kill in the **small pineland** to the south. He then travels east and catches the scent of another male panther in his territory.

The male travels 100 miles in January.

February

This month the male travels down to the south **cypress swamp** and stalks a deer, caching and eating his kill for the next few days. One day he finds a gate left open and hops on to the edge of the **highway** and travels north, using the highway as a corridor. Late one night, a car speeds at 65 mph in a 45 mph night panther crossing zone, and has to swerve and brake to avoid the male, who jumps away at the last second and avoids a deadly collision! The male runs off west into the **neighborhood**. For the last part of the month he searches for food there and catches a small deer and several raccoons.

The male travels 110 miles in February.

March

This month the male roams south, crossing beneath the highway using the **South wildlife crossing** to get to the **small pineland** where he rests. One night, he encounters another male panther that has wandered into his territory looking for a female. Our panther holds his ground and the panthers engage in a fight over territory. Both panthers leave alive but with cuts and bruises from their battle.

The male travels 145 miles in March.

ADULT MALE PANTHER

April

This month the male panther wanders south to a **palmetto thicket** to hunt. He finds a female and her den with 3 panther kittens. Acting on instinct, the female panther defends her den as the male shows aggression, and the male eventually backs off. Later in the month he hunts in the **small hardwood hammock** to the east and makes a deer kill.

 **The male travels 50 miles in April.**

 Wet Season

May

This month the male panther roams the **large pineland** to the north. It is the beginning of the wet season, so much of the panther's range is wet, which limits where he will find food. Later in the month, he moves up through the northeastern **large hardwood hammock** and west to the **large pineland**, where he makes a hog kill and eats for a few days.

 **The male travels 95 miles in May.**

June

The summer heat is setting in and this month the panther travels by night beneath the **north wildlife crossing** to the **neighborhood** where he spots potentially easy prey: goats quietly sleeping by a fence. He roams all around them but cannot find a way into their pen, which is complete with a roof. A few days later, he travels south to the **city** and again must turn around and rest in the **small hardwood hammock**.

 **The male travels 135 miles in June.**

July

Rains have soaked the area, and the water level has risen – even in the pinelands! The panther must move through the water anyway. This month he crosses the highway through the **south wildlife crossing** and then ventures into the **prairie**, where he makes a deer kill. He travels north to the **large pinelands** and comes to a wide **river**. In his quest for more females, he crosses the **river**. At the end of this month he searches for food north of the river in agricultural lands, but is unsuccessful.

 **The male travels 140 miles in July.**

August

At the start of August, he crosses back to the south side of the **river** in search of food, moving into the **large hardwood hammock** to the east. The hottest days of summer are upon our panther, and he moves via nightfall past his **scraped logs** and into the **large pineland** to the south. He hunts there until he encounters a young male panther to the west. There is a scuffle over the pineland territory in the area, but he wins this fight and continues on to the **small pineland** to the west. There he finds a female panther and mates with her.

 **The male travels 105 miles in August.**

September

This month, a tropical storm system brings heavy rain to the area, but the male braves the edge of the **cypress swamp** to the south and makes an alligator kill. A couple of days after he eats, he crosses through the **South wildlife crossing** and finds himself at the edge of the **city**. He must find food soon, so he wanders north to the **small pineland** and makes a kill. Later in the month he continues north to the **saw palmetto thicket** where he finds a familiar female. They mate and he hunts small mammals in the **neighborhood**.

 **The male travels 155 miles in September.**

ADULT FEMALE PANTHER

 Dry Season

October

The ground is still very wet from the rainy season, so the female panther begins October in the high and dry **saw palmetto thicket** west of the highway. Throughout the month she roams through the **neighborhood** and makes a deer kill, caching it in a small forest near a home. Towards the end of the month she subsists on smaller mammals including raccoons and opossums.

 **The female travels 40 miles in October.**

November

This month the female spends time in the **small pineland** eating small mammals, and then ventures south to the **city**, but cannot find food there. Later in the month, she turns around and heads north into the **small hardwood hammock**, where she encounters a male panther. She is not ready to mate, and it requires much effort to make the male leave her alone.

 **The female travels 55 miles in November.**

December

This month the female travels north to a **small pineland** where she encounters the same male panther. This time, she is ready to mate. After the 2 panthers mate, they spend time together and head south into the **small hardwood hammock** where she makes a deer kill. She spends 3 days eating her cached food.

 **The female travels 35 miles in December.**

January

In January, the female heads east to the **highway**, where she uses the fence line as a guide to walk north. In the middle of the night, she travels back into the **small pineland** west of the highway. Towards the end of the month she moves into the **small hardwood hammock** and is chased by a pack of dogs into a tree! She wakes up later to find that scientists have placed a new radio collar around her neck.

 **The female travels 50 miles in January.**

February

This month the female heads north into the **neighborhood**, where she has found good small mammals to eat before. She is feeling weighed down because she is pregnant. She spots 2 chickens roosting behind a fence – easy food. The female roams the fence line but can't find a way in. She decides to run and jump the fence, and has a meal of chicken that night. Later in the month, she ventures north to begin looking for a place to den, but finds a wide **river**. She decides not cross the river, so after a rest, she must turn around.

 **The female travels 60 miles in February.**

March

This month the female knows she will have kittens soon, and begins to search for a good denning site. She eventually wanders into the nearby **saw palmetto thicket**, which is the perfect dry and protected spot to make her den. She survives on fawns that are plentiful nearby.

 **The female travels 40 miles in March.**

ADULT FEMALE PANTHER

April

The female doesn't do very much traveling this month because she is a mother of two fuzzy, spotted, blue-eyed kittens! She stays in the **saw palmetto thicket** this month, giving milk to her kittens and only leaving her den to find food for herself when she needs it. Early one morning, when the female is away getting food, a team of biologists enter the den and examine the kittens. They check their health, give them vitamins and vaccines, and place a microchip under the skin of their backs. The mother returns and feeds them, never having seen the biologists.

 **The female travels 15 miles in April.**



Wet Season

May

This month, the female is still denning in the **saw palmetto thicket**. As the weather heats up, the kittens grow stronger and develop a taste for meat. The female leaves the den more often, traveling south to the **neighborhood** to find food for her kittens and returning to her den in the **saw palmetto thicket** as quickly as she can. One day, a male panther comes too close her den, and she must defend her kittens, snarling and pawing at him. He finally leaves her and the kittens alone.

 **The female travels 20 miles in May.**

June

This month, the days are hot and the female hunts by night. Her kittens are ready to leave the den and begin to learn the art of hunting from their mother. They wander together south into the **neighborhood** where the mother shows them how to hunt small mammals. Towards the end of the month, they share 3 raccoon kills.

 **The female travels 40 miles in June.**

July

This month, the kittens are growing quickly and still learning to hunt. The female leads them beneath the highway at the **North wildlife crossing** and into the **large pineland**. One of the kittens makes his first discovery, a fawn resting in a dense cover of wax myrtle bushes.

 **The female travels 40 miles in July.**

August

The days seem even hotter this month, and the female with her kittens hunt during the night in the **large pineland**. One day, they travel across the highway at the **North wildlife crossing**, and back to the familiar **saw palmetto thicket** to rest in the shade and find good hunting. Towards the end of the month, the female and kittens venture north to a wide **river**, but are too afraid to cross it, so they head back to the **saw palmetto thicket**.

 **The female travels 50 miles in August.**

September

In September, a tropical storm system brings heavy rain to the area, but the **neighborhood** has plenty of dry ground for hunting. The female and her kittens hunt together there. At the end of the month, they move south into the **small pineland** and make a hog kill.

 **The female travels 55 miles in September.**

Name 1: _____ Name 2: _____



Directions: Use your clue sheets and range map to answer the following questions.

1. Why do panthers need large spaces to roam?

2. Add up the total distance traveled by the male and female panthers in 1 year.
Male: _____ miles Female: _____ miles

3. Why does the male panther need more space than the female?

4. What are 4 ways that humans alter the life of a panther?
 - 1.
 - 2.
 - 3.
 - 4.

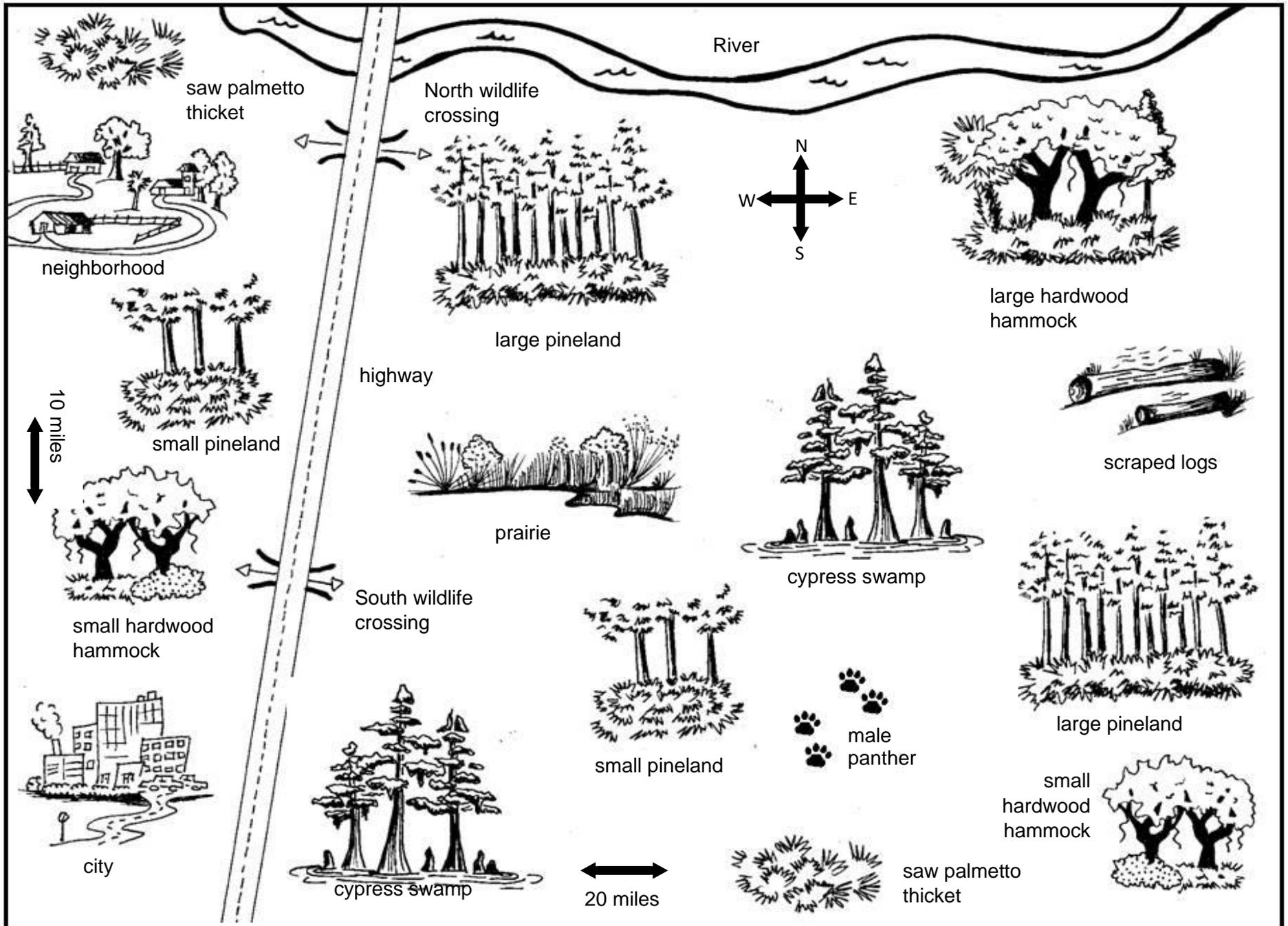
5. What is 1 way that panthers communicate with one another?

6. What would happen to the male and female panther if the large pineland just east of the North wildlife crossing was developed into a city?

7. How do natural barriers affect the movement of panthers?

A Year in the Life of a Panther

Home Range Map



exactly is the impact of removing organisms from ecosystems? Are some species more important to the function of the ecosystem than others? The growing consensus among scientists is that ecosystems are highly interconnected. Some organisms may have more visible or obvious effects on ecosystems than others, but is it likely that every organism impacts the ecosystem in some way and changes the way it functions. In other words, removing any species from an ecosystem will change that ecosystem to some degree.

All organisms in an ecosystem share special relationships with other organisms. We can use terms such as **competition**, **predation**, **mutualism**, **parasitism** and **commensalism** to describe some of these relationships. Additionally, we can organize organisms into trophic levels depending on where they fall in their **food web** using categories including **producers**, **consumers**, and **decomposers**. This description tells us more about where they obtain energy in an ecosystem.

In our country's past, top predator consumers like wolves and mountain lions were disliked by people so much that we exterminated them from many ecosystems. This has caused ecological impacts across the continent, from exploding deer populations to decreases in plant species diversity. In Florida, we came very close to losing the Florida panther due to hunting and habitat loss. Luckily, we realized the value of this species before it became extinct. What if the Florida panther had not been protected and gone extinct? What if sea level rise and continued development in South Florida threaten the only habitat that the Florida panther has left? What will be the impact on our ecosystems if we lose the panther?

Not only do South Florida's ecosystems face threats from development and climate change, but exotic species are perhaps one of the most pressing concerns. The exotic Burmese python is now breeding and spreading throughout South Florida. This poses a problem because it directly competes with our native predators such as other snakes, alligators, and even panthers. An ecosystem has a finite amount of solar energy entering via photosynthesis and can only support a finite number of consumers. Animals like the python

disrupt this balance and cause the decline of other consumers. This activity gives students a chance to visualize the connectivity in a South Florida ecosystem and the potential impacts if the composition of species changes.

Advance Preparation

Assign one organism to each student in the class and print copies of a food web organism and research worksheet for each student. Gather materials for the food web.

Procedure

1. Ask students if they can think of any organism that could disappear from an ecosystem without any consequence. Are there any organisms that no other organisms depend on? Are some organisms more important to ecosystems than others? Try and facilitate a discussion about these questions, which aren't easy to answer, even for ecologists!
2. Assign each student one organism. Give them a copy of the large drawing of their organism. Instruct students to color in their organism accurately.
3. Instruct students to research where their organism belongs in the food web of South Florida ecosystems by finding other organisms that interact with theirs. Give each student a copy of the research worksheet to guide their work. Write down each student's organism in a list on a whiteboard. Ask students to record the list and focus on finding relationships between their organism and others on the list (though it doesn't have to be exclusively from the list). This will help facilitate the food web creation in the next step.
4. After students have completed their research, pin up a picture of each animal that was assigned (you may use the drawings that are provided) on a whiteboard, taking up the entire board and leaving space between the organisms.

- Each student will take a turn sharing their research with the class. They will use a dry erase marker to outline their organism in the proper color to define its role in the ecosystem according to the following key:

Orange = Decomposer

Green = Producer

Purple = Consumer

Then, with the help of the rest of the class, the student will use a black marker to draw lines between their organism and other organisms with which it has relationships. Draw any likely relationships, even if it may not have been written down in their research.

- On each line that the student draws, instruct them to write the name of the type of relationship the two organisms share (i.e. mutualism, predation, parasitism, commensalism, decomposition, competition etc.)
- Discuss the complexity of the food web with students and have students complete the discussion questions.



Alternative Options

- Permanent display board:

Instead of creating a temporary food web on a whiteboard, you may choose to create a more permanent display by making the food web on a cork bulletin board. If the board is lined with paper, markers could still be used. Alternatively, you can use string and pushpins to connect organisms. The advantage to this is that you can try

removing any organism from the food web and see how the string arrangement (ecosystem) is affected.

Additional supplies needed:

- Pushpins and permanent markers or string

- Poster Partners:

Instead of creating a large food web as a class, you may choose to have students work in pairs and create smaller food webs on poster board. In this option, give students copies of the poster-sized organism drawings instead of the larger drawings. Students could still share research with the class, but then break into pairs. The same coloring rules and relationship lines could be used. The advantage to this activity is that posters can be compared between different student groups. Students could also color in a landscape in the background on posters.

Additional supplies needed:

Each student pair will need:

- A large piece of paper or poster, colored markers or pencils, scissors, and tape or glue.

Spinning a Food Web

Research Worksheet

Your Name: _____



Directions: Use the internet and library to research your assigned organism, and record your findings here.

1. Write the name and brief description of your organism: _____

2. How does your organism obtain food? What does it eat, if anything? _____

3. List five organisms that are in some way related to your organism and describe the relationship:

Related organism	How is it related?	Is this an example of predation, parasitism, mutualism, decomposition, competition, or commensalism?

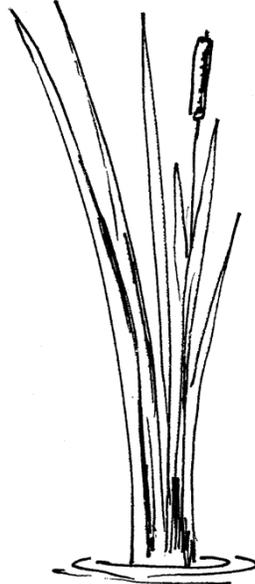
4. What do you think would happen if your organism was removed from South Florida? How would the ecosystem change? : _____

Spinning a Food Web

Poster-sized Organisms



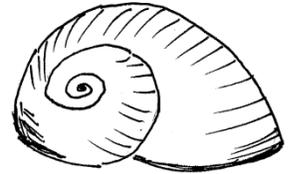
Big Cypress Fox Squirrel



Bald Cypress



Fungi



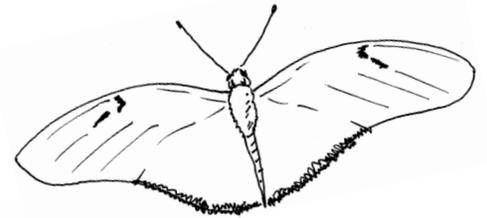
Apple Snail



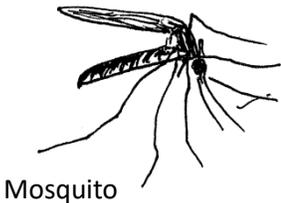
Bald Cypress



Opossum



Julia Butterfly



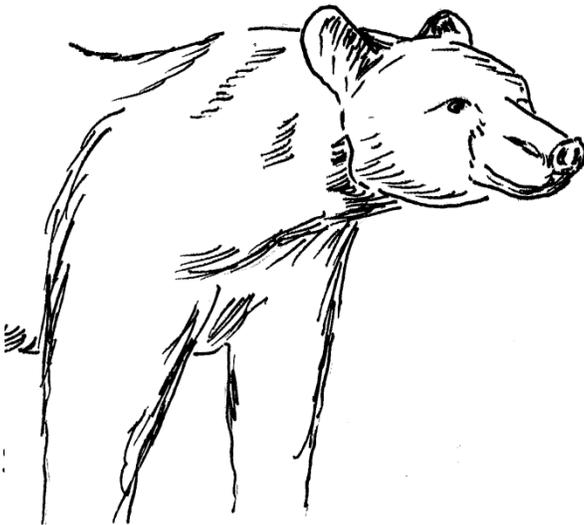
Mosquito



Mexican Weevil



Yellow-rumped Warbler



Florida Black Bear



White-tailed Deer

Spinning a Food Web

Poster-sized Organisms



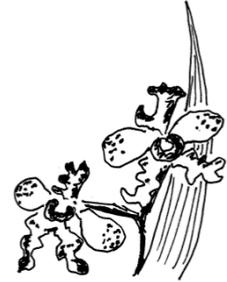
Sabal Palm



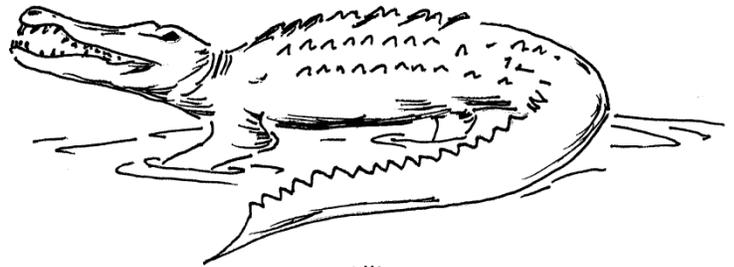
Cardinal Airplant



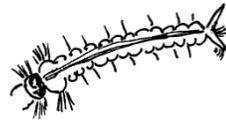
Mosquito Fish



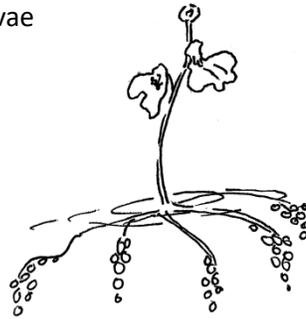
Cowhorn Orchid



Alligator



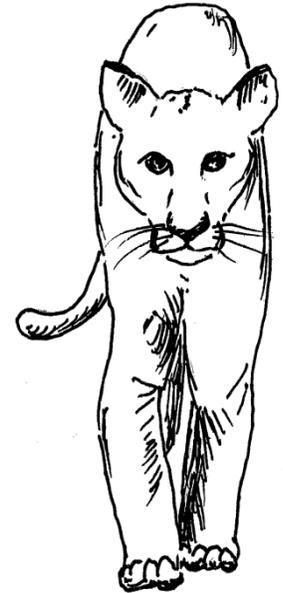
Mosquito Larvae



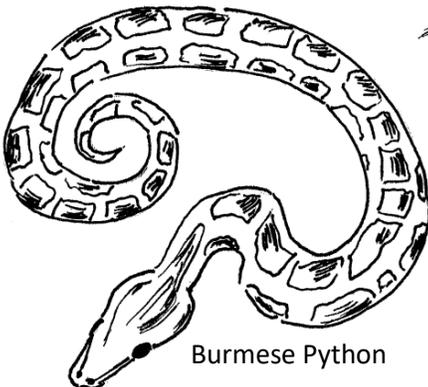
Yellow Bladderwort



Snowy Egret



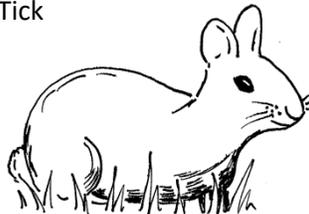
Florida Panther



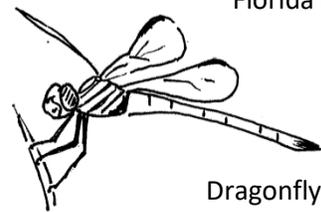
Burmese Python



Deer Tick



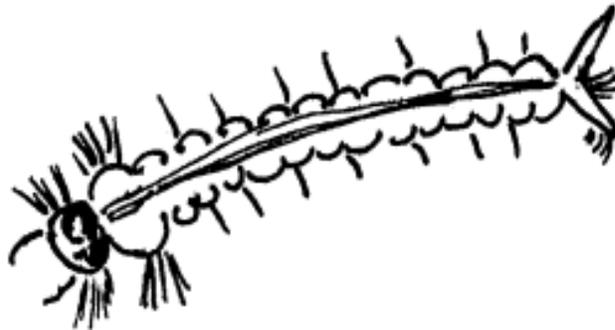
Marsh Rabbit



Dragonfly

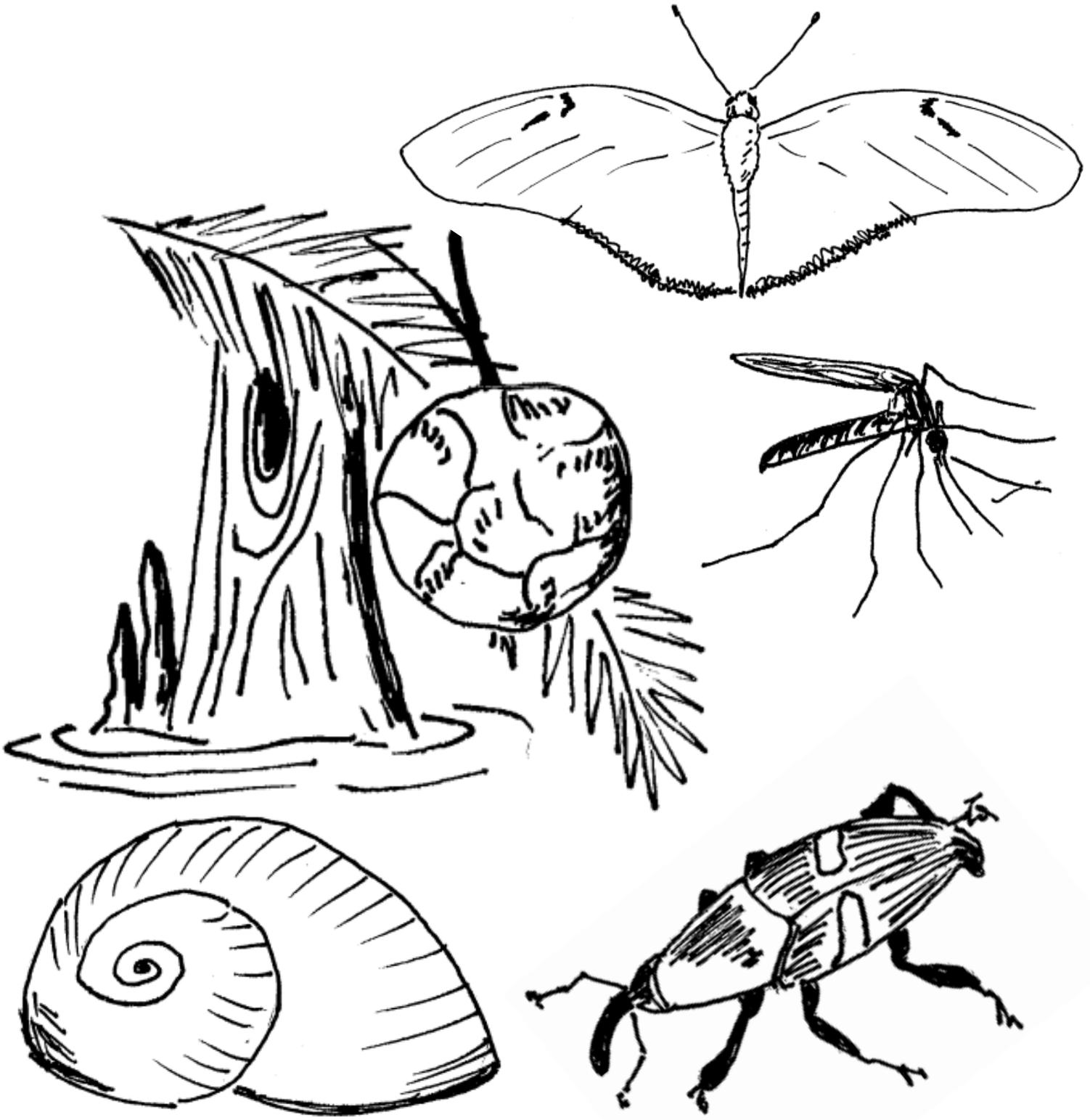
Spinning a Food Web

Food Web Organisms



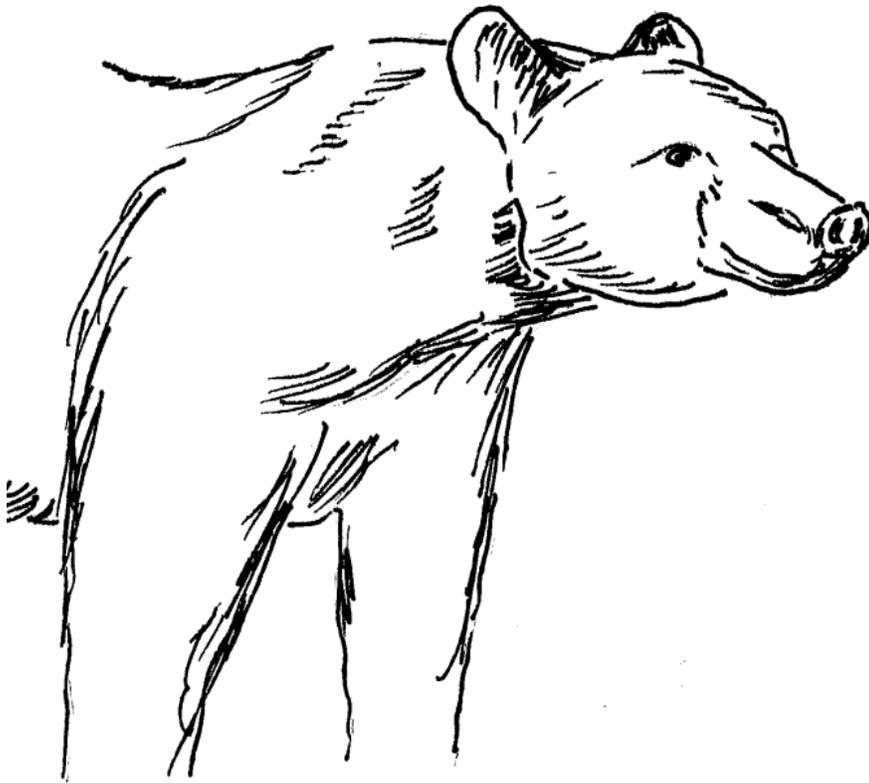
Spinning a Food Web

Food Web Organisms



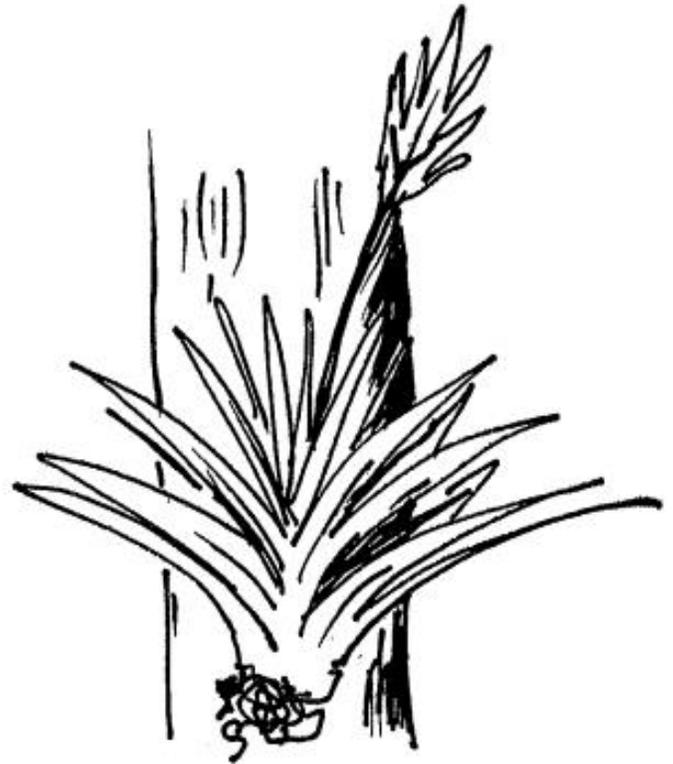
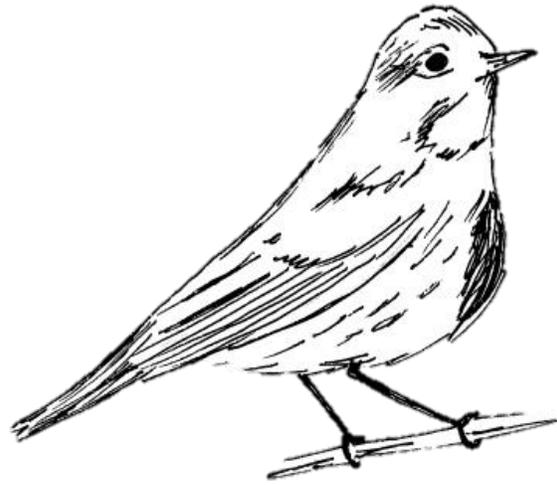
Spinning a Food Web

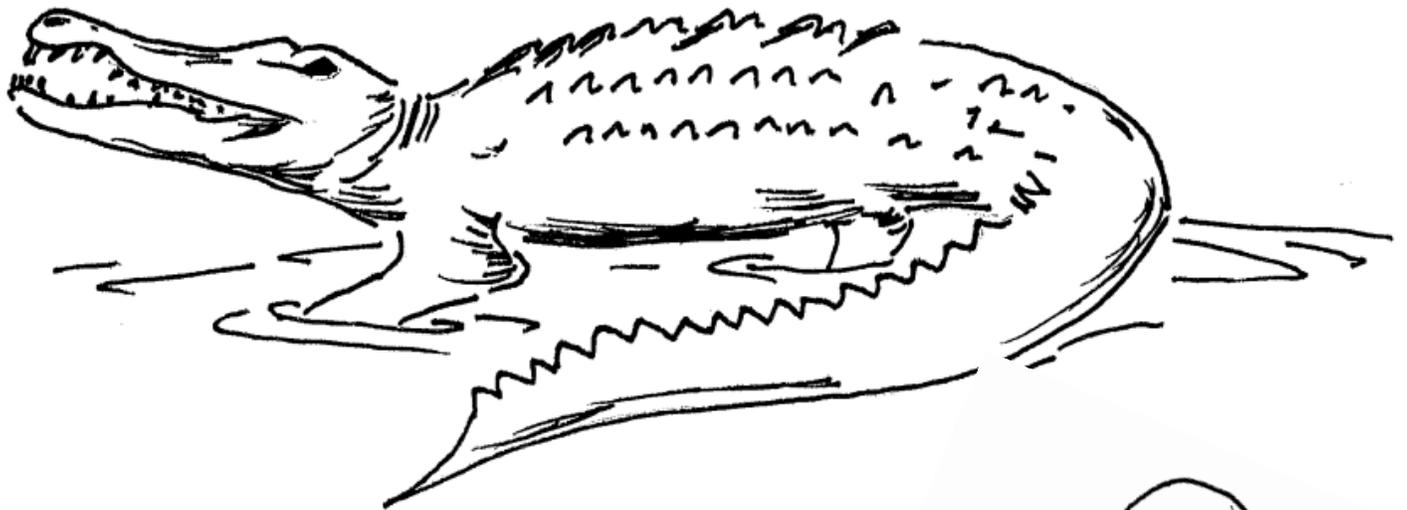
Food Web Organisms



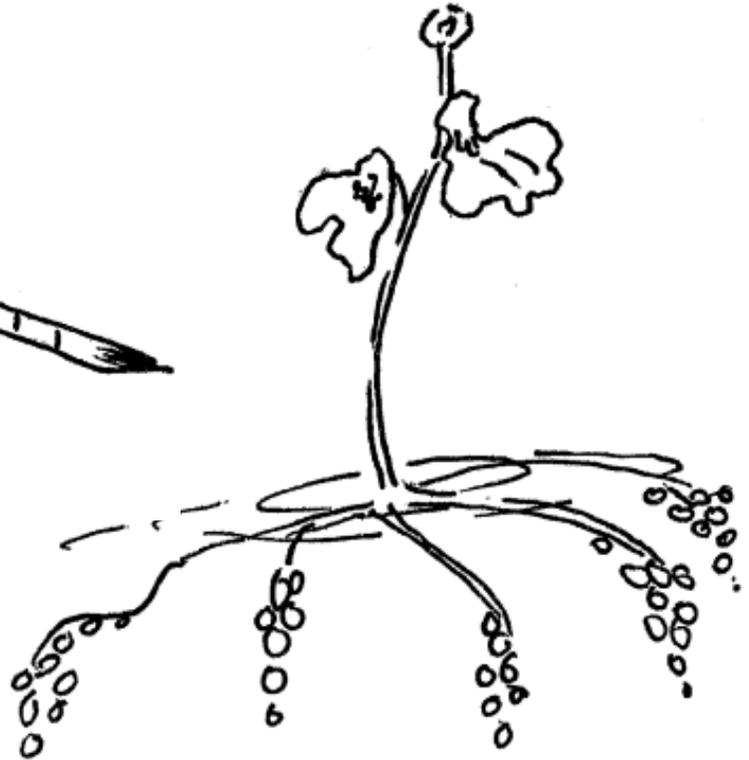
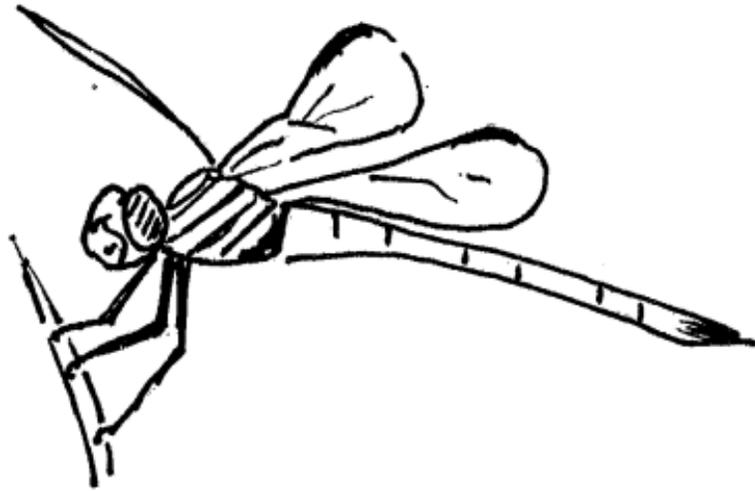
Spinning a Food Web

Food Web Organisms





Spinning a Food Web



Food Web Organisms



Spinning a Food Web

Discussion Questions

Your Name: _____



Directions: Using the information you have learned after building a food web, answer the following questions.

1. According to the food web you created, name an organism that appears to have a large impact on the ecosystem. Provide details on what might happen to the organisms that it shares relationships with if it were to disappear: _____

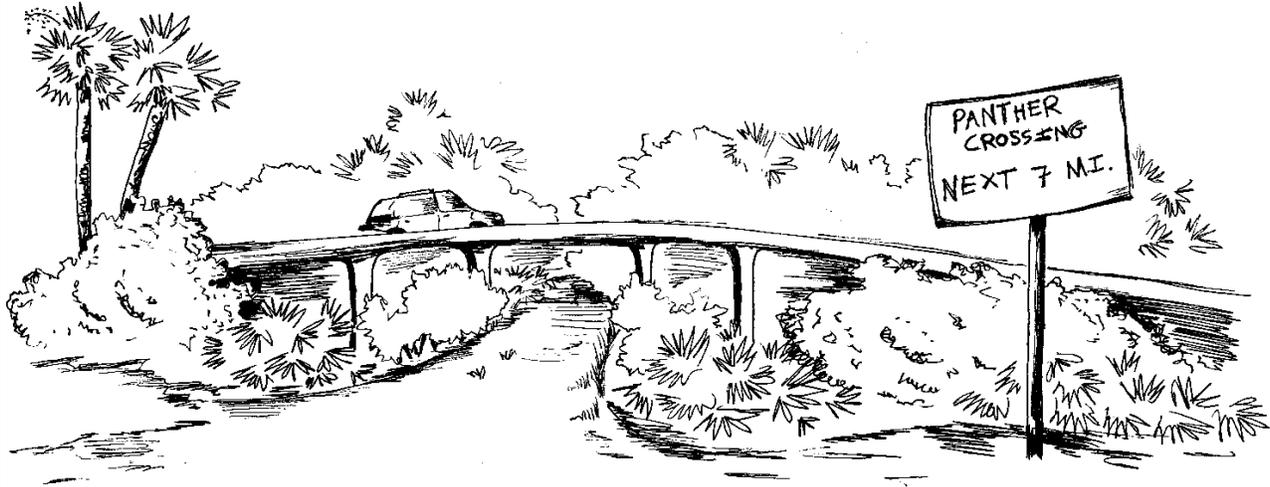
2. The exotic Burmese python was accidentally introduced into South Florida and is now breeding. Which other organisms in the ecosystem are likely to be affected by the python and how? _____

3. Top predators like wolves and panthers used to roam over much of the United States until they were hunted and driven out of most of the country because people feared or hated them. The Florida panther almost met the same fate but is now protected in South Florida. If the Florida panther had gone extinct, how would that have altered the other organisms living in South Florida? Give specific examples of organisms that would be affected. _____



Lesson Eight

Crossing Paths: A Great Debate



Key Question

How do people with different viewpoints come together to make community decisions about wildlife management?

Subjects

Social Studies, Science, Reading/Language Arts

Time Estimate

60-90 Minutes one day

Key Vocabulary

Stakeholders, wildlife crossings, taxpayers, endangered species

Sunshine State Standards

Social Studies

SS.7.E.2.1 Explain how federal, state, and local taxes support the economy as a function of the United States government.

SS.7.C.2.7 Conduct a mock election to demonstrate the voting process and its impact on a school, community, or local level.

SS.7.C.2.13 Examine multiple perspectives on public and current issues.

Science

SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

Reading/Language Arts

LA.7.1.7.3 Determine the main idea or essential message in grade-level or higher texts through inferring, paraphrasing, summarizing, and identifying relevant details.

LA.7.5.2.1 Use effective listening strategies for informal and formal discussions, connecting to and building on the ideas of a previous speaker and respecting the viewpoints of others when identifying bias or faulty logic.

LA.7.5.2.3 Organize and effectively deliver speeches to entertain inform and persuade, demonstrating appropriate language choices, body language, eye contact, gestures, and the use of supporting graphics and technology.

Objectives

In this activity, students will:

1. Read and interpret the viewpoint of a particular stakeholder in the building of a wildlife crossing.
2. Debate the issue from the perspective of a particular stakeholder at a simulated committee meeting.
3. Develop a group consensus based on multiple perspectives.
4. Present their solution to the class at a simulated community meeting.
5. Vote as a class on the final solution to the issue.

Materials

Each student will need:

- Stakeholder Role slip of paper
- Stakeholder Position worksheet

Background

The extensive home range requirements of the Florida panther often mean that individuals cross busy highways in order to find food, shelter, water, or a mate. Panthers usually cross at times of limited visibility (between dusk and dawn), a dangerous and potentially deadly task. Even motorists who follow the speed limits may collide with a panther that jumps out at the last moment.

As a response to this and other road kill problems, the Florida Department of Transportation has built multiple **wildlife crossings** or underpasses in areas where panther crossings are most frequent. The wildlife crossings are extremely successful in preventing accidents and saving animal lives – not only panthers, but bears, deer, and other animals as well. However, these crossings are costly (anywhere from \$2M to \$8M) and involve the installation of miles of fencing on either side of the highway. In order to retrofit existing highways with wildlife crossings, the county must support the decision to use **taxpayer** money for the project.

In this activity, students will play the roles of different **stakeholders** at a community meeting. They will determine whether or not a new wildlife crossing should be constructed at a certain spot on a local highway where panther-vehicle collisions have occurred. As the teacher, you act only as a facilitator. Do not provide opinions or try to persuade the students to see things a certain way. If necessary, remind them of their stakeholder's views and keep the discussion focused on the problem at hand. The aim of this exercise is for students to see how **endangered species** management is not easy.

Advance Preparation

Prepare copies of the Stakeholder Position worksheet for each student. Print one copy of the Stakeholder Roles and cut them apart to be able to hand 1 role to each student. Determine who will be in each committee and write the committee number on the stakeholder role slip for each student.

Procedure

1. Ask students: How does society affect wildlife management? Discuss the idea that people with different beliefs and values can affect the management of wildlife, especially when dealing with controversial topics that may not have one correct answer. Explain that a stakeholder is any person who has an interest in a particular management decision.
2. Have students read the section titled **The Problem** individually or as a class. Discuss the problem as a class and make sure students understand the conservation history of the Florida panther and the function of the wildlife crossing.
3. Inform the students that they will now be given the opportunity to explore this issue firsthand. Each will be assigned the role of a stakeholder participating in a community meeting. As a group of stakeholders representing different viewpoints, they will need to come to a consensus regarding a specific issue.

4. Hand out **Stakeholder Role** sheets. Inform the students that even though they will be playing fictitious characters, the scene they will be enacting actually happened and will likely happen again.
5. Instruct students to read their roles carefully and answer the first 3 questions on the **Stakeholder Worksheet** to define their position. Have each student briefly introduce their position to familiarize the class with their viewpoint. Please remind the students that this is just one individual's viewpoint and may not represent all of the people with similar values.
6. Place the students into committees of 5 or 6 students each. Make sure that each committee has at least 1 stakeholder that is pro, neutral and con. You may use the **Committee Assignments** sheet to form the groups.
7. Within their committees, have students discuss the pros and cons of the wildlife underpass, complete the remainder of the questions on the **Stakeholder Worksheet**. Then, the committee must come to a consensus on what to do about the wildlife underpass. They should write down their ideas and prepare to persuade the other committees in favor of their consensus.
8. It is now time to begin the town council meeting. To begin the meeting, test the student's knowledge of the issue by asking them to explain why the problem exists. Then, each committee will select a speaker in their group to present the committee's recommendation to the class.
9. After all committees have presented, hold a class vote on the situation. Discuss the outcome – were students surprised? Do they agree personally? How would the real-life situation be different?

Crossing Paths- A Great Debate



The Florida panther once lived all over the Southeastern United States. In 1500, scientists estimate that there were 1,360 panthers living in Florida. The European settlers were afraid of the large cats and killed them whenever they encountered them. As more and more European settlers came to Florida, the number of panthers began to drop.

In the 1880's, the United States government believed that the country would be safer for people and livestock if large predators like panthers and wolves were eliminated. They allowed states to offer bounties, or money for killing the large predators. In 1887, Florida began paying \$5.00 for each panther scalp. Because of this, panthers were very scarce around human settlements and were pushed down into the swamps of South Florida. As the human population of Florida continued to grow, more roads were built and more cities and neighborhoods sprang up. This pushed the remaining Florida panthers into smaller and smaller areas of remaining wild lands. In 1958, there were so few panthers remaining in the state that Florida listed them as endangered. Hunting of panthers was no longer allowed.

In 1967, the U.S. government listed the Florida panther as an endangered species. By 1971, panthers were believed to be extinct in Florida. In 1973, a cougar hunter from Texas tracked and treed one panther in Glades County. The same year, Congress passed the Endangered Species Act, which gave the U.S. Fish and Wildlife Service the authority to help the panther recover. By 1976, and their survival was viewed as unlikely.

In the 1980's, more people began to see the Florida panther as an important piece of the environment. A Recovery Plan was developed in 1981 to help the many parks and refuges in Southwest Florida work together to help the panther survive. In 1982, students voted to name the Florida panther the official state animal of Florida. In 1984, Florida's Department of Transportation changed the speed limits on Alligator Alley and Highway 29 to 45 miles per hour at night to help prevent road kills.

In the early 1990s an estimated less than 30 panthers roamed in the swamps of South Florida. Florida panther numbers began to recover after 8 female Texas cougars were released in 1995 into South Florida to breed. They were later removed, but greatly helped the genetic diversity of panthers. As of 2020 there were an estimated 120-230 panthers in South Florida, a population still too small to sustain itself without human intervention.

The panther has become a symbol of wild Florida and many people and agencies are working hard to help the population survive. With more people and more panthers living in close proximity to each other, panther deaths by vehicles are on the rise. In 2016 alone, a record 32 panthers were killed by vehicles. As a response to road kill issues with panthers and other animals, the Florida Department of Transportation has built multiple wildlife crossings or underpasses in areas where panthers cross frequently. They have been tremendously successful in preventing accidents and saving the lives of many animals like deer and bears. However, these crossings are costly (from \$2 to \$8 million dollars) and involved the installation of miles of fencing on either side of the highway. When Alligator Alley was widened to four lanes, 23 wildlife crossings were built. Wildlife crossings have also been installed along highway 29 and other areas around the state.

The Florida Department of Transportation has also considered building a wildlife crossing along the Tamiami Trail in the Big Cypress National Preserve where many panther deaths have occurred over the years (5 in just 7 years). In order to construct these crossings, the county will have to support the decision to use taxpayer money for the project.

Crossing Paths – A Great Debate



1. Animal Rights Activist

PRO

Wildlife does not have the ability to speak up for itself. However, through the data collected by wildlife biologists, we can see that an important wildlife pathway runs directly across the highway at this location. The Florida panther was here using these pathways for centuries before we came and constructed roads, houses, and other buildings in their home. If we do not do something to help these animals in their struggle for survival, we will continue to lose panthers and other animals to vehicle collisions. Do not ignore their needs simply because they don't have a voice!

2. Outdoor Recreationist

PRO

Early one morning last year, I was driving down this stretch of road on my way to hike some trails in the area. I saw a beautiful female panther and her kitten in a field not far from the road. Later, after I had finished my hike, I returned back by this same stretch of road and witnessed the mother lying in a ditch. She had been hit by a vehicle and killed. Without its mother, the kitten most certainly died shortly thereafter. People explore this part of Florida because of its natural beauty and "wildness". Nowhere else in the state (or any of the eastern states, for that matter) can you be lucky enough to have the wildlife sighting that I experienced. This is a treasure that we should protect and preserve as much as possible.

3. Florida Fish and Wildlife Conservation Commission Employee

PRO

It is the responsibility of the Florida Fish and Wildlife Conservation Commission (FWC) to protect endangered species of Florida, like the Florida panther. It is because of human actions that the panther is now endangered. We believe that the addition of a wildlife underpass is necessary in order to protect the panther. Too many breeding age females and sub-adults have already been lost to vehicle collisions along this stretch of road (5 in the 7 years). Radio telemetry data shows us that this is an important corridor for panthers – at least two adult cats cross the road here regularly.

4. National Wildlife Organization

PRO

With only about 120-230 individuals remaining as of May 2020, the Florida panther is among the most endangered species in the world. The panther is an important piece to the ecological balance of Southwest Florida. People from all over the world are watching Southwest Florida to learn about protecting an endangered species while allowing for human development. You have the opportunity to be a model community for endangered species protection! We need to do everything in our power to help the panthers survive.

5. Wildlife Biologist

PRO

As a biologist, I take radio telemetry data every other day from an airplane to document the location, movements, and habitat utilization of multiple panthers within the area. It is my scientific observation that this particular location along the highway is a heavily-traveled wildlife passageway to habitats on the other side of the road. Because of the change in elevation and water flow, different sides of the road offer different habitats for the panthers, so they will continue to cross at this location. The area also provides excellent hunting opportunities for the cats, so there are multiple breeding-age females who traverse this area frequently. A wildlife underpass at this location is essential! Without the underpass, panthers and motorists will both be at risk.

6. Insurance Agent

PRO

Based on a study conducted in 2007 by the U.S. Department of Transportation, an estimated 1 million to 2 million large animals are struck by vehicles each year in the United States. This results in millions of dollars of damage to vehicles and injuries to people. In Southwest Florida, collisions with panthers, bears, deer, alligators, and other large animals have been increasing. In order to keep drivers' insurance premiums at a reasonable rate, we need to minimize roadway collisions with wildlife. The proposed wildlife underpass would eliminate nearly all animal-vehicle collisions along this stretch of road, keeping the highway safer for all travelers.

7. Truck Driver

PRO

I drive this stretch of road many times each week to make my deliveries all over south Florida. Usually, I am driving this portion of the highway either early in the morning or early evening, when light is minimal, and very few other drivers are on the road. The current speed limit for this area is 45 mph at night. This slows my progress and requires me to work longer hours. With a wildlife underpass at this location, I would be able to make better time in my deliveries and be able to drive without concern about hitting an animal. An accident with an animal as large as a panther would most certainly damage my truck, and I don't make money if I don't have my truck!

8. County Law Enforcement

PRO

This stretch of the highway has been a trouble zone for some time now. We often must respond to vehicle-wildlife collisions as well as single-vehicle accidents resulting from motorists swerving to avoid wildlife. Sometimes, this even requires the shut-down of the entire highway for hours at a time. In addition, this stretch of road is not as heavily-patrolled by our officers as other areas because it is so remote. The 45mph speed limit for nighttime travel is rarely observed. With the addition of a wildlife underpass at this location, we would certainly see fewer wildlife-related accidents. This is the safest option for travelers along this highway.

9. School Teacher

PRO

I am a middle school science teacher in a nearby community. I have been living and teaching here for nearly 30 years. Back in 1982, my students at that time contributed to the election which designated the Florida panther as the state mammal of Florida. Since that time, I have focused many of my lessons on the Florida panther and its struggles for survival. I have an updated log of all panther-related news in my classroom for my students. I have seen an unnerving pattern of panther fatalities at this particular location. My students ask me why no-one has done anything to change this pattern, and I have no good answer for them.

10. Business Owner #1

UNDECIDED

I am still undecided about this wildlife underpass issue. My concern is that with the proposed fencing in place, potential customers would have a difficult time accessing my business. In other local areas where the fences have been constructed, a gate is often required to allow for human access while preventing wildlife from escaping. I do NOT want a gate in front of my business! While I dislike hearing about all the panthers that have been killed in this area, my business is my livelihood. Even a small drop in customers would greatly affect my family's quality of life. I wouldn't be opposed if I could be guaranteed that the fencing would run behind my business and not block my signage. I do not want any responsibility for maintaining the fence. I also don't want workers on my property repairing the fence without first scheduling the repairs with me.

11. News Media

UNDECIDED

It is obvious that the struggle of the Florida panther is something very important to the people of southwest Florida. Each year, we receive more and more reports of panthers finding their way into neighborhoods and crossing major highways. While it is our job to report on situations that may be dangerous to our audience, we also must remain unbiased as to the possible solutions. Whatever the people of Southwest Florida decide, we will report.

12. Landowner #1

UNDECIDED

My property is located near the proposed site, but would not be affected by the fencing. On the one hand, I believe that this dangerous stretch of road is a hazard for people coming to visit my family and should be made safer. On the other hand, my fear is that without the lower speed zone, more and more large semi-trailers would use this route. It is already dangerous to turn on to and off of the highway from my property. Accidents have been known to shut down the road completely. As this is the only road that I have access to, I have been stranded on my property for hours at a time waiting for them to investigate and clear wrecks. I just want the safest option.

13. Hunter #1

UNDECIDED

I often hunt with my sons in the area near the proposed wildlife underpass. It is a beautiful area which represents the closest thing to “native Florida” that you will find anywhere in the state. I wish that the government would just leave it alone. Though I would love to see this highway demolished altogether, I understand that that is not an option. Instead, I’d like to see that the highway remains as natural-looking as possible without hurting the wildlife populations around it.

14. Federal Government

UNDECIDED

I hesitate to support any decision about the proposed wildlife underpass at this time. It is not the role of the federal government to manage wildlife in the states. In this circumstance, it is the role of Florida Fish and Wildlife Conservation Commission (FWC) to protect the Florida panther. While the Endangered Species Act does provide some protection for the panther, roadway concerns are still best handled by state agencies. The FWC has a greater understanding of the biology, patterns, needs, and problems of the Florida panther because they are here studying it. That being said, if the decisions made here do not follow the requirements of the Endangered Species Act, we will be forced to intervene.

15. Rancher

UNDECIDED

I own a small ranch near the proposed wildlife underpass site where I raise goats and sheep. Recently, more and more of my livestock have fallen prey to panthers and other large predators. I am tired of buying them dinner! If the government is able to put in miles of fencing to protect the panthers, I believe that they should also be able to offer me fencing to protect my animals. If they decide to construct the wildlife underpass but do not help me with my fencing needs, I am sure that depredation incidents will increase on my property because it will be easier to get to.

16. Farmer

UNDECIDED

I am a local farmer who utilizes the referenced stretch of roadway to transport my produce to farmer’s markets around south Florida. I am undecided about whether or not to support the proposed wildlife underpass. I know that panthers are an important piece of the ecology of this area. Years ago, when there were fewer panthers, my crops would often be grazed upon by deer. Lately, there doesn’t seem to be as many deer looking for food, so I’ve had better crop production. I am concerned, however, about the cost of the project. Where will all this money come from?

17. Parent #1

UNDECIDED

I raise my three young children at our home just north of the proposed wildlife underpass. While I have never seen a panther myself, I am concerned for the safety of my children around wild animals. My fear is that the underpass would encourage MORE wildlife to visit my yard and increase the chances of one of my children being attacked. On the other hand, I am also concerned about the safety of my children in the car when I'm driving this stretch of road. It would be terrible to hit a panther! I need to learn more about the issue before I will be ready to voice my opinion.

18. Eco-tour Operator

UNDECIDED

I own a small eco-tourism business which offers canoe and kayak trips throughout the area. The natural resources and wildlife viewing offered here in Southwest Florida is what drew me to this location in the first place. I think it is very important to try to preserve as much of it as possible. However, I am concerned that the proposed fencing would cut off my access to the waterways. Without access, I have no business!

19. Business Owner #2

CON

I have owned and operated a small business in the area for close to 25 years. I have witnessed a lot of change in Southwest Florida over that time, and it isn't always good. Panthers have become a nuisance around my property – killing my hobby livestock and even a pet. I don't believe that there are as few left as some scientists say. It seems to me that we have more panthers than the area can support. Why spend millions of dollars to protect something that shouldn't even be on the Endangered Species List?

20. Indian Tribe Member #1

CON

My tribe has been living on the land south of the referenced road for over a hundred years. Decades ago, this portion of the Everglades was granted to us as a reservation. We love the land and want to see it remain as undisturbed as possible. In recent years, Southwest Florida has grown exponentially, and development has destroyed much of the natural beauty here. People have tried to conquer nature rather than to live within her limits. This road is just another example. The construction of a wildlife underpass requires miles of unsightly fencing through our reserve. This is our land and we don't want to see it cluttered up until it looks like everywhere else in Florida. Other measures need to be taken to limit panther deaths in the area instead.

21. Hunter #2

CON

I have been hunting in this area for many years and have seen a lot of changes lately. For twenty years I never once saw a panther here; now I've seen two in the last year. Along with the increase in panthers, I have seen fewer deer. If we continue to give the panther right-of-way, soon it will be illegal to hunt deer because they are the panther's main food source. Also, I like to enter the hunting grounds at a location that would be fenced off by the proposed project. Without access, I would have to walk miles extra in order to get to my hunting grounds.

22. Taxpayer

CON

There are so many problems facing Southwest Florida right now, the last thing we need is to be spending taxpayer money to protect a couple of big cats down in the Everglades. There are several intersections here in town that have far more accidents than the site for the proposed wildlife underpass. Why don't we focus on keeping people safe first? If the animal activists want the underpass, make them find the money for it.

23. Recreational Fisherman

CON

I spend every free minute I have fishing. I love to park my truck on the wide shoulder and fish directly in the canal that parallels the road. Sometimes I bring my catch back home for my family, but oftentimes I just fish catch-and-release style for relaxation. If the wildlife underpass is constructed, my access to the canal will be fenced off. I have just as much right to this space as anyone – and certainly more than a panther should!

24. Landowner #2

CON

Part of the fencing related to the proposed wildlife underpass would cross right through my front lawn. Not only is it ugly and unwelcoming to look at, but it would require a gate in order for me to enter my driveway. As we all know, the weather in south Florida can be quite dangerous at times and opening a tall metal gate is not the safest activity in a thunderstorm. Why is my safety less important than the panthers'?

25. ORV Recreationist

CON

My family has been in this area for generations. We know this land and love to take our off-road vehicles out to enjoy the landscape. The location for the proposed wildlife underpass and associated fencing is a favorite location of ours to explore. Not only would our access to the area be cut off by the fence, but we are afraid that this is just another step towards taking away our right to go off-road vehicle riding in the area. We believe that the interests of people should be considered before those of animals.

26. Parent #2

CON

As a parent of two school-aged children, I would rather see this money go to construction projects that will make the roads in town safer. Very few people in town use the section of road in question. It's mostly tourists that travel that highway. In town, however, there are many streets that don't even have a shoulder, let alone a bike lane or sidewalk. I worry about the safety of my children when they are outside playing in the neighborhood. I think our tax money should be used for projects that will benefit the majority of taxpayers, not a few cats out in the swamp.

27. Indian Tribe Member #2

CON

My tribe has been living on the land south of the referenced road for over a hundred years. Decades ago, this portion of the Everglades was granted to us as a reservation. We love the land and want to see it remain as undisturbed as possible. In recent years, Southwest Florida has grown exponentially and development has destroyed much of the natural beauty here. People have tried to conquer nature rather than to live within her limits. This road is just another example. The construction of a wildlife underpass requires miles of unsightly fencing through our reserve. This is our land and we don't want to see it cluttered up until it looks like everywhere else in Florida. Other measures need to be taken to limit panther deaths in the area instead.

Crossing Paths – A Great Debate

Committee Assignments

Committee 1:

Animal Rights Activist (pro)

Business Owner #1 (undecided)

Business Owner #2 (con)

Insurance Agent (pro)

News Media (undecided)

Indian Tribe Member #1 (con)

Committee 2:

Outdoor Recreationist (pro)

Landowner #1 (undecided)

ORV Recreationist (con)

Truck Driver (pro)

Farmer (undecided)

Parent #2 (con)

Committee 3:

Fish and Wildlife Employee (pro)

Hunter #1 (undecided)

Landowner #2 (con)

County Law Enforcement (pro)

Taxpayer (con)

Committee 4:

National Wildlife Organization (pro)

Parent #1 (undecided)

Indian Tribe Member #2 (con)

Federal Government (undecided)

Hunter #2 (con)

Committee 5:

Wildlife Biologist (pro)

Rancher (undecided)

Recreational Fisherman (con)

School Teacher (pro)

Eco-tour Operator (undecided)

Crossing Paths – A Great Debate

Stakeholder Worksheet

Your Name: _____

Stakeholder: _____



Directions: Answer the following questions about your stakeholder role. Remember, you must answer the questions in the role that you have been assigned. As a result, some of the answers may not align with your personal opinions. Put yourself in this person's shoes.

Your Position

1. Do you think that the proposed wildlife underpass should be built? _____
2. Why do you care whether or not there is a wildlife underpass built on this road? _____

3. What is your biggest concern about this issue? _____

Preparing for the Community Meeting

4. What other stakeholders might *agree* with your position? Why? _____

5. What other stakeholders might *disagree* with your position? Why? _____

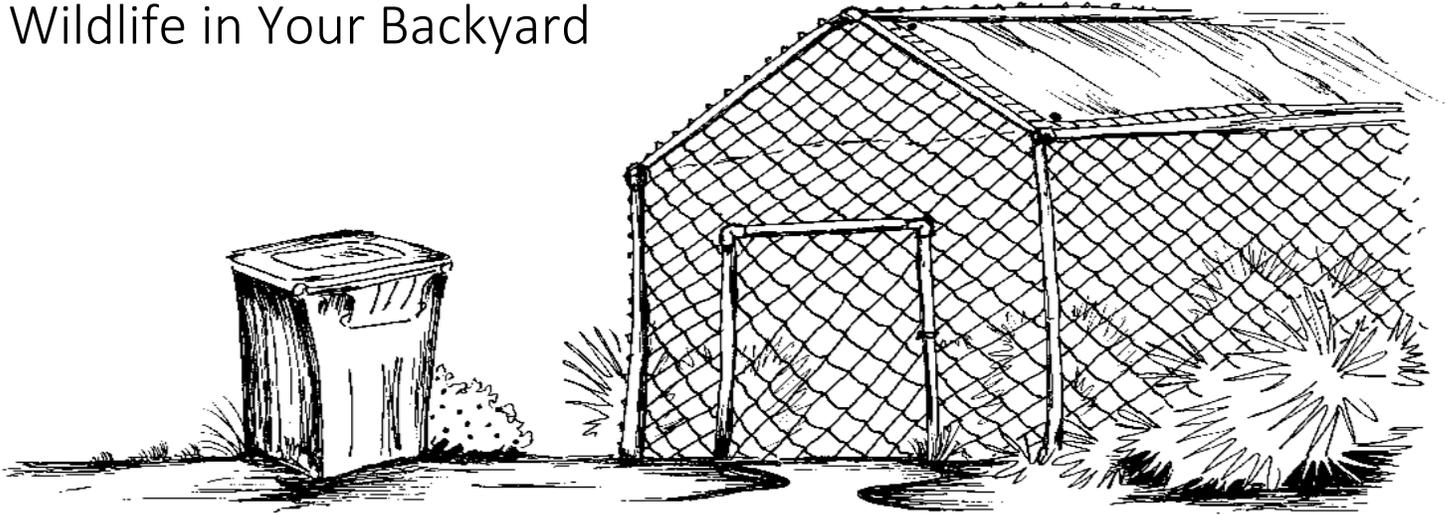
6. Which stakeholders have not taken a definite stand on this issue? _____

7. How will you attempt to *change the position* of those who disagree with you or are undecided?



Lesson Nine

Wildlife in Your Backyard



Key Question

How can people and wildlife live safely with one another?

Subjects

Science, Reading/Language Arts

Time Estimate

60 Minutes each day for two days

Key Vocabulary

Domestic animals, predator, omnivore, humane, proper enclosure, animal-proof, depredation

Sunshine State Standards

Science

SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

Reading/Language Arts

LA.7.2.2.3 Organize information to show understanding (e.g., representing main ideas within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting).

LA.7.6.2.2 Assess, organize, and check the validity and reliability of information in text, using a variety of techniques by examining several sources of information, including both primary and secondary sources.

Objectives

In this activity, students will:

1. Discuss issues they or others have had with wildlife.
2. Research a local animal.
3. Describe how to keep pets, livestock and people safe from potential dangers.
4. Describe how to keep wild animals safe from people.
5. Build a model enclosure or receptacle that would effectively prevent wildlife from entering OR create a poster display to showcasing safe practices for living with wildlife.

Materials

Each pair of students will need:

- One Backyard Wildlife worksheet
- Access to internet/library research materials
- Popsicle sticks, mesh or screen, wire, string, scissors, glue, cardboard to build a model *OR*
- Poster paper and pencils/markers.

Background

Floridians have adapted to live with a number of natural hazards including hurricanes, lightning, floods, fire and exotic species such as fire ants. Wildlife abounds in this state and can also be potentially dangerous to people and property if we are not educated on how to live in harmony with our native animals.

People's attitudes towards wildlife are shaped by media and popular culture, personal interactions with wildlife, and education. Fear of many animal species is natural, but without proper education, fear can foster a negative attitude towards wildlife and lead to inappropriate behavior when wildlife is encountered.

In Southwest Florida, many people live on the fringes of urban and rural areas where wildlife is prevalent. Interactions with wildlife occur daily, and it is important that we take steps to ensure the safety of people, their belongings and wildlife.

Some larger, predatory wildlife species like the Florida panther and the Florida black bear can potentially pose a direct threat to people. While there has never been a documented attack of a Florida panther on a human and less than a handful of incidents involving bears, it is still important that we understand the behavior of these animals and how to react if we encounter them. If you encounter a panther or bear and are too close, slowly back away, maintaining eye contact. If the animal shows aggressive behavior towards you, make yourself seem big and loud by waving arms, throwing objects, and yelling. If attacked, fight back.

Most negative wildlife interactions do not involve direct threats to people, but instead occur because

people have left food items or **domestic animals** within the reach of wildlife.

Goats, sheep, calves, pigs, donkeys, chickens and other domestic animals and pets that are left outside, especially overnight, are relatively easy prey compared to wild animals and can attract the interest of predators like Florida panthers, bobcats, and coyotes. These wild predators of Florida are extremely agile and can find their way into improper enclosures. Florida panthers, in particular, can jump very high fences. It is not uncommon for domestic animals to be harmed or killed by wild predators like panthers. This is known as **depredation**.

Depredation can foster negative attitudes and misunderstanding of wildlife species. The good news is that depredations are completely avoidable if domestic animals are properly enclosed or brought inside at night. **Proper enclosures** include a roof, fencing all the way up to the roof, and fencing that penetrates beneath ground level to prevent burrowing animals from entering. Properly enclosed domestic animals will discourage wild predators from repeatedly coming back for easy prey, which is a long term benefit. Nighttime, dawn and dusk is when our wild predators like Florida panthers are most active. Therefore, it is of particular importance that all domestic animals are enclosed during these times. You may also want to consider other discouragements like electric fencing or motion-sensor lighting to scare off predators.

Omnivores like bears, raccoons and opossums can also be problematic for land owners. These animals are attracted to garbage, bird seed, and pet food and will breach bins, pins, and fences to find these items. These problems are also avoidable if you use **animal-proof** containers for garbage and keep pet foods out of the reach of these omnivores. Garbage should be kept in a garage, shed or animal-proof container and be put out no earlier than the morning of pick up. Pet food should be served indoors or in an enclosure and should be cleaned up immediately after the meal. Bird feeders should hang out of the reach of all mammals far from tree branches and other structures. Grills should be cleaned or locked away when not in use.

By following these simple principles, land owners can prevent problems with our local wildlife. Remember that wild animals that are fed tend to lose their fear of humans, which makes them more dangerous to us. Additionally, these animals often have to be relocated or even destroyed to alleviate the danger. Keeping our wildlife wild is the most **humane** course of action we can take.

If you observe any problem animals that may pose a threat to people, please report them to the Florida Fish and Wildlife Conservation Commission.

Advance Preparation

Prepare copies of the Research Sheet, make animal assignment cards, and gather a selection of craft supplies.

Procedure

1. Introduce this lesson by asking students if they can recall any interactions with local wildlife that they or someone they know has had. Was the situation handled appropriately? What could have been done before, during or after the interaction to decrease the risk to people or pets? Discuss the local wildlife with which we share space and ask the students to share their attitudes and fears regarding these animals.
2. Introduce local wildlife issues including depredations and problems with animals finding garbage containers. Discuss how this shapes how people feel about local wildlife.
3. Explain that it is natural for people to have fears about wildlife, but that there are simple ways to keep yourself and your animals safe. In this activity, students will research an animal: Florida panther, Florida black bear, bobcat, coyote, opossum, or raccoon and find out what threat the animal could

cause to people or property. Hand out one Animal Assignment card to each student or have students draw at random which animal they will study. They will research ways to avoid threats and negative interactions with the animal species.

4. When students have completed their research, they will find a partner student who researched the same animal and discuss their findings. Partners will discuss recommendations to keep people and their animal safe. (For this and the following activity, grouping students in 3's would also work.)
5. Partners will then decide either to create an informative poster with words and illustrations showcasing safe practices for living with that species OR to create a 3-D model of a proper enclosure or waste receptacle that will alleviate issues with their animal.
6. Partners will present their creations to the class, providing recommendations for their animal species.

Wildlife in Your Backyard

Florida panther

Florida panther

Florida black
bear

Florida black
bear

Raccoon

Raccoon

Opossum

Opossum

Bobcat

Bobcat

Coyote

Coyote

Animal Assignments

Florida panther

Florida panther

Florida black
bear

Florida black
bear

Raccoon

Raccoon

Opossum

Opossum

Bobcat

Bobcat

Coyote

Coyote

Name: _____

Animal Assigned: _____

 **Directions:** Use your school library or the internet to research your animal and answer the following questions. If you find additional information in your research, make notes on the back of this page.

1. What does your animal eat?

2. In what types of habitat does your animal prefer to live?

3. When does your animal have their young, and what kind of den or burrow do they make?

4. What time of day is your animal most active?

5. If they feel threatened, what behaviors do they display?

6. A. What threats does your animal pose to people?

B. In what *humane* ways can these threats be avoided?

7. A. What threats does your animal pose to property and other structures?

B. In what *humane* ways can these threats be avoided?

8. A. What threats does your animal pose to domestic animals or pets?

B. In what *humane* ways can these threats be avoided?



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