Team Up for Conservation

Indoor/Outdoor activities for ages 8-14

Connecting Tiger Conservation with Environmental Stewardship in South Carolina

By Nature as Teacher, Inspired by "Team Up for Tigers" Classroom curriculum by Tigers United University Consortium at TigersUnited.org

Nature as Teacher
The Margaret H. Lloyd SmartState™ Endowment at Clemson University

TEAM UP FOR TIGERS

TIGERS UNITED UNIVERSITY CONSORTIUM

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About these activities....

The goal of these activities is to introduce students to the work done by tiger conservationists at Clemson University and beyond. Through this lens, we aim to connect major ecological, conservation and environmental stewardship themes from tiger range areas to "sister landscapes" in South Carolina. With inspirations from the University's mighty and charismatic mascot the tiger, and engaging, flexible activities that push the bounds of Place Based Education Principles, students are sure to be kept on their toes as they explore both near and far.

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Tiger Safari – An introduction to Tiger Conservation

Objective: Introduce students to tiger conservation and the connections between preserving global wildlife and local wildlife.

Set Up:

Materials: Team Up for Tigers Safari Slides or printed and laminated pages with text on the back. 30 laminated paper tigers with facts on the back

Tiger safari photo sheets, 1 per participant or small group.

Vocab to review: Apex Predator Carrying Capacity Niche Food Web

Set up for a lecture style lesson, and prepare to read the slides to the group. Before starting, let everyone know that in the middle of the presentation, there will be a part where we get to get up and move!

Consider using Tiger facts from "Team Up for Tigers" supplemental materials, some of which are pasted below:

• Tiger vocalizations include roars, growls, snarls, grunts, mews, hisses, moans and chuffs.

• You can hear a tiger's roar up to two miles away.

• A tiger usually roars for one of two reasons: to defend its territory or to invite females to mate.

• Unlike most cats, tigers like the water and will often be found playing or cooling off in the water during hot summers.

• Tigers are powerful swimmers, having been known to swim up to 6 kilometers (3.6 miles) to cross rivers to hunt.

• Tigers are excellent jumpers, too. They can leap 25-30 feet in one jump.

• Tigers have large, padded feet, making them more silent stalkers of prey.

• The track of a tiger found in the ground is called a "pug mark."

• White tigers are not a separate subspecies, nor are they albino. They are extremely rare, occurring only once in 10,000 times. They are the result of a recessive gene from each parent that affects pigmentation. White tigers usually have blue eyes.

In all subspecies, the females tend to weigh less than males.

• The largest subspecies is the Siberian or Amur tiger, which can weigh up to 660 pounds.

• The smallest subspecies is the Sumatran tiger; males weigh up to 310 pounds.

• Tigers can reach a length of up to 11 feet long.

• The stripes of each tiger are unique. No two tigers have the same stripes, just like how human fingerprints are all unique.

• The tiger is the only cat species that is completely striped; they even have stripes on their skin!

• A tiger's stripes can range from light brown to black in color.

• A tiger's stripes are not symmetrical on both sides.

• On Sumatran tigers, the stripes are closer together than on other subspecies.

• The South China tiger has the fewest stripes, meaning that the stripes are farther apart on this subspecies.

• Tigers typically give birth to two or three cubs, which are blind and helpless when born. They open their eyes approximately 14 days after birth.

Initially, they follow their mother by way of smell.

• Cubs begin to learn to hunt at 6 months, but the female is the sole provider for the cubs until they reach independence around 2 years of age. At

age 2, cubs leave to find their own territories.

• Around half of all tiger cubs do not live beyond 2 years of age.

• The Pench Tigress, also known as "Collarwali," lives in central India in Pench Tiger Reserve (PTR) and is famous as a Super Mom. She has given

birth to 29 cubs in her 13 years. Most recently, she was seen with a litter of four cubs.

• Tigers live alone for the most part except for when females are raising cubs.

• Tigers are very territorial, fighting to protect their "home range." Their territories are often large, encompassing between 40-60 square miles.

• While it is rare to see tigers in groups other than females with cubs, the term for a group of tigers is called a "streak" or an "ambush."

• Tigers are a keystone species, meaning they are critically important to the health of the ecosystem in which they live. As apex predators, they keep prey species from overpopulating, which protects the vegetation, in turn protecting streams and water supplies, which directly affects human populations. When we protect tigers, we protect many, many other species, including homo sapiens.

• Nine major watersheds are covered in tiger landscapes in Asia, providing water for at least 830 million people in Asia, including several cities across India, Malaysia, Indonesia and Thailand.

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College of Agriculture, Forestry and Life Sciences

The Team Up for Tigers Activities that we will be doing today are based on a program made for classrooms to spread awareness about conserving wild tigers.

What does it mean to conserve?

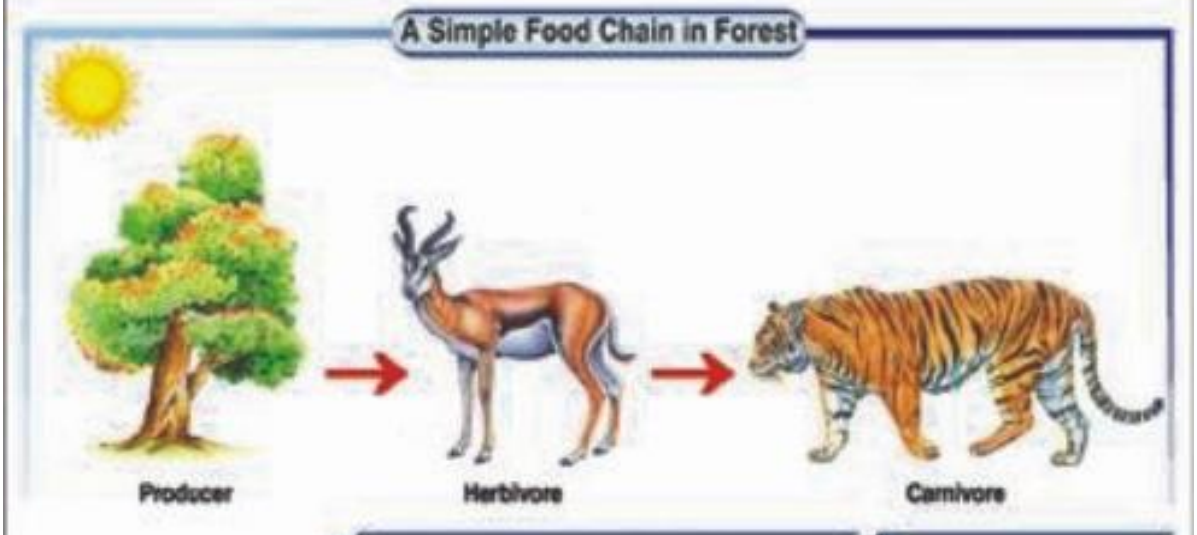
Wildlife conservation is the preservation and protection of animals, plants, and their habitats. By conserving wildlife, we're ensuring that future generations can enjoy our natural world and the incredible species that live within it.

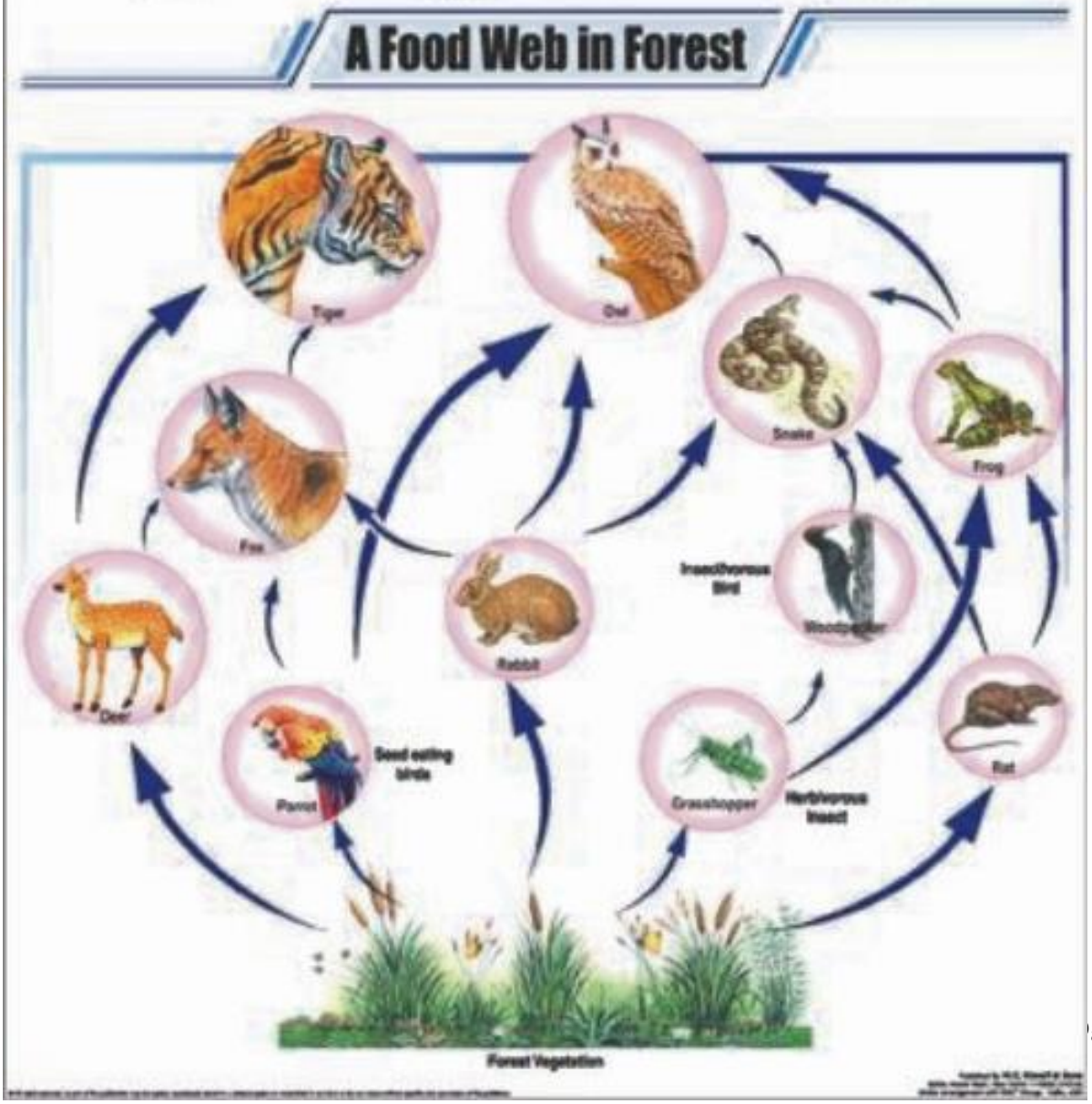
Tigers are very beautiful animals, and they often symbolize stealth and strength. What else do Tigers Remind you of?

For all these reasons, Tigers are a popular Mascot, or symbol used to represent team spirit! Clemson University's mascot is a Tiger! Can you name any other teams or groups that use a tiger as a mascot?

Part of what makes tigers so charismatic is their role, or job in Nature. Scientists call an animal's job in Nature a "Niche".

Food Chain in Forest Ecosystem





Part of a tiger's Niche or Job in nature is to be an "Apex Predator".

What is a predator?

A predator is an animal that naturally preys on other animals.

An Apex Predator a predator that exists at the very top of the food chain. Unlike some other predators, it's never preyed upon itself.

Can you think of other examples of Apex Predators?

Examples include polar bears, lions, crocodiles, and orcas. This are all well-known and well loved species of the world. Why do you think people are so drawn to these species?

Maybe we relate since we as humans are never preyed upon by other animals. We also might revere or admire these animals because they promote balance in nature.

In order to learn more about the important niche …. What's a niche?

… of the Tiger, lets review the niche of the Apex Predators that live in and near South Carolina.

Can anyone think of an Apex species that lives in South Carolina?

Bobcats, sometimes called Red Lynx, are an animal that lives in South Carolina that preys on smaller animals like mice, rats, rabbits and squirrels. Bobcats have no predators, other than humans.

Bobcat, like all apex predators, promote balance in the ecosystem. They eat many herbivore species – or plant eaters. This ensures that there aren't so many plant eaters that they become pests – eating farmer's crops and depleting natural plants. When there are so many mice that they are looking for extra food they may even come into our houses, looking for snacks.

Have you ever seen a mouse inside a house? How did it make you feel? Why don't people like mice inside their homes? Mice can spread germs, and ruin food.

Have you ever seen a Bobcat in nature? Have you ever heard of a story of a wild bobcat ?

Often, people kill Bobcats because they are afraid the Bobcat might hurt them or their family. Sometimes people kill bobcats because the bobcat was stealing chickens.

In nature, when two apex predators of the same or different species kill each other it is due to competition for resources. When a human kills a bobcat for stealing chickens, the human did not want to compete with the bobcat for the chicken.

If you have never seen a Bobcat in nature, it may be because they are nocturnal. What does it mean to be Nocturnal?

Bobcats are nocturnal- they are most active at night, doing their job in nature and helping to keep the population of rodents down.

In South Carolina, the bobcat is legally classified as a furbearer and can be taken by hunting or trapping during the open season. The season for trapping these animals is December 1 through March 1. Hunting season is Thanksgiving Day through March 1 on private lands with a valid hunting license.

Just like the Bobcat, The Tiger has an important job in Nature.

The wild tigers that live in India are called Bengal Tigers.

Bengal Tigers eat plant eating animals like the water buffalo and Axis Deer. The people who live in and near the Bengal Tiger's habitat are happy that the herbivore species are controlled by the tiger because if there are too many deer, the deer eat farmer's crops.

There are not many wild tigers in India, mainly because of habitat loss. Much of the tigers natural habitat has been destroyed to make way for farmer's fields, to harvest timber and make space for homes.

Just like we are thankful that there are not too many mice, People of India are happy when there are not too many deer.

Just like people in South Carolina who may kill a bobcat for eating their chicken, A person in India might kill a tiger for eating their cow or goat that they rely on for milk. Remember, sometimes we call this competition or conflict.

At Clemson University, there are scientists and researchers who are working to find ways to have less conflict between people and Tigers, so that there are more tigers in the wild!

One of these scientist is a woman who grew up in India and is now studying at Clemson. Her name is Hrishita Negi. Hristita reads a lot about tigers and human behavior, she teaches about mapping, and she travels to India to learn more about Tigers and people who share Tiger habitat.

Hrishita interviews people who live near tigers to understand their experiences, and she shares what she has learned with them as well.

One way Hristia learns more about Tigers is by going on a Tiger Safari.

Have you ever heard of a safari? What is a Safari?

A Safari is a special type of expedition or trip to observe animals in their natural habitat . What does it mean to observe?

What are somethings someone might observe on Tiger Safari? People could observe where the tigers spend time, how they hunt and what they eat.

When Hrisita goes on tiger safari, she goes in a Jeep with forest rangers. To remember what they saw on Tiger Safari people take lots of photos.

Today you will go on a special Tiger Safari ! Your challenge will be to look around this area and find some tigers to take photos of!

These are the Tigers you will be looking for on your Safari. This one is orange and black. That is how we are used to seeing Tigers.

This one is green! Anyone know why there would be GREEEEN tigers on your safari?

As humans, we see tigers as orange. Herbivore animals, or the prey of the tiger, can not see all the colors humans can see, so the animals that the tiger would like to sneak up on , see the tiger as Green.

How would this help the tiger hunt animals like deer and buffalo?

A green Tiger would blend in perfectly with the brush of the jungle and long grasses!

So as an added challenge some tigers on your safari will be orange – but some will be green! Just like the prey animals see them.

_____'s Tiger Safari

There are about 5,574 Wild Tigers in India

For your Safari you will be given a paper with spaces that look like photographs.

When you find a Tiger on your safari, the back of the Tiger will tell you what your tiger was doing when you spotted it.

Think about the observation and draw a picture in the photograph space of what the tiger was doing when you spotted it.

The back of the tiger will also tell you a fun fact about tiger conservation. Write the fact at the bottom of the photograph. When you are done, put the tiger back where you found it for the next person.

You can also write your name at the top of the paper!

*Pass out photograph worksheets and pencils.

There are 15 total orange Tigers and 15 green tigers on this safari. You can see you have spaces for 6 photographs on your worksheet. Just find and photograph a many tigers as you can in _____ minutes.

Any questions?

Ok you have _____ minutes to go on your tiger safari, find tigers, draw their behaviors and record your facts! When you are done, come back to your seats. Ready, Set, Go!

How was your Safari!? What did we see the tigers doing? What behaviors did we observe?!?

What about the facts, did anyone learn something that surprised them about Tiger Conservation?

There are many people like Hrishita working in India and in other Tiger range countries like Russia, China and Indonesia to help conserve the Wild Tiger.

Here in the United States, people work to conserve Apex Predators too.

Can anyone think of an animal people in America work to conserve?

Wild Grey Wolves are Apex Predators that live in the mountainous in the western part of the United States.

They have faced a lot of the same pressures that other apex predators face- mainly habitat loss and conflicts with humans.

For a time Grey Wolve were exterminated from the United States and only existed in Canada. People started to recognize that with out the Apex predator of the region, the ecosystem lacked balance.

What types of signs do you think the people in the West saw when they noticed the environment lacked balance?

People started to notice that many of the native plant species were harder to find in scenic landscapes like Yellowstone National Park. This was caused by an overpopulation of herbivores, because there was no animal filling the job of controlling those populations.

Many scientists worked for many years to re-introduce the wolves to Yellowstone National Park. These scientists worked by understanding wolve niche and behavior. They also worked by teaching people about how important the Wolves job is in Nature.

People worked together by holding workshops with landowners to educate about Wolves, and Art exhibits brought awareness to the Wolfs beauty, niche and conservation.

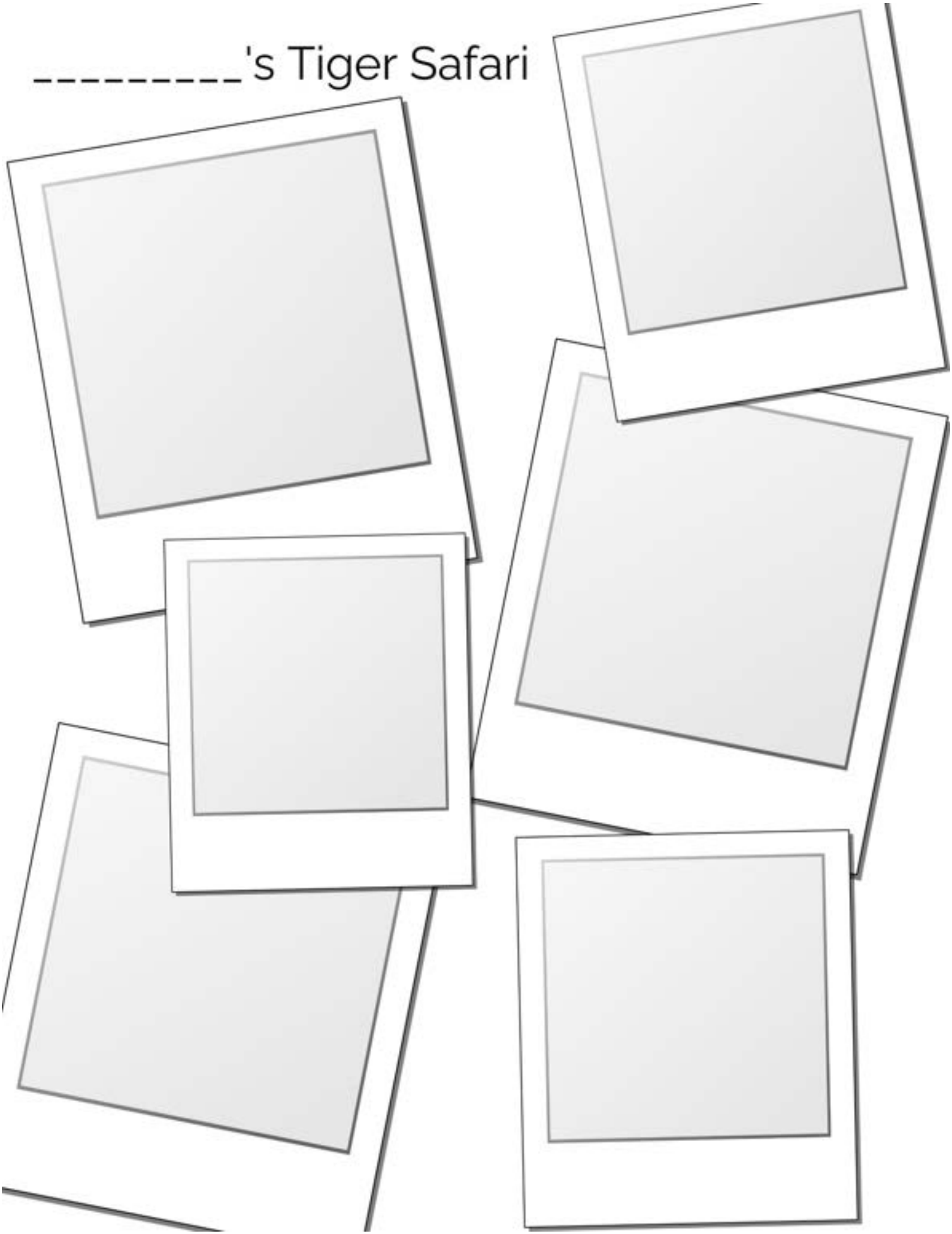
I hope you enjoyed learning about Apex Predators, and their conservation. I loved seeing all of the photos from your tiger safari!

I have a list of resources about Bobcats, Tigers and Wolves that you can take home to research online or use Library resource. I hope you feel inspired to teach others about animals' important jobs in nature, or make some awesome animal art to spread awareness!

If we all work together to know more and share more about our important wildlife species, we can work as a team to help conserve wild animals and their important habitats.

If you make art, ordo research, please share your work with us on facebook and Instagram!

_____'s Tiger Safari



Food Webs; SC Energy Flow

Objectives: Students will be able to define food web and differentiate between a food web and a food chain.

Students will be able to create a model of a SC food web.

Set up:

Materials: Paper Cups SC Wildlife Cut Outs Yarn or string scissors Glue/tape crayons/markers

Consider allowing the students to color, cut out and paste the images from the SC Wildlife Cut Outs on cups themselves in small groups while you explain Introduction & instructions. For faster gameplay, prepare the cups ahead of time yourself. The cups should be upside down, and images pasted right side up. Alternatively, ask the students to draw on the cups instead of using the cut-outs.

This game is best played in an open space like a gym or field where student have room to circle up. Gather a complete yarn ball or string ball to toss/ unravel during the game.

While students can work in small groups to prepare the cups, this game is best played in a large circle of 6-30 students. The more students, the more cups you will need. If you may choose for every student to have a complete set (18) or for the students to share cups. Minimally you need 3 plants, around 6 primary consumers, and 3 apex predators. Save the cups to use for other games afterwards.

Vocabulary to review before gameplay:

Predator Prey decomposition food web food chain primary consumers secondary consumers apex predator

Introduction:

Start by discussing food chains; a hierarchical series of organisms each dependent on the next as a source of food. Ask the students examples of food chains. Encourage them to start with the sun. When they get to the top of the food chain, discuss decomposition. Explain that the energy flows from the sun, though the chain to the apex predator. When that animal dies its energy returns to the soil to helps plants grow.

Next, define food web: a system of interlocking and interdependent food chains. Speak with the students about how different food chains connect to make a food web. Maybe one prey is prey to many different types of predators. Maybe an animal typically in the middle of the food chain decomposes before it is preyed upon.

Now, we'll make our own food web!

Gameplay:

Ask the groups to sit in a large circle with their cups. If every student has a cup ask them to stack the cups on top of each other like Russian dolls in front of them, with the one on top representing their character. If students are sharing cups they can simply set a cup in front of them,

Teacher plays the sun, and holds the end of the ball of yarn. Prompt the students: where does the sun's energy go? To a plant! Through the ball to a student with a plant cup. Prompt again for the energy to move from the plant to the primary consumer. Continue to toss the yarn representing the energy flow in the food web, with every person continuing to hold the string at their turn, eventually forming a visual web. When an apex predator is reached, direct the energy flow to decomposition and then a plant. Keep playing until everyone is holding a piece of the web.

Unbalanced webs: If the students choose too many apex predators, the game will get "stuck" with out enough primary consumers to support them (the next game is focused on tropic levels). Troubleshoot with students why the web might be unbalanced, and coach them to add more plants and primary consumers and start over.

You may have a lack of apex predators, which does not unbalance the web but forces the primary consumers to decompose before they are preyed upon.

Encourage the students to switch cups/characters and play a few times.

Before the last round ends, when everyone has a piece of the web, ask someone to let go of their piece of string and watch what happens. Guide students to think about what would happen in nature. Sometimes the energy simply flows to another animal, and sometimes "missing links" cause a major disruption(represented by the string hitting the ground)

Reflection Questions:

What would happen if all the predators were gone from the web. The Primary consumers? The plants? The sun/?

What surprised you most about this game?

When was the web unbalanced? Why?

When are food webs unbalanced in nature and what happens?

What part of the energy/food web would you be and why?

Tiger Reservation: Trophic Levels Game

Objectives:

Student will be able to define Trophic Level, Range, and Wildlife/Nature Reservation.

Student will be able to create a visual model/representation of the tropic levels related to supporting a tiger.

Set up:

Materials: Tiger tropic levels cut outs, reservation areas , sun tokens (Print outs below)

62 Paper Cups Scissors, tape/glue, crayons/markers (optional).

Consider allowing the students to color, cut out and tape/paste the cut-outs to each cup while you discuss the Introduction and game rules. For quicker game play, prepare the cups yourself ahead of time by pasting one organism on each cup. Alternatively, have the students draw directly on the cup. Cups should be upside down while images are pasted right side up. You will want to start with 4 tiger tropic sheets (each containing 1 tiger, 1 goat, 1 buffalo, 12 plants requiring 15 cups per sheet). Consider also using the complete visual as an example or as hand-outs. If you played the Food web game, use the same cups, just the other side or a blank space on the cup.

This game can be played indoors or outdoors, on the ground or 4 separate desks/tables. Wind may hinder game play. Set out the 3 areas and corresponding resources in 3 different nearby areas.

Be sure to cut out the sun tokens ahead of time and keep them in an envelope to use as the "sun store". Collect all the resources (cups with tigers, herbivores, plants) in a separate 4th location which a facilitator should monitor. You will need 97 sun tokens to play (4 sheets). Prepare 1-3 human cups by pasting the human silhouette onto cups.

This game is designed for 3 groups of 2-6 students. Identify groups before gameplay.

Vocabulary to review before play:

Trophic Levels Carnivore Omnivore Herbivore Photoautotroph
Wildlife Reservation Conservation Ecological Range

Introduction:

Start by discussing trophic levels:

> What are trophic levels and what do they represent? In ecology, a trophic level pertains to a position in a food chain or ecological pyramid occupied by a group of organisms with

similar feeding mode. The trophic levels are shown in a series or a succession to represent the flow of food energy and the feeding relationships between them.

Next, Review the simplified example with the Tiger's food pyramid from the Tiger tropic levels cut out sheet. Explain that plants are fed by the sun, and it takes many plants to fill a plant eater's belly and give it energy. Explain that it also takes multiple plant eaters to fill a meat eater's belly. Everything below the tiger, that supports the tiger or fills it's belly is in the tigers range.

A range is the amount of land or space a Tiger would need to support itself. It would include all the food in every trophic level, water, and sunshine. It is a specific way to think about the tiger's habitat and everything 1 tiger would need to thrive or be happy.

Now that we know what trophic levels are and what it takes to support a tiger in its range, we can play the Reservation game!

What is a reservation?

A nature reserve (also known as a wildlife refuge, wildlife sanctuary, biosphere reserve or bioreserve, natural or nature preserve, or nature conservation area) is a protected area of importance for flora, fauna, or features of geological or other special interest, which is reserved and managed for purposes of conservation and to provide special opportunities for study or research. They may be designated by government institutions in some countries, or by private landowners, such as charities and research institutions.

In our game, the reservation will be a protected area meant to support Tigers, and everything a tiger needs to be happy.

Gameplay:

In our case the reservation's goal would be to support as many tigers as possible.

In this game, you and your team are looking for the perfect place to create a tiger reserve. Remember, your range must support the tiger and all the trophic levels to be successful. Different areas start with different resources.

Area 1 has a mountain, a stream and 40 sun tokens. (See below)

Area 2 as a large lake, a human and 2 goats, with 25 sun tokens. (See below)

Area 3 is a grassy savannah with seasonal watering holes. It comes with 5 plants and 32 sun tokens. (See below)

You can build your range by trading your sun tokens in for plants, or by trading what you have with other teams.

As you build your range, stack the plants on the bottom, the herbivores on top, and the tiger on the very top like a pyramid.

To get started, choose an area (or go to your teams assigned area) and start trading with your neighbors or go to the "sun store" to trade in your sun tokens for plants. As you establish the correct amount of plants, ask the sun store to check your work and give you herbivores and so on. Remember, the goal is to have the most tigers with well supported ranges, meaning the most tigers that have 2 herbivores, and each herbivore having the plants that they need. For this game, your may not kick a human out of an area, or feed a human to a tiger.

Let the game play out. When the reservations are finished you may hold a reflection discussion about each reservation and their unique challenges and experiences, or you may rotate groups so that every group has a change to try each area.

Reflection discussion questions:

What was a challenge you faced?

What was something that was easier than you thought it would be?

What was something that surprised you?

Who saw someone else have a great strategy? What was it and why did it work well?

What is something you would do differently next time?

If we think about each cup in this game as being a unit of energy, what cup took the most energy to support it?

Can you stack a tiger right on top of grass? How about sunshine? Why/why not.

Is there a way you could skip a trophic level, saving energy? (The answer here is yes, since humans are omnivores, you could support 1 human with just plants, skipping herbivores.)

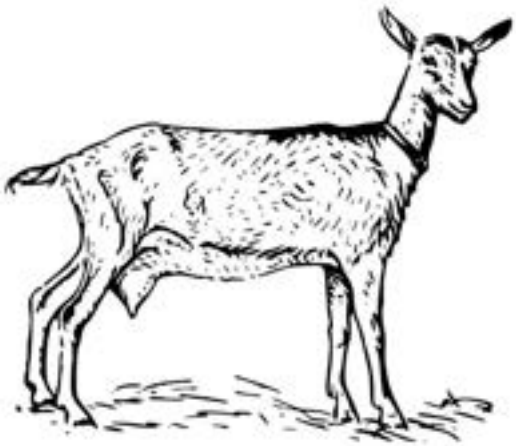
What happens to the energy when a goat dies? When a tiger dies?

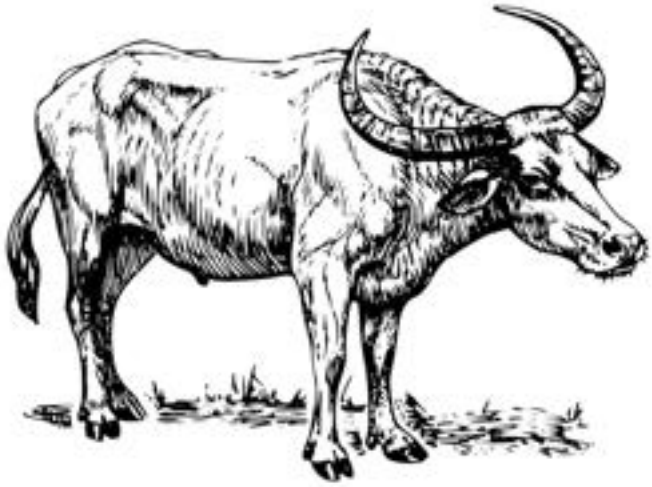
Stacking rules for the game:

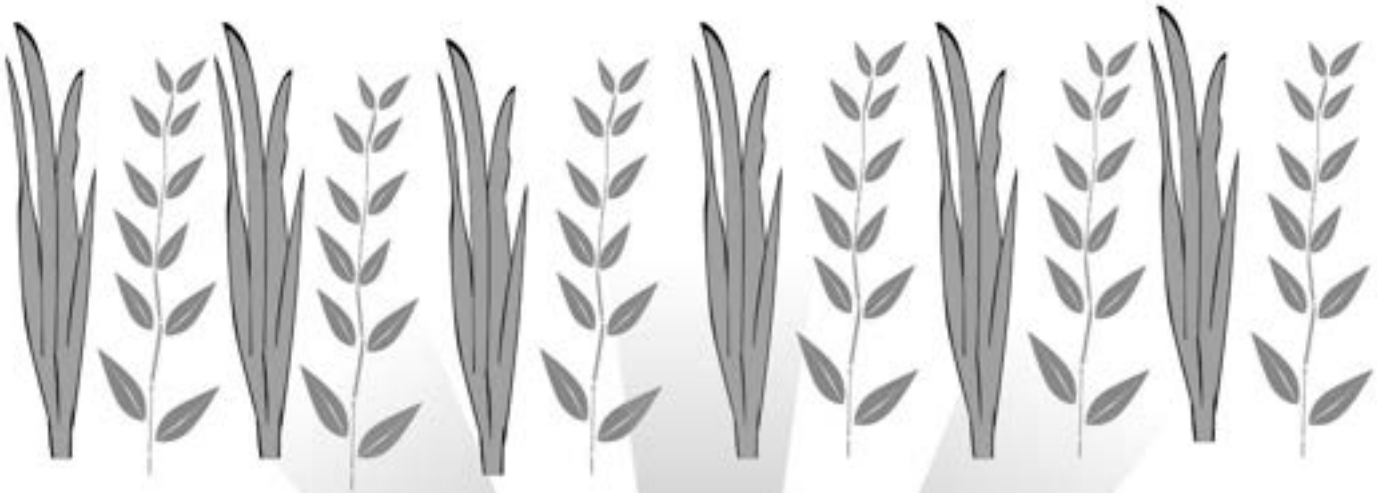
Remember, Humans can not be "kicked out" or fed to tigers.

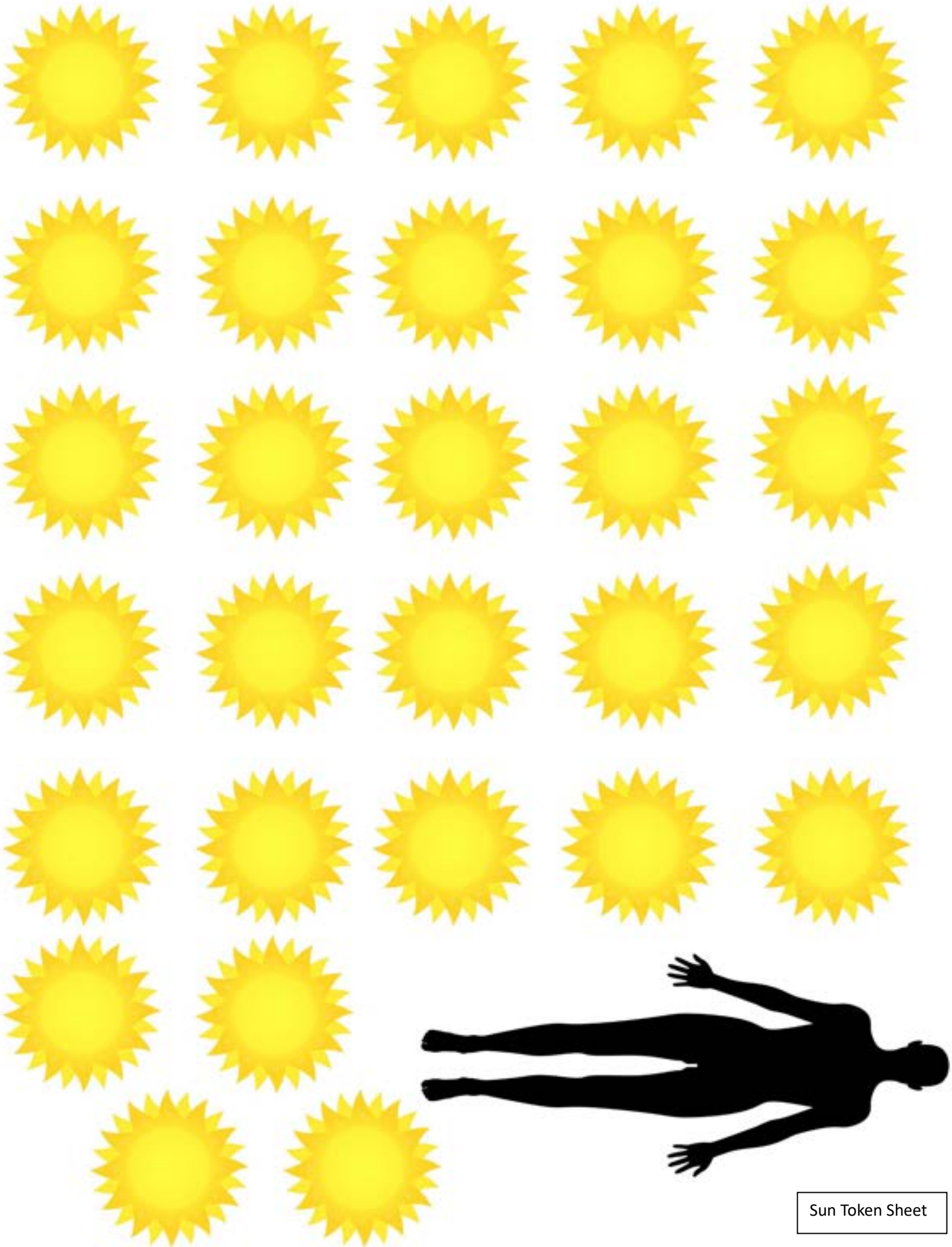
1 Tiger (carnivore)	2 herbivores
1 goat (herbivore)	5 plants
1 buffalo (herbivore)	8 plants
1 plant (photoautotroph)	2 Sun
1 Human (omnivore)	2 plants + 1 herbivore OR 5 plants

Tiger Tropic Level Sheet



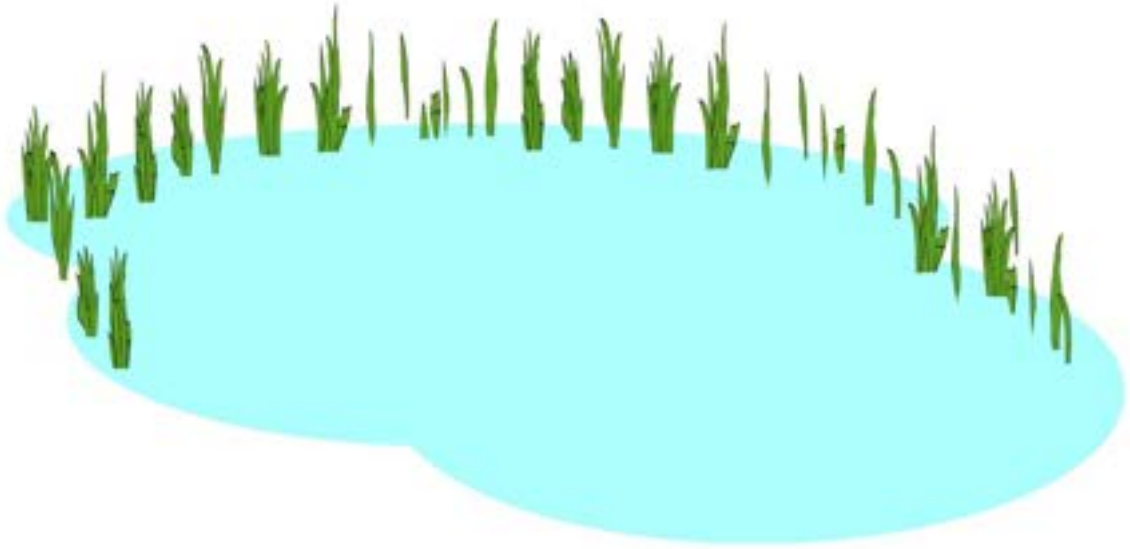






Sun Token Sheet

Area 2: A Lake, A human, 2 goats, 25 sun tokens



1 Tiger (carnivore)	2 herbivores
1 goat (herbivore)	5 plants
1 buffalo (herbivore)	8 plants
1 plant (photoautotroph)	2 Sun
1 Human (omnivore)	2 plants + 1 herbivore OR 5 plants

Area 3: Grassland, Seasonal watering holes, 5 plants, 32 sun tokens

1 Tiger (carnivore)	2 herbivores
1 goat (herbivore)	5 plants
1 buffalo (herbivore)	8 plants
1 plant (photoautotroph)	2 Sun
1 Human (omnivore)	2 plants + 1 herbivore OR 5 plants

Area 1: Mountain, Stream, 40 Sun tokens

1 Tiger (carnivore)	2 herbivores
1 goat (herbivore)	5 plants
1 buffalo (herbivore)	8 plants
1 plant (photoautotroph)	2 Sun
1 Human (omnivore)	2 plants + 1 herbivore OR 5 plants

Wildlife Stewards

Objective: Students will be able to define a wildlife Steward

Students will be able to identify professionals in the field of wildlife stewardship, and recall local wildlife stewards.

Students will practice writing Thank you letters

Set Up:

Materials: Pens/pencils lined paper letter template letter example. Addressed 9X12 envelope Information about local wildlife Stewards.

Set up the space for a lecture style lesson. Be sure each student has access to paper / pens.

Vocabulary to review before starting: Stewardship Wildlife wildlife management habitat profession/career Ranger Researcher

Introduction:

Start by defining Stewardship: the job of supervising or taking care of something, such as an organization or property. Talk to students about what it means to be a wildlife steward.

A wildlife steward may take many forms. Most often we thing of rangers or people who work in national or state lands, protecting habitat and wildlife.

Other people who are wildlife stewards are people who research wildlife behavior and their habitat, to better understand how to protect them. What are some other examples of wildlife stewardship?

What are some ways we can be stewards of wildlife at home?

Introduce some local wildlife stewardship agencies and researchers.

Exploration/Application:

Tell the students we are going to write letters thanking the wildlife stewards for their hard work. Show them the example and help them to write their letter on the template. Encourage them to draw pictures on the back. When the students are finished, place the letters in the addressed envelope.

Write an outline of an appropriate letter on the board:

Dear organization/person

I am writing to thank you for being such a great steward of wildlife.

Thank you for _____, _____, _____ (parts of their job).

I love wildlife because…..

Thank you for all that you do.

-Sincerely, Name & Age.

Questions for Reflection:

Who are some stewards in your every day life?

What do you think will happen when a steward gets this envelope?

What are some other ways to thank wildlife stewards or become wildlife stewards?

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Dear Congaree Land Trust

I am writing to thank you for the important work that you do conserving and land and being stewards of wildlife. I love seeing deer and raccoons in my backyard and I am thankful that there are many people working to protect them and their habitat. I am also thankful for fresh air and water.

Thank you do all that you do.

Sincerely,

Leoncia Cruz

Age: 32

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The Margaret H. Lloyd
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Dear _____

Sincerely,

_____

Age: _____

Where is Wildlife?

Passport - Tigers Around the World

SC Habitat Investigation

Tigers Around the World

Objective: Student will be able to identify Tiger range countries on a map.

Student will be able to describe the varying habitats of tigers.

Students will be able to match adaptations with the appropriate habitat.

Set Up:

Materials: Tiger Range Maps (1 per student or small group) Crayons/Markers
gluesticks Tiger adaptation stamps Tiger Habitat stamps
Paper "passports" (One per student or per small group).
Comprehensive Reading Sheets.

This activity works best when started in a classroom or seated at tables and then moved to a large open space like a field or gym. Set up the three passport stations ahead of time. If you are outside this can be spots along the trail, or indoors simply 3 different tables. Each station should have a variety of adaptation, country flag, and adaptation stamps, 1 Comprehensive reading sheet (mock magazines) and some gluesticks.

Vocabulary to review: Habitat adaptation continent vs. country

Introduction:

Adapted from "Team Up for Tigers" Module 1 lesson 2.

Start out by handing out the maps of Asia and reviewing the difference between a continent and a country. See if the children can point to the focus of tiger range countries – India, China, Russia.

Next explain that we are going to choose a color, and color all of the countries where tigers live with that color. Explain that you are going to read out the list of countries slowly, and the students need to find them using the key at the bottom of the map and the corresponding country, and color that country.

As you read the list, you may want to add some facts about tigers in those countries from Team Up for Tigers Module 1 lesson 2:

Basic Tiger Facts

• Today, tigers are native to 13 Asian countries, known as "range countries." They do not live in Africa (a common misunderstanding).

• The tiger-range countries include:

1. India

2. Nepal

3. Bhutan

4. Bangladesh

5. Myanmar

6. Thailand

7. Malaysia

8. Indonesia

9. Laos

10. Cambodia

11. Vietnam

12. China

13. Russia

• However, tigers are believed to be functionally extinct in 1) Laos, 2) Cambodia and 3) Vietnam.

• Tigers are on the brink of extinction in China; the last estimate suggested there were only seven tigers remaining in the wild there.

• Today, more than half of the world's population literally surrounds the remaining wild tigers.

-Humans are central to the three primary causes of tiger population decline, which include loss of habitat, poaching and human-wildlife conflicts.

• Tiger populations severely plummeted due to hunting during the late 19th and early 20th centuries, resulting in local extinctions from several sites.

• Today, many tiger-bearing forests have become fragmented, and the corridors between them have been cut off due to the conversion of forest land for development projects and the construction of linear-transportation corridors.

• Tigers are facing a severe threat from poaching and the illegal wildlife trade.

• Tigers are known as a keystone species, meaning they are critically important to the health of the ecosystem in which they live.

• As apex predators, tigers keep prey species from overpopulating, which protects the vegetation and in turn protects streams and water supplies, which directly affect human populations.

• Today, the historic range for tigers has been reduced by 95%, leaving tigers with little room to roam freely.

• As a result of human population growth, forests are being rapidly converted for housing, agriculture and other public uses. This brings humans into closer contact with tigers, often resulting in human-tiger conflicts.

• A tiger skin is worth more than $10,000.

• A half-liter bottle of tiger-bone wine sells for $135.

• All parts of the tiger are used for traditional medicines.

• The illegal trade of tiger parts on the black market stimulates the market by increasing demand, especially for tigers in the wild. The greater the demand, the greater the number of wild tigers poached.

• The last remaining tigers in China are found in the remote northeast of China near the border with Russia. The estimate of wild tigers in China is now at only seven adults!

• Loss of livestock, and sometimes even loss of human lives occur when tigers enter towns and villages. Villagers sometimes retaliate for these losses by killing the tiger.

When you are finished listing and coloring the tiger range countries, look at the map together and talk about the habitats of those countries. Let the students know it is important to remember the habitats for the next activity. Generally speaking where is it coldest? Where is it warmest?

Define Adaptation: adaptation is the biological mechanism by which organisms adjust to new environments or to changes in their current environment. Give some examples of animal adaptation and ask the students if the know of any. Remember – an adaptation helps an animal thrive in it's habitat.

Exploration/ Application:

Split the larger group up into 3 smaller groups and explain that each group to start at one station, and rotate to the next station. If you are outside this can be spots along the trail, or indoors simply 3 different tables. Explain you will ring a bell or call out after 5 minutes to switch stations. At each station you need to work together to find the correct corresponding habitat card, adaptation card, and country flag card for the pages in your passport by using the reading sheet to help you.

Allow the students time to rotate through the stations, then review the correct corresponding cards at the end.

Reflection Questions:

Did anyone get all the cards right on the first try!? Great job!

When a person travels they might visit another country by travelling in a plane or train. How do tigers travel long distances?

Would a tiger from Russia ever decide to live in Vietnam? Why or why not?

CHINA

FLAG

ADAPTATION

HABITAT

NOTES

PASSPORT

TEAM UP FOR CONSERVATION

NAME:

CHINA

FLAG

ADAPTATION

HABITAT

NOTES

PASSPORT

TEAM UP FOR CONSERVATION

NAME:

INDIA

FLAG

ADAPTATION

HABITAT

NOTES

RUSSIA

FLAG

ADAPTATION

HABITAT

NOTES

INDIA

FLAG

ADAPTATION

HABITAT

NOTES

RUSSIA

FLAG

ADAPTATION

HABITAT

NOTES

small
size

TIGER TIMES

THE BENGAL TIGER

India's tropical moist deciduous forest are probably some of the most productive habitats for tigers and their prey. In India, Tigers live in forests, grasslands, mangroves and even highlands.

THE SWIMMING CAT!

In the extreme heat of India, Bengals have adapted to swim in natural streams and pools to keep cool!

NATURE NEWS

ALL ABOUT NATURE AROUND THE WORLD

Adaptable Amur Tigers

Along with the thick fur on their bodies they have an extra fur "scarf" around their necks. While all species of tigers have this Amur tigers have the most developed neck fur layer. Extra fur on their paws acts like snow boots to protect them from the cold and snow. Tigers have large padded feet that enable them to silently stalk prey. The claws of Amur tigers are up to 4 inches in length and are used to grasp and hold onto prey. Tiger claws are retractable.

Russian Climate

During the summer and fall, a monsoonal influence brings tropical storms and typhoons coming from the southeast, resulting in substantial rainfall. Fog occurs as a result of difference in temperatures between the continent and the ocean, resulting in more moderate temperatures, higher humidities. Winters can be long and bitterly cold with January mean temperatures ranging from -15 to -20 °C and snow covering the forest floor from October to April

Tigers in Russia

Siberian (or Amur) tigers may be the world's largest cats. They live primarily in eastern Russia's birch forests. Though their northern climate is far harsher than those of other tigers, these animals have some advantages. Northern forests offer the lowest human density of any tiger habitat, and the most complete ecosystem. The vast woodlands also allow tigers far more room to roam, as Russia's timber industry is currently less extensive than that of many other countries. this area is one of the most productive and diverse forests in the world and also contains one of the highest endangered species densities on Earth. While most temperate rainforests around the world have retained only a fraction of their historical range, these forests maintain the majority of their former range and almost all of their historical biodiversity.

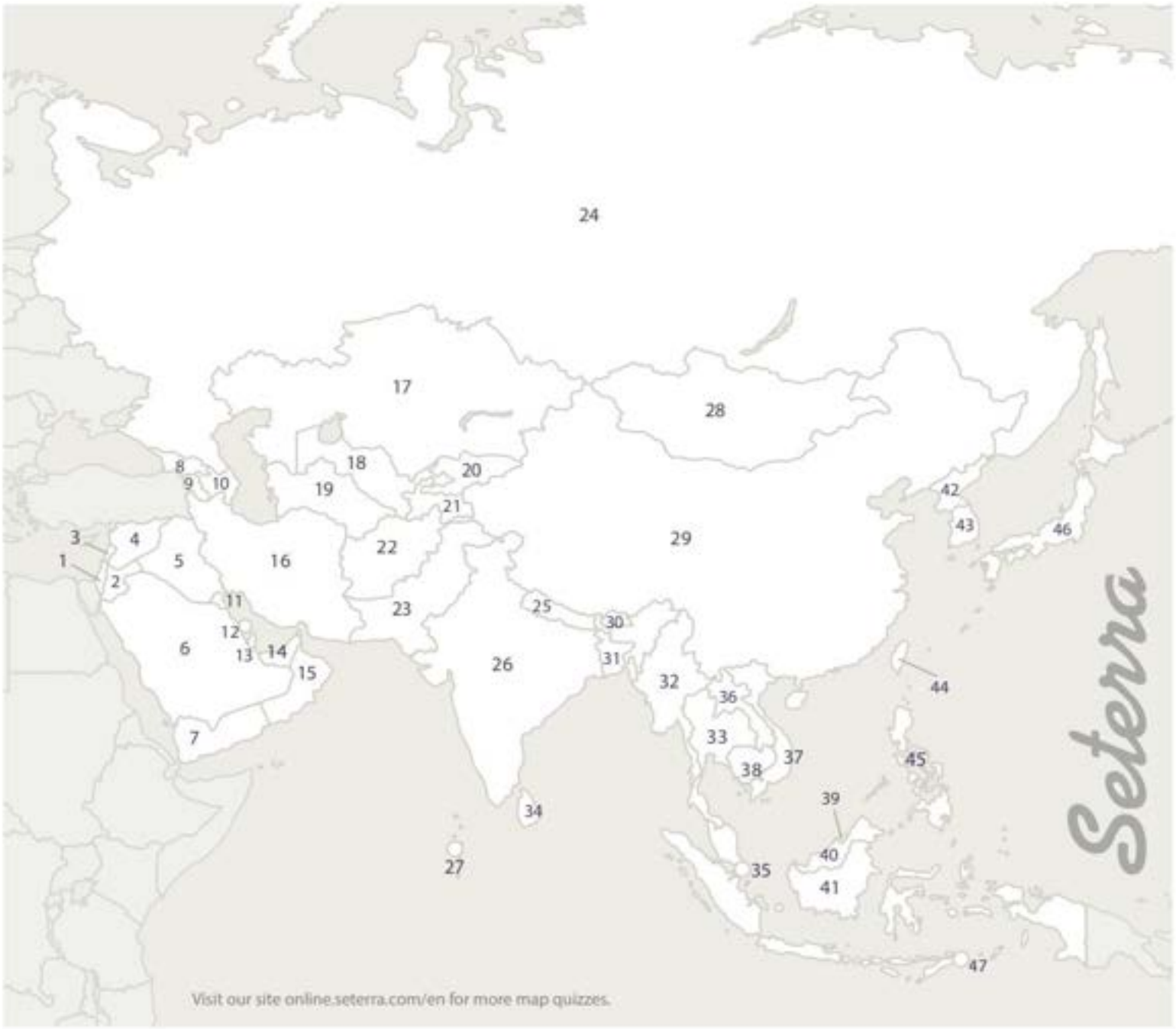
TRAVEL
TO TIGERS

Elusive Predator

The South China tiger is believed to be the oldest of all tigers and the tiger from which all other tigers descended.They are so rare that no photograph of them in the wild exists and they haven't been seen in the wild for decades. This tiger is also the smallest of the mainland tigers, adapted to move sneakily and swiftly through the most dense of forests.

DISCOVER CHINA

Explore tiger habitats of forests, bush lands and grassland in mountain areas.
South China tigers are fierce nocturnal animals. Their prey includes: roe deer, deer, wild boars or even black bears.



ASIA | COUNTRIES

1 Israel
2 Jordan
3 Lebanon
4 Syria
5 Iraq
6 Saudi Arabia
7 Yemen
8 Georgia
9 Armenia
10 Azerbaijan
11 Kuwait
12 Bahrain
13 Qatar
14 the United Arab Emirates
15 Oman
16 Iran
17 Kazakhstan
18 Uzbekistan
19 Turkmenistan
20 Kyrgyzstan
21 Tajikistan
22 Afghanistan
23 Pakistan
24 Russia
25 Nepal
26 India
27 Maldives
28 Mongolia
29 China
30 Buthan
31 Bangladesh
32 Myanmar
33 Thailand
34 Sri Lanka
35 Singapore
36 Laos
37 Vietnam
38 Cambodia
39 Brunei
40 Malaysia
41 Indonesia
42 North Korea
43 South Korea
44 Taiwan
45 the Philippines
46 Japan
47 East Timor

South Carolina Habitat Investigation

Objective: Students will be able to identify South Carolina habitats and match organisms with their habitats

Students will be able to recall three parts of a habitat: Water, Food & Shelter.

Set Up:

Materials Needed: Habitat Cards Organism Cards

This game can be played indoors or outdoors, and is best in an open area.

Vocabulary to review before the game: Habitat Riparian Sandhill Vernal pool aquatic terrestrial Woodland Forest

If you have access to the outdoors, take the children to areas with varying habitats and play each round in a different habitat after talking about what makes each habitat unique and which animals might thrive there.

Divide the cards in a way that each card has a match ensures each student has one card. For example if you have 10 students, ensure that you have 5 pairs of matching cards, and each student gets one card.

Game Play:

Ask each student to review their card. They have either a habitat or an organism. Ask each student to think about what type of habitat or organism might match with their card. Without showing the card or saying the item outright, ask the students to mill around and describe their card to other students, and listen to the description of other student's cards. For example if one student has a frog card, they should not announce "frog" and instead say, "I have an organism that likes to live in riparian habitats. An amphibian that hops and lays it's eggs in water". When the student finds their match (and both students agree) they raise their hands for the facilitator to check their match. The first to find a match wins, but the game continues until all matches are found. Facilitator can shuffle cards and distribute again for more rounds.

Questions for Reflection:

Could there be more than one possibility for a match?

Can one animal live in more than one habitat?

Can one habitat be suitable for more than one animal?

What are the most important details when matching the animals and habitats?

What was challenging about this game?

Golden Orb spiders spin webs to rest in and catch insects in. They often prefer open woodland or forests with plenty of space between trees. Insects like to be around fresh water, so spiders tend to be in these places as well.

The Carolina Parakeet has been extinct since 1940. They lived in the Longleaf pine forests, nesting in the dead trees and eating the seeds, nuts, and berries of the understory plants in longleaf forests. They received a lot of water from the fruits they ate. When the longleaf pine habitat was harvested, they lost their habitat and quickly became extinct, meaning there are no more animals of this kind living anymore.

Alligators live near freshwater because they like to hid just below the water's surface and wait quietly until a fish or bird lands near by. They snap down on pray with their powerful jaws . They lay their eggs on land barely covered by a layer of earth. They always lay their eggs near the river bank so that their babies will hatch close by.

Humans can live almost anywhere because they build shelters from almost anything and equip them with water. Humans eat plants and animals and need clean fresh water for drinking.

Wild hogs like to live in a group and eat roots and insect larva from under the ground. Hogs will also eat just about anything they can find, and like to keep cool in wet mud. They are most active at night and will rest during the day in mud wallows, or hidden in the tall grass. Hogs tend to follow rivers and streams while hunting for food.

Crayfish feed on insect larva, and the remains of dead fish and animals in the river. They hide under riverbed rocks, and need clean fresh running water to survive.

Blue Jays can be found all over the eastern and central United States. They live in all types of forests and woods. They eat insects and seeds and get most of their water through their food. They make a nest out of twigs in limbs of trees or sometimes on the ground. This bird likes to be the only blue jay family in an area. They also love to bathe their feathers in shallow puddles .Sometimes Blue Jays learn how to find the tiny seeds in grasses and live in open meadows.

Green Anoles are tiny lizards that live all over the south eastern United States. They like to climb around trees, bushes, shrubs, tall grasses and rocks that provide tiny places for protection and excellent hunting ground for mosquitos, gnats, crickets and other insects. Mosquitos and gnats love standing water so this reptile may be found near wet areas.

Painted lady butterflies feed on nectar and pollen from flowers, so they are often found in open meadows. They get the water they need through nectar, and will sometimes sip from shallow pools of fresh water.

Catfish eat insects and the flesh of dead river animals. They hide along the muddy banks of rivers and streams, and often come out at night searching for a meal.

Wildlife Travel Agency – Habitat Review

Objective: Students will be able to create a model of various habitats

Students will be able to describe habitats and habitat needs of organisms.

Set up:

Materials: Poster paper Crayons/markers White board & markers

This activity is best done at desks or tables. Divide the group into smaller groups.

Introduction:

Review Habitat with the students. Write 4 animals on the board in one column. In the next column assign each team to an animal. Explain that they have to imagine that they are that animal, who is searching for the perfect habitat. Now, make a third column, and assign each team an animal to Advertise to. See example bellow:

Animal Traveler (Imagine you are…)	Team	Travel Agency Client (Create a travel plan for…)
Bengal Tiger	John, Mary, Susie	Bobcat
Bobcat	Becky, Ellie, Chris	Mountain Lion
Siberian Tiger	Moe, Justin, Ashley	Bengal Tiger
Mountain Lion	Carrie, Steve, Larry	Siberian Tiger

Exploration/ Application:

Explain that each group will have to make a travel agency for their assigned client. They need a poster or brochure advertising the habitat to the client, a short skit ”elevator pitch” and be prepared to answer any questions the client may have.

Allow 15-20 minutes for the groups to come up with the parts of their travel agency and review.

When the creations are finished have each group present to the group, with the animal traveler able to ask questions at the end. Have each traveler decide if they would travel there or not, and explain why.

Questions for Reflection:

What was the easiest part of making a travel plan? of choosing a habitat?

What surprised you about the activity?

Why is it so important to have healthy habitats?

Do all the animals in this activity have healthy habitats in the world?

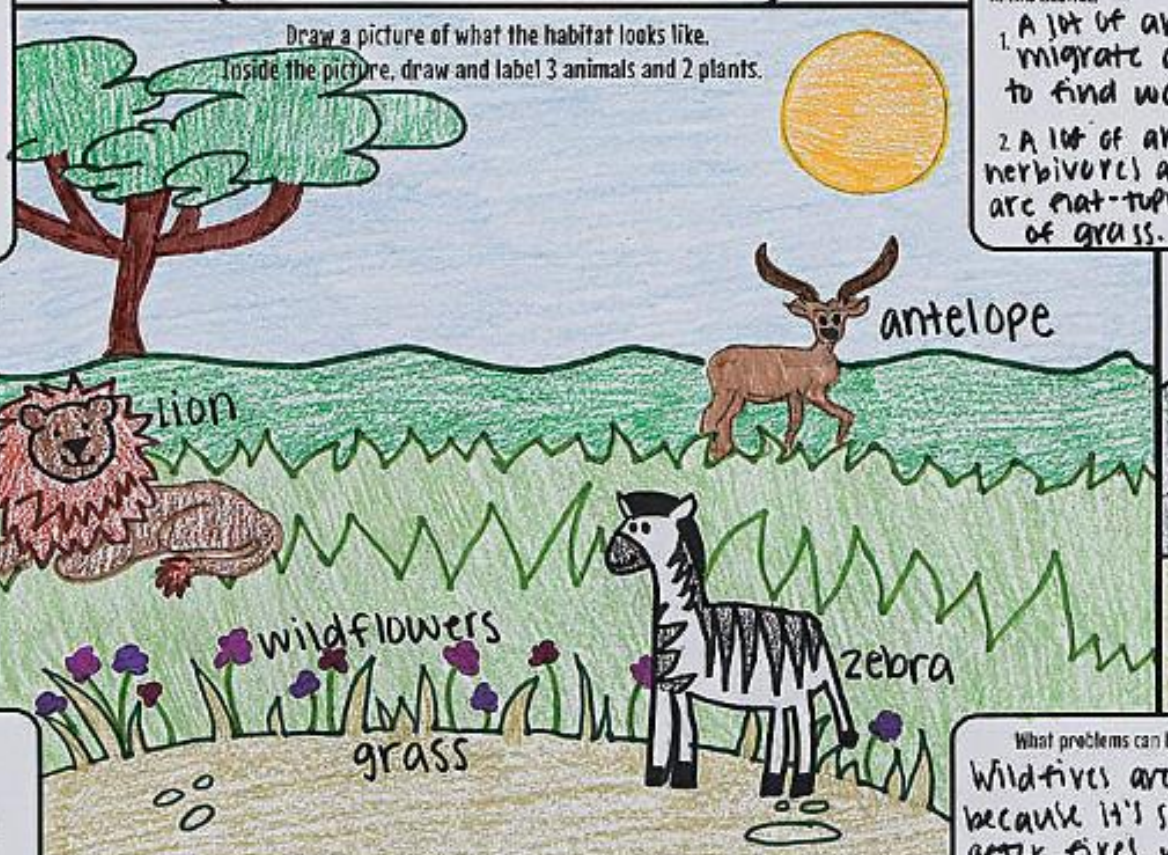
All About A Habitat

Name of habitat: grasslands

What type of weather does the habitat experience?

Grasslands are dry and do not get a lot of rain.

Draw a picture of what the habitat looks like.
Inside the picture, draw and label 3 animals and 2 plants.



List 2 adaptations the animals must do in order to survive in this habitat.

1. A lot of animals need to migrate across grasslands to find water.
2. A lot of animals are herbivores and their teeth are flat-topped to eat a lot of grass.

List 2 interesting facts about this habitat.

They are found in the
1. middle of continents, between mountains and deserts.
2. Many of the plants here are grasses because they don't need a lot of water.

What problems can be found in this habitat?

Wildfires are a problem, because it's so dry. But after fires, nutrients are released into the soil and plants grow back fast.

Intro to Advocacy

From Team Up For Tigers Unit 1 Lesson 4.

Objective:

Students will be able to define advocacy

Students will be able to practice writing informed advocacy letters.

Set Up:

Materials: Lined Paper Pencils Research Materials Letter Template
Info about local representatives Addressed 10X13 envelope Crayons/coloredpencil

Set up an area for a lecture style lesson. Each student prepared with paper and pencil.

Vocabulary to Review before:

Advocacy Advocate State Representative State Senator Legislature

Introduction:

Start discussion by defining advocacy

Advocacy: public support for or recommendation of a particular cause or policy

Use an example of a teacher advocating for a student by writing to the super intendent that students need more paper in the classroom. When the teacher explained a challenge to someone who could change the situation, the teacher advocated for the student.

One can also be an advocate by helping other people to be informed. A dentist may advocate for using floss to help people have healthier teeth. The dentist may tell people facts about how much healthier their teeth would be if they used floss regularly, or tell them about how flossing works.

Now that you know what advocacy is and the role of an advocate, Let's see if we can do some advocacy.

Exploration – Application:

Continue discussion by asking examples of important things students would like to advocate for. Take several examples.

Ask if students learned anything new today that they would like to advocate for.

Now that we know we can be advocates, who can we advocate to? Take some examples.

Let the students know that later in the week we will be making advocacy art to advocate to people who visit the preserve.

Today we will learn how to advocate to our legislatures. Write on the board who the current local and federal legislatures are. Let the students know that you will be sending an envelope of their advocacy letters to a member of the legislature. Encourage them to use the template if they wish, and read the example. Write a structure on the board.

Dear Honorable _____.

I am writing to …….

A fact about your topic (to inform).

I hope that when you can, you will also advocate for topic because….

Thank you for time.

Sincerely, Name and Age.

Let students know they can draw a picture on the back if they wish.

Allow students time to write their letters and draw pictures. When they are ready have them put their letters in the addressed envelope.

Questions for Reflection:

What are some ways you already advocate in your every day life?

What do you think will happen when the member of legislator gets the envelope?

What are some other ideas to advocate for wildlife?

TIGERS UNITED

Nature as Teacher
The Margaret H. Lloyd SmartState™ Endowment

Dear Honorable Senator Penry Gustafson

I am writing to advocate for local wildlife. Apex predators like bobcats help keep the ecosystem healthy. Across the United States, bobcat populations are increasing due to the increase of valuable habitat that protects not only bobcats, but many other important species as well. I hope that whenever possible you also advocate for local wildlife and the research that helps people learn about and protect wildlife across the globe. Thank for your time.

Sincerely,

Leoncia Cruz

Age: 32

TIGERS UNITED

Nature as Teacher
The Margaret H. Lloyd SmartState™ Endowment

Dear _____

Sincerely,

_____

Age: _____

Culture & Conservation

Tree Stories

Becoming Stewards (Citizen Science)

Cultural Crafts

Adapted from cultural craft activities in "Team Up for Tigers"

Objective: Students will be able to explore cultural crafts of the tiger range countries of India, China and Russia.

Set Up:

Materials: Review the cultural craft pages below and gather the necessary materials, setting each up at a different station/area. Students will be allowed to rotate through the craft stations and create the craft of their choice or multiple crafts after the story.

Vocabulary to review: Culture

Introduction:

Recall with the group the passport activity. Explain that now we are going to investigate the culture of the tiger range countries. Explain we will start out by reading a story about tigers in India, written by someone from India, and illustrated by an Indian. After the story, students will have the chance to visit the other stations to learn about other cultures and do cultural crafts.

Read the story to the group.

Application/Exploration:

After the story allow the students time to visit the other stations and do the crafts.

Questions for reflection:

How do you think different cultures influence the animals that live there?

What are some cultural aspects of South Carolina?

How does SC culture influence the animals that live here?

How do the animals that live here influence culture?

Russia

Color the Russian Flag

Flag of Russia - Tricolor
Adopted on 11 December 1993.
Rectangular tricolor with three equal-size horizontal bands: the upper one is white, the middle blue, and the lower red.
Many Russians associate white with nobility, blue with honesty, and red with courage or love.
The flag was first used as an ensign for Russian merchant ships and only became official in 1696. According to one source, the choice of the colours may originate from the flag of the Netherlands.

White represents nobility. What does <u>noble</u> mean?

_____

Blue represents honesty. What does <u>honest</u> mean?

_____

Red represents courage. What does <u>courage</u> mean?

Matryoshka Dolls

https://www.activityvillage.co.uk/paper-cup-matryoshka-dolls

What is a Matryoshka Doll?

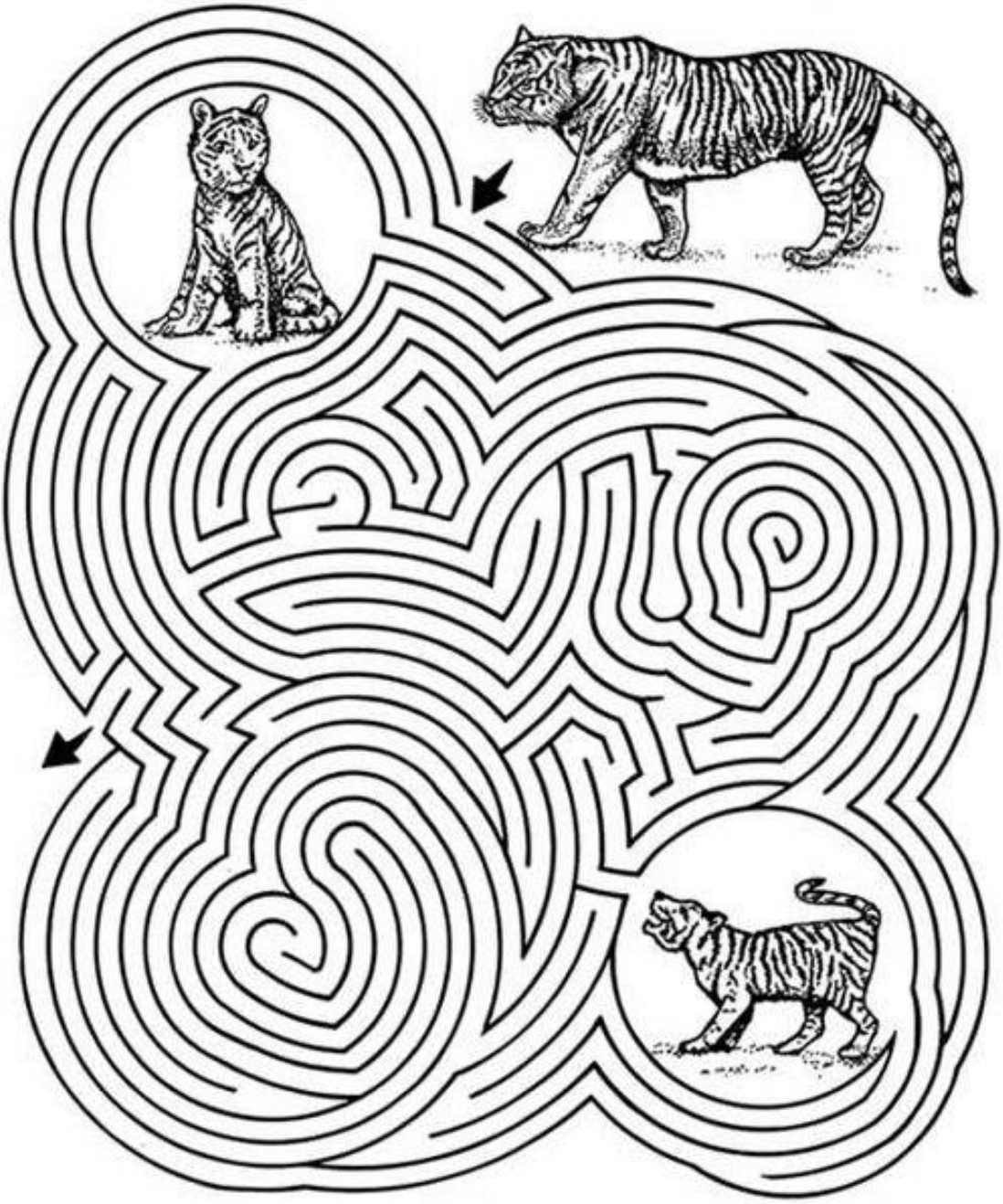
Also known as Babushka dolls, stacking dolls, nesting dolls, Russian tea dolls, or Russian dolls, are a set of dolls of decreasing size placed one inside another. The first Russian nesting doll set was made in 1890 by a folk crafts painter. Traditionally, the outer layer is a woman dressed in a sarafan (a long, shapeless, Russian peasant dress). The figures inside may be of any gender, and the innermost doll is usually a baby. The dolls often follow a theme, like fairy tales.

What do you need to make a Matryoshka Doll?

- Materials
  - Paper cups
  - Gluesticks
  - Colored paper
  - Scrapbook/patterned paper
  - Pens/markers/crayons/colored pencils

How do you make a Matryoshka Doll?

1. Cut circles from the colored paper for faces and decorate with pens/markers/crayons/colored pencils.
2. Cut shawls, bodies, and tummy panels from the scrapbook paper.
3. Glue onto the cups to make a doll on each cup.

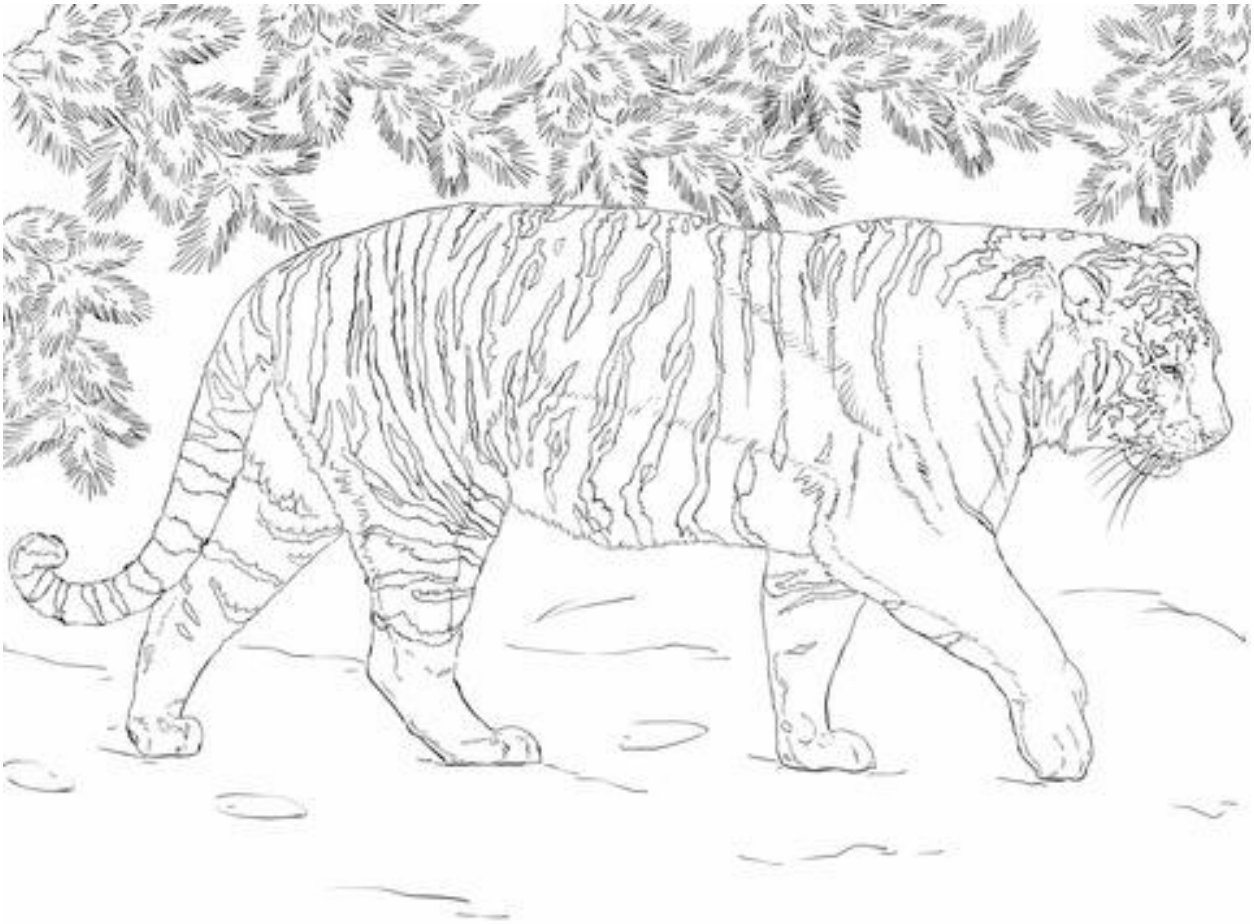


Siberian Tiger

The largest of living cats, the Siberian tiger has been threatened by poachers and by human invasion of its habitat. Serious efforts are being made to protect the few hundred that still exist.

Help the tiger find its cubs before exiting the maze.

Siberian Tiger in the Snow



What are 3 things you know about Siberian Tigers?

1. _____

2. _____

3. _____

Tigers in China

R D S W A P S R L G K D F C A

P E E M P T K E N P T E G H C

S R G R R K A G L Y D N P I L

N Q E I E P U I G N I E H N A

W Y P D T G N T Y H H T A E W

E E C R A A N N C E X A B S S

S L Q E U T N A P T F E I E Y

N S G T W J O I D A X R T Z H

S N B N D P P R H N A H A O I

S E O U U Z Y E W C E T T D M

M D Q H C J L B Y C H V O I U

G N I G G O L I X M H T F A K

O R A N G E S S F Z O I U C B

D E F O R E S T A T I O N O W

N O I T A V R E S N O C A A S

CHINA
CONSERVATION
ENDANGERED
JUNGLE
PAWS
PREY
STRIPES
CHINESE ZODIAC
CUBS
HABITAT
LOGGING
POACHING
SIBERIAN TIGER
THREATENED
CLAWS
DEFORESTATION
HUNTER
ORANGE
PREDATOR
SOUTH CHINA TIGER

Chinese Hand Fan Craft

About Chinese Hand Fans

The oldest existing Chinese fans are a pair of woven bamboo, wood, or paper side-mounted fans from the 2 nd century BC. The Chinese character for "fan" 扇 is derived from a picture of feathers under a roof. A particular status and gender would be associated with a specific type of fan. During the Song dynasty, famous artists were often commissioned to paint fans. In later centuries, Chinese poems and four-word idioms were used to decorate the fans by using Chinese calligraphy pens. In ancient China, fans came in various shapes and forms (such as in a leaf, oval, or half-moon shape), and were made in different materials such as silk, bamboo, feathers, etc.)

What do you need to make a hand fan?

- Materials

o A long piece of paper (preferably legal paper)

o Paper clips

o Gluestick

o Markers, pens, crayons, or colored pencils (for decoration)

How do I make a hand fan?

1. First, use your markers to decorate both sides of the sheet of paper.

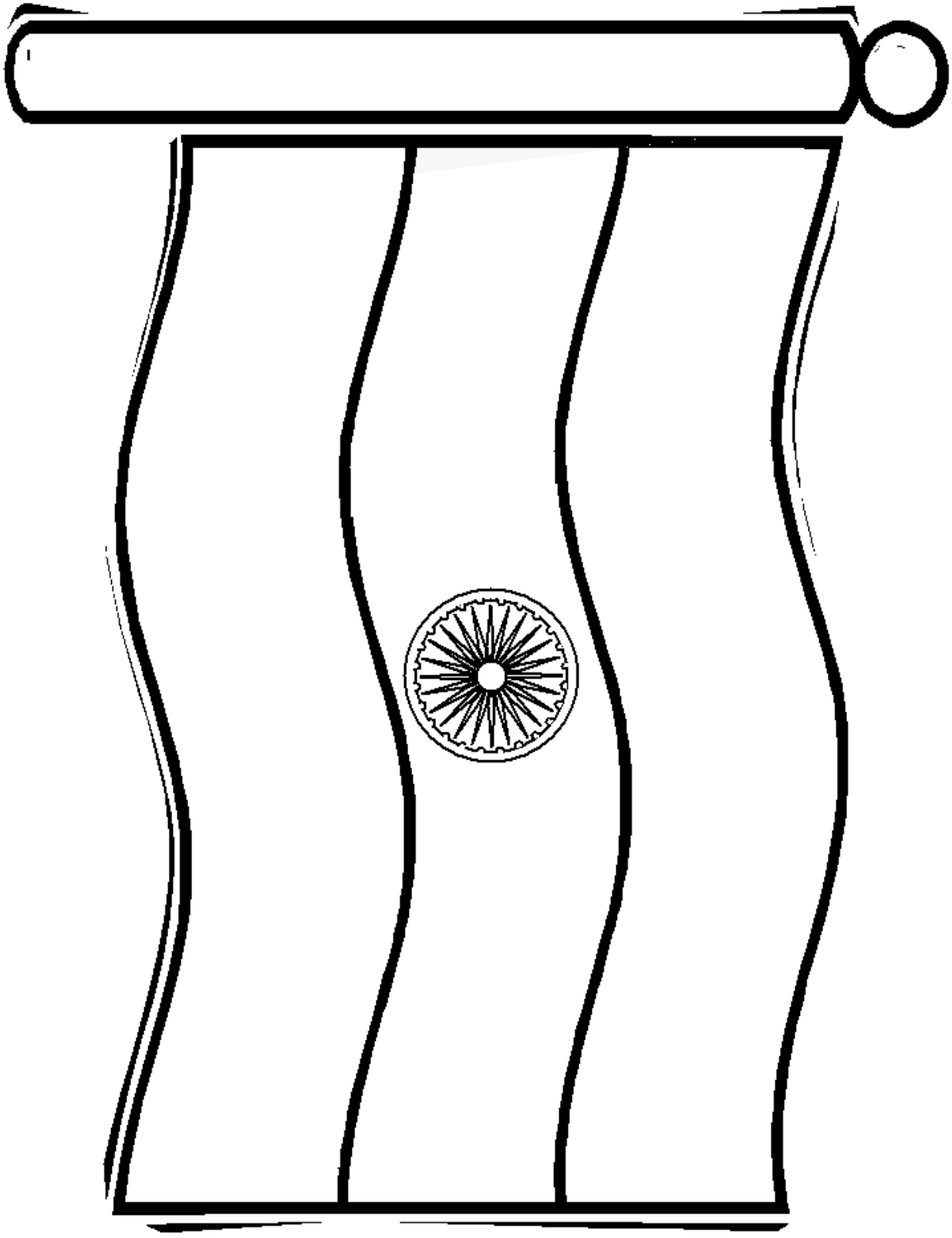
2. Starting on the short side, evenly fold your piece of paper back and forth (about 1-inch folds) accordion style.

3. Pinch the bottom of the folded paper to gather it together and make a small fold up.

4. Use your paper clip to seal the bottom closed, and add some glue to ensure it will stay.

5. Gently unfold the top of the accordion to reveal your decoration, and enjoy!

Color the Indian Flag



Jess Perna

Source: Inspired by Aparna @ Weaving Ideas, "Diwali Craft: Paper Plate Rangoli Idea for Kids" (http://www.theweavingideas.com/2016/10/diwali-craft-paper-plate-rangoli-idea-for-kids/)Rangoli is such a beautiful Indian tradition. Typically, you use colored rice flowers and either draw or use patterned sieves to trace beautiful designs onto a surface, usually the front of your house where everyone can admire it during the festive season. So how do you bring that activity to your child during craft time? Rangoli"¦.painted on a paper plate?

Materials Paper plate, preferably white markers Pencils to draw your design on the plate or stencils, if you have them.

Method Step 1: Use a pencil or a stencil to draw a rangoli pattern onto your plate. .Step 2: Now comes the fun part. You have prepped your plate and have your design stenciled out. Go ahead and marker swirls of color over them to form a beautiful rangoli pattern.

Or start by tracing your design on the plate with a pencil. Step 2: cut out strips and bits of colored craft paper, to fit your design. Go wild with color, craft time is *all* about color. Step 3: Next, layout the colored paper over the stenciled design and make sure all the bits go where they need to. Step 4: Start gluing the bits of paper where they belong.

Longleaf Tree Stories

Adapted from SC Project Learning Tree

Objective: Students will be able to define Keystone Species

Students will able to recall important characteristics of longleaf environments

Set up:

Materials: Tree Cookies Parts of a tree cookie poster blank paper markers

This activity can be done in a classroom setting or sitting on the ground using clipboards.

Be sure every child or small group has a tree cookie, blank paper and some markers.

Vocabulary to review: narrative parts of a narrative keystone species phloem xylem Cambium bark pith sapwood heartwood tree growth ring

Introduction:

Facilitator explains that here in SC, Longleaf is a Keystone Species. Review some Longleaf facts:

Longleaf Pine Talking Points:

Longleaf pine forests once covered 90 million acres spanning from present day Virginia, down to Florida, and stretching into Texas. After decades of fire suppression and intense logging, only about 6% of the highly fragmented forest remains. Since 2010, over three million longleaf pine trees have been planted by the National Forest Foundation to help restore the forest to its former range.

Longleaf pine trees are very tall, usually reaching heights of 98 to 115 feet. The name comes from their needles, which are the longest of the eastern pine species. These needles grow in bunches of three and are 8 to 15 inches long on mature trees.

Longleaf pine forests are home to hundreds of unique plant and animal species. Approximately 900 plant species are only found in longleaf pine forest ecosystems, and there are over 20 other threatened or endangered species, including the gopher tortoise. The gopher tortoise is federally considered threatened in it's western range, and all states throughout the species range offer protections. The gopher tortoise is considered a keystone species, as burrows dug by the tortoise are relied upon by over 350 other species, such as mice, snakes, frogs, and small mammals.

Gopher tortoises are 9 to 11 inches long when fully grown, and usually live 40 to 60 years and spend around 80% of their lifetime in their burrows. Burrows are typically 15 feet long, and 6.5

feet deep, and gopher tortoises often use multiple burrows over the course of their lives. Burrows maintain a steady temperature and humidity throughout the year, offering protection from the elements and threats like hurricanes and fire. Longleaf pine forests are ideal habitats for gopher tortoises, with their sandy soils, open and grassy forest floors, and lots of sunlight. Longleaf pine forest ecosystems also support the plants that compose the gopher tortoises' diet.

Working with the US Forest Service, The Longleaf Alliance, and donors such as Endangered Species Chocolate, the National Forest Foundation plants longleaf pine trees, helping to restore the longleaf pine range, improve ecosystem and habitat connectivity, and help reestablish habitat for many species, including the gopher tortoise.

Longleaf pine is an evergreen conifer that got its common name for having the longest leaves of the eastern pine species. The needlelike leaves, which come in bundles of three, can grow up to 18 inches (46 centimeters) long. Mature trees stand 80 to 100 feet (24 to 30 meters) tall. The single trunk, which is covered in thick, scaly bark, reaches up to three feet (0.9 meters) in diameter. The trees naturally prune their lower branches and grow almost perfectly straight.

RANGE

The historic range of the longleaf pine once extended from southeastern Virginia to Florida, west through Louisiana to east Texas. Today the trees are only found within small patches of this range. Longleaf pines can survive in a range of habitats, but they prefer sandy, dry, acidic soils ranging in elevation from sea level to 2,300 feet (700 meters). They are intolerant to shade and require sunlight to grow. When frequent fires sweep the forest, longleaf pines dominate and sometimes form pure stands.

LIFE HISTORY

Longleaf pine seeds develop in cones and are dispersed by wind. When they fall to the ground, they must come in contact with soil to germinate. Historically leaf litter and debris were cleared away by forest fires that were sparked during lightning storms. When fire is suppressed, ground cover buildup prevents seeds from reaching the soil, and they can't germinate. The seeds that are able to take root undergo an interesting life cycle that differs from most other conifers. Rather than spending its first few years growing in height, the longleaf pine goes through a grass stage.

From the surface, the grass-stage plant appears to be a large clump of needles that grows very little. The real work, however, is going on underground. During the grass stage, the longleaf pine starts to develop its central root, called a taproot, which will be up to 12 feet (3.7 meters) long at maturity. After going through the grass stage, longleaf pines begin to grow in height. Both mature trees and grass-stage specimens are fire-resistant. The lifespan of a longleaf pine spans several centuries. These slow-growing trees live for over 300 years, and they may take up to half that time to reach their full size.

CONSERVATION

Longleaf pines, which once covered an estimated 90 million acres, now cover less than 3 percent of their original range. This tree was once so abundant that it seemed like an inexhaustible resource to early settlers. Forests of longleaf pines were cleared to make space for development and agriculture. The lumber, which is of exceptional quality, was used for building ships and railroads. Most of the longleaf pines were gone by the 1920s, and they had a hard time coming back on their own because of fire suppression. Rather than replanting the longleaf pines, foresters replaced them with faster-growing pines that would produce more short-term economic benefits.

Restoration of longleaf pine forests has become a major conservation priority in recent years though. More than 30 endangered and threatened species, including red-cockaded woodpeckers and indigo snakes, rely on longleaf pines for their habitat. Additionally, longleaf pines are more resilient to the negative impacts of climate change than other southeastern pines. They can withstand severe windstorms, resist pests, tolerate wildfires and drought, and capture carbon pollution from the atmosphere. A number of nonprofits, government agencies, and private landowners are collaborating to restore longleaf pine forests.

Facilitator explains the parts of the tree, and parts of a narrative, matching them up. Facilitator helps the students “read” the tree cookies:

A tree cookie is a small slice of a tree. The center is called a pith. This is where the tree first started growing, and every ring going outward represents a season of growth. Winter season rings are often dark and thin, while summer season rings are wider and lighter. Sometimes trees grow straight up from the ground, in which case the average number of rings from the pith to the bark on each side of the tree cookie would be the same. Sometimes trees lean, toward light, nutrients in the ground, or toward more stable ground. In this case the tree fills one side of the growth ring with more matter than the other allowing it to lean.

Sometimes trees can grow very old and have many rings. It is not uncommon for a tree that is 30 years old to only be as thick as a person’s arm. When studying many tree cookies and/or tree cookies that are from very old trees, we need to estimate the tree’s age or number of rings by using an average. We know if, on average, there are 4 rings per centimeter from the pith, and the whole tree cookie is 40 centimeters from the pith to the bark, the tree is about 160 years old.

Knowing how many rings on average one tree has tells us how fast a tree is growing. We can infer why a tree may be growing fast or slow. We can study a collection of tree cookies to learn how different types of trees grow, how a forest in particular may be growing, or examine weather/ climate.

Sometimes on the inner bark we can see squiggles or doodles. These are tunnels made by bark beetles. Bark beetles like to eat pine Cambium , just inside the bark. The most detrimental part about a bark beetle infestation is the holes they leave behind. These holes leave the inside of the

tree vulnerable to bacteria, virus, and fungus. It is common to see a blueish tint to the cambium and sapwood if a fungal infection was introduced.

Exploration/application:

Now that you know how to “read” a tree cookie, let’s make the narrative reflect our own lives. If you are 10 years old, draw 10 tree rings. Pith is the tree’s first growth located in the center- Write where you were born near the pith .

Heartwood supports the tree, just outside the pith- Who in your life supports you? Write this in the heartwood, or color the heartwood their favorite color

Sapwood or Xylem brings nutrients from the roots to the leaves- What is your favorite food or meal to cook?. Write this in the sapwood.

Cambium is the layer of actively growing cells located just inside the phloem. How are you growing right now? What is something you love doing or something that you are just learning how to do?

Phloem brings nutrients from the leaves to the rest of the tree and is located just inside the bark. What is your favorite drink ? Write this in the Pholem.

Bark helps protect the tree- What helps you feel protected? A family member, friend, pet, house? Write this in the Bark of the tree.

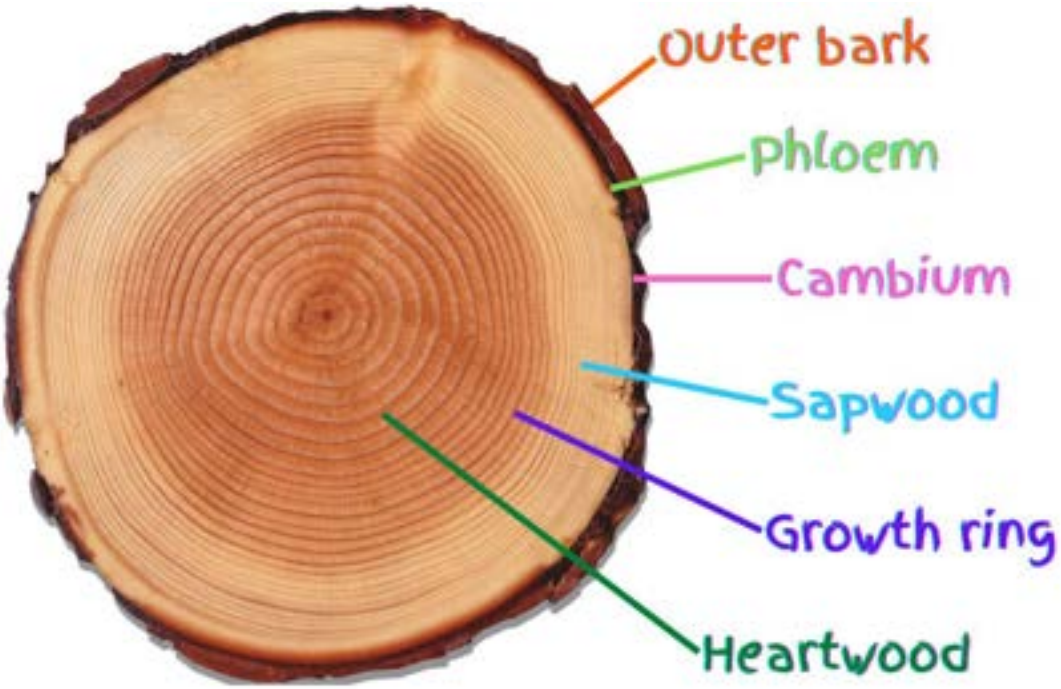
Questions for reflection:

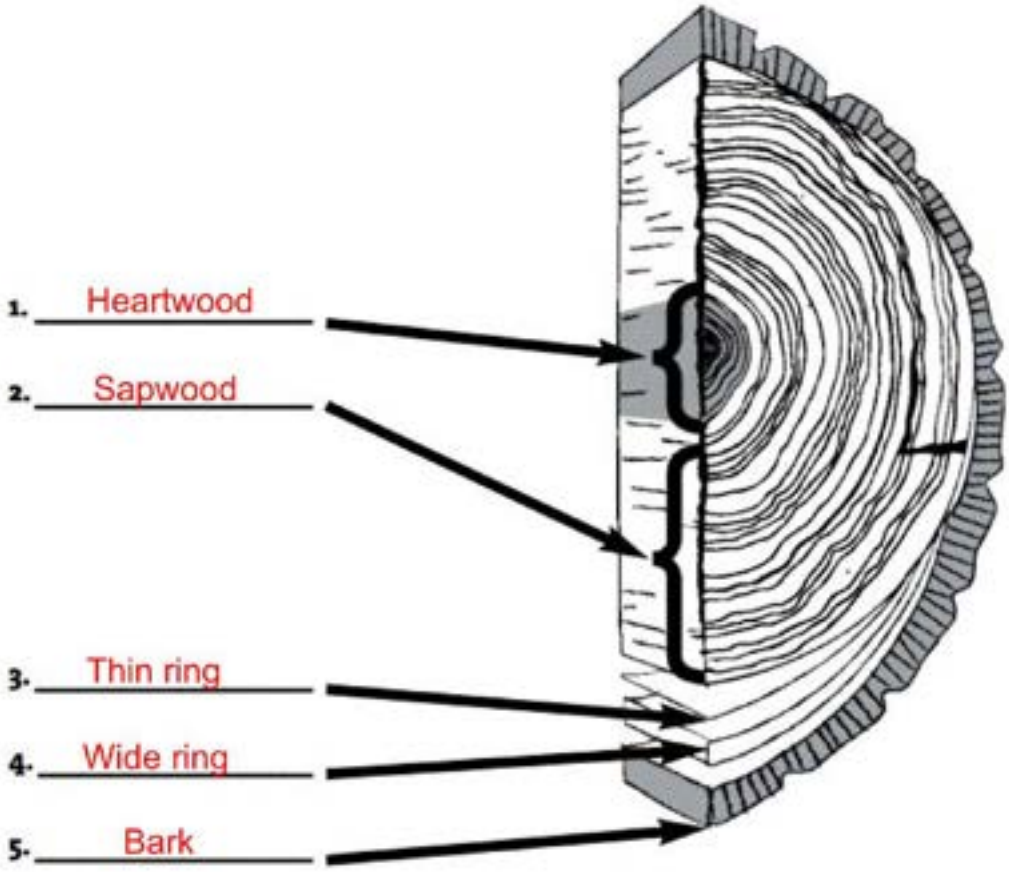
Was everyone’s story the same? Would everyone’s tree cookie look the same? Were there similarities? Differences?

How can we tell what happened to a tree during its life?

How does longleaf influence the wildlife in the area?

What makes longleaf habitat?


Outer bark
Phloem
Cambium
Sapwood
Growth ring
Heartwood


1. Heartwood
2. Sapwood
3. Thin ring
4. Wide ring
5. Bark

Advocacy Art

Objective: Students will review definition advocacy.

Students will review different types of advocacy Art

Students will be able to practice advocacy Art.

Set Up:

Materials: Examples of Art, Art supplies Recycled materials for art

This project best done with students at tables or desks.

Introduction: Recall the advocacy and thank you letters from the previous unit. Explain to the students hat we can try to design art that informs, or emotes a feeling like gratitude. Go through some examples with the group:

“Kindred Spirits”

Kindred Spirits is a large stainless steel outdoor sculpture in Bailick Park in Cork, Ireland. Kindred Spirits commemorates the 1847 donation by the Native American Choctaw People to Irish famine relief during the Great Hunger, despite the Choctaw themselves living in hardship and poverty and having recently endured the Trail of Tears. The sculpture consists of nine 20-foot (6.1 m) stainless steel eagle feathers arranged in a circle, no two feathers being identical, forming a bowl shape to represent a gift of a bowl of food. This art was made to communicate gratitude.

“Trash Transformed”

This sculpture was made out of plastic found on beaches, and assembled to look like a shark. The artists wanted to communicate just how much plastic ended up in the ocean, and inform people how it I influencing the habitat of important apex predators like sharks. This piece was made to bring awareness to habitat destruction caused by trash pollutants.

Exploration/ Application:

Now that we know what advocacy art, lets think about how we can make our own.

Facilitator can write on the board the creative cycle and go over the steps with the group.

Inspiration/observation: When you notice something that inspires you to learn more or do more. What was the inspiration for the above pieces? What are some things you are inspired by from spending time at the preserve this week?

Exploration: Learn more about the subject by doing research, talking to others about it, or studying it in the field.

Plan: Plan out a way to convey your message, inform others, raise awareness or inspire feelings about the topic.

Create: Create your idea!

Reflect/share: After your creation is complete, reflect on if your piece came out how you wanted it. Which parts were challenging, which were easy. Share it with others and listen to what they think and how it makes them feel.

Questions for Reflection:

What are some ways you can share your art?

What does it mean to you? Will it mean the same to others?

What are some ways you can make other art that inspires?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Becoming a Steward

Objective: Students will be able to identify different ways to becoming stewards.

Students will be able to practice being stewards of the environment.

Set Up:

Materials:

Vocabulary to review: Citizen Science Steward

Introduction:

Recall that we previously talked about people whose professions involved steward, now we will learn about different ways we can become stewards in our everyday lives.

Start out by defining Citizen Science: the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

Give some examples of current, local citizen science projects happening in your area:

Though DNR: On their website, DNR lists a lot of ways you can help monitor species like various mammals, birds, fish and even insects. One citizen science survey that would be easy to participate in here at the preserve would be Southern Fox Squirrel Survey– Every other year, a fox squirrel sighting survey is conducted by SCDNR as part of the Small Game program. Sign up and help before your next hunting or hiking trip! Read about the Southern Fox Squirrel and contact the small game biologist to get on the mailing list. Show the students the survey information and walk them through the process. Why would it be important to help monitor a species like the fox squirrel? Why is it important to record the location and time of the sighting?

Through National Geographic: On their website, National Geographic has various citizen science projects you can get involved in. One is “nest watch” where you can help monitor nests you may see in your backyard or in local natural spaces. Show the students the materials from nest watch if you have access to the internet and walk them through the process. Why would it be important to record this information?

Exploration/Application:

Practice being a citizen science by recording what you see around you. Choose to look for something specific – mushrooms, birds, mammals, reptiles or insects. Use the mini citizen science book to help you record your data. Remember the more detailed and specific you can be, the more useful your data!

Questions for Reflection:

What are some other ways you can become a steward?

Have you ever heard of any other citizen science projects?

Why is it important to be a steward of yourself? What does it mean to steward yourself?

Why is it important to steward other people? What does it mean to steward other people?

Why is it important to steward place? What does it mean to steward place?

What are something you can do at home to continue stewardship?

SMALL GAME PROGRAM

SC DEPARTMENT OF NATURAL RESOURCES

2022 Fox Squirrel Sighting Survey Summary

Introduction

Due to concern about the population status of the fox squirrel (*Sciurus niger*) across the Southeast, a fox squirrel sighting survey was initiated in South Carolina in 1989 to document distribution, habitat preference and relative abundance for this species. Fox squirrels prefer habitat consisting of mixed stands of longleaf, loblolly and shortleaf pine, hardwoods and bottomlands. They use tree cavities and leaf nests both as escape and for rearing young. Fox squirrels also use cavities in a variety of tree species especially in the winter and spring. The widespread loss of preferred habitat is detrimental to fox squirrels throughout the Southeast. Practices such as large-scale monoculture replacement of longleaf pine by loblolly pine, shortened stand rotation, loss of natural hardwood stands and fire suppression have contributed to habitat loss. Changes in agribusiness and increased urban sprawl have also replaced suitable fox squirrel habitat.

The fox squirrel sighting survey has been conducted in even-numbered years since 1994. This report details information from the 2022 survey.

Methods and Materials

Data cards for recording information were distributed to Wildlife Section personnel of the South Carolina Department of Natural Resources (DNR) and cooperators from the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), the South Carolina Forestry Commission (SCFC) and other potential cooperators. In addition, sightings could be recorded using a smart phone app. Cooperators who wish to use this method of reporting can sign up at https://www.dnr.sc.gov/hunting/smallgamesurvey.html.

From January 1 through December 31, 2022, participants were asked to record date, county, location, color phase and associated habitat type each time a fox squirrel was sighted. Participants were asked to report sightings during the course of their normal work activities and not to drive purposefully through areas of known fox squirrel concentrations.

Habitat types were delineated as follows: pine plantation <15 years old (PPy), pulpwood sized pine plantation (PPp), sawtimber sized pine plantation (PPs), mixed pine-hardwood <30 years old (PHy), mixed pine-hardwood 30-50 years old (PHm), mixed pine-hardwood >50 years old (PHo), bottomland hardwood 30-50 years old (BHy), bottomland hardwood >50 years old (BHo), upland hardwood 30-50 years old (UHy), upland hardwood >50 (UHo), and agricultural or other open field (FD).

Results and Discussion

A total of 383 (an increase from 113 in 2020) individual fox squirrel sightings were recorded in 21 counties (increased from 14 counties in 2020) across South Carolina during the 2022 calendar year. We believe the increase in reporting rate for the 2022 period is more accurate than the 2020 survey and a better representation of the current population. The 2020 period was directly related to the national pandemic (COVID 19) and more likely resulted in decreased travel and observations across the state.

Fox squirrel sightings were higher during the first six months with the most sightings occurring in May (82) followed by April (72), March (69) and February (36) respectively. Fox squirrel sightings showed a noticeable decline during the months of August, September, and October (Figure 1).

The 2022 survey had fox squirrel sightings most prevalent in mixed pine-hardwood habitats (greater than 50 years old and 30-50 years old). This is to be expected as maturing/old mixed pine-hardwoods are a preferred habitat for fox squirrels. However, fox squirrels were also observed in other habitat types including sawtimber sized pine plantation and agricultural or other open field (FD), or orchard (FDo) (Figure 2).

Fox squirrels are the largest species of squirrel in North America. This, combined with their multiple color phases, makes them very noticeable and intriguing to those who encounter them. In the 2022 survey, gray (257 sightings) was the dominant color phase observed followed by black (120 sightings) and brown (6 sightings), respectively (Figure 3). Chesterfield County had the highest number of sightings with 93, followed by Richland (81), Berkeley (59), Hampton (39), and Calhoun (28) respectively (Figure 4).

In the past, counties with the most sightings often contain large areas of multiple suitable habitat types for fox squirrels. Fort Jackson Army Base, Richland County, includes a large mature longleaf pine area. Hobcaw Barony, Georgetown County, consists of several hundred acres of longleaf and mixed pine-hardwood forests. Chesterfield County is home to Sand Hills State Forest and Carolina Sand Hills National Wildlife Refuge, two large expanses of mature longleaf pine habitat. Berkeley and Charleston Counties contain the Francis Marion National Forest and several large low country plantations, and Colleton County is home to Donnelley Wildlife Management Area and several large low country plantations. There was a single fox squirrel sighting in Oconee County for the first time since the Fox Squirrel Sighting Survey 33 years ago. Most of the sightings reported for 2022 come from the Santee and Edisto River drainages (Figure 5). Only 3 counties in South Carolina have not reported a fox squirrel sighting over the 33-year lifetime of this survey (Greenville, Cherokee, and York Counties).

Before estimates of relative abundance can be determined, survey methodology will have to be adjusted in order to quantify effort expended by cooperators during the survey. Other confounding variables including weather, suitable habitat available for fox squirrels and observer numbers and visibility will have to also be controlled. Combinations of these factors may be responsible for skewing results in any given area of the state.

Conclusions and Recommendations

In South Carolina, fox squirrels seem to be prevalent where suitable habitat occurs. They have a state rank of S3, vulnerable, and a global rank of G5, secure (NatureServe 2023, Item 1). South Carolina's NatureServe rank is likely due to low participation during the COVID19 pandemic. It is recommended that this survey be continued in order to document changes in distribution and relative abundance of fox squirrels in South Carolina.

The South Carolina Department of Natural Resources, Small Game Program would like to thank all participants in the 2022 Fox Squirrel Survey. It is through their commitment that SCDNR can conduct these surveys. Copies of these small game survey reports can be obtained online at https://www.dnr.sc.gov/hunting/smallgamesurveys/reports.html.

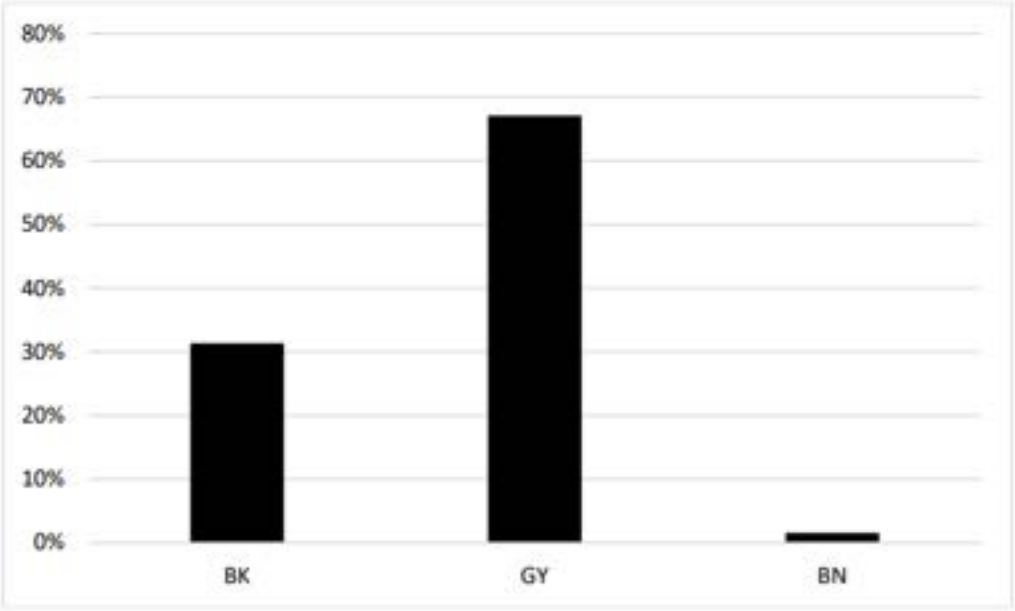

Figure 3. Color Phase (%), SCDNR Fox Squirrel Sighting Survey, 2022.

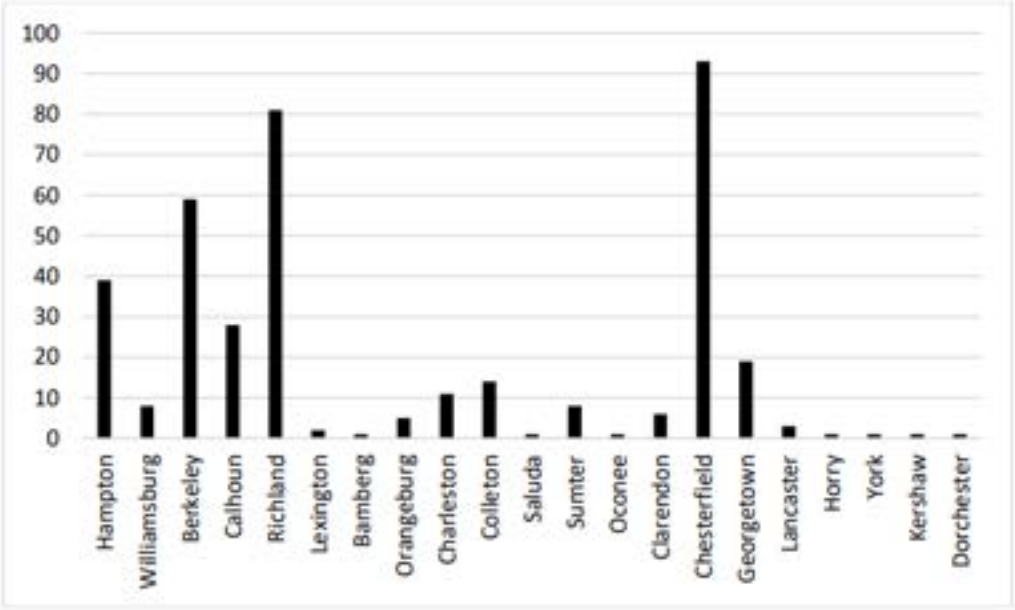

Figure 4. Number of Fox Squirrel Sightings by County, SCDNR Fox Squirrel Sighting Survey, 2022.

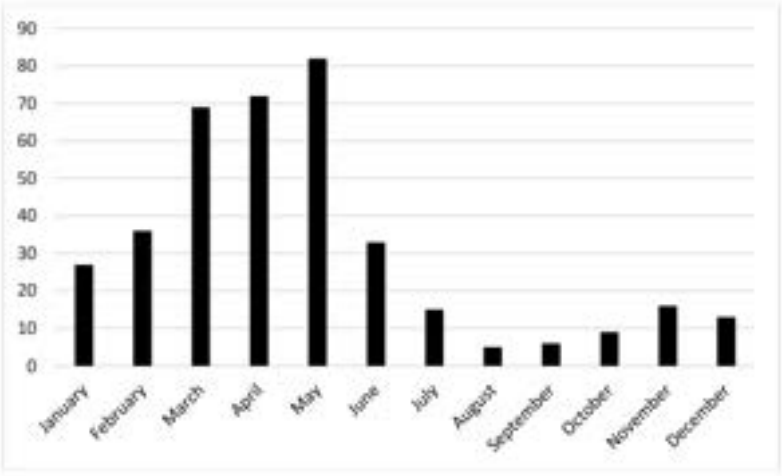

Figure 1. Fox Squirrel Sightings by Month, SCDNR Fox Squirrel Sighting Survey, 2022.

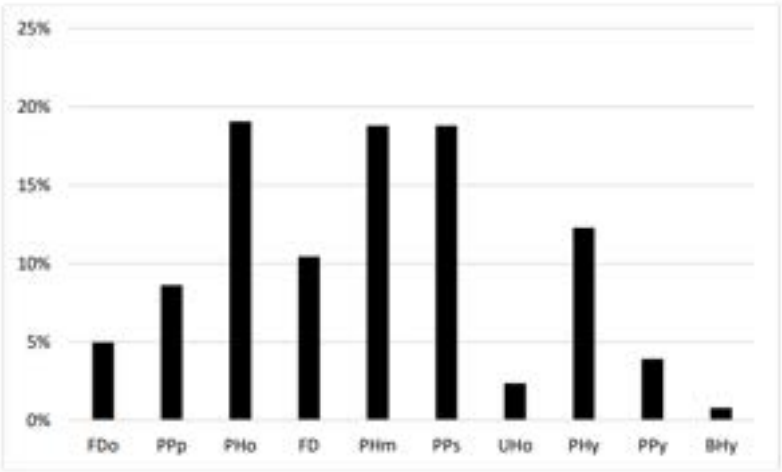

Figure 2. Fox Squirrel Sightings (%) by Habitat Type, SCDNR Fox Squirrel Sighting Survey, 2022.

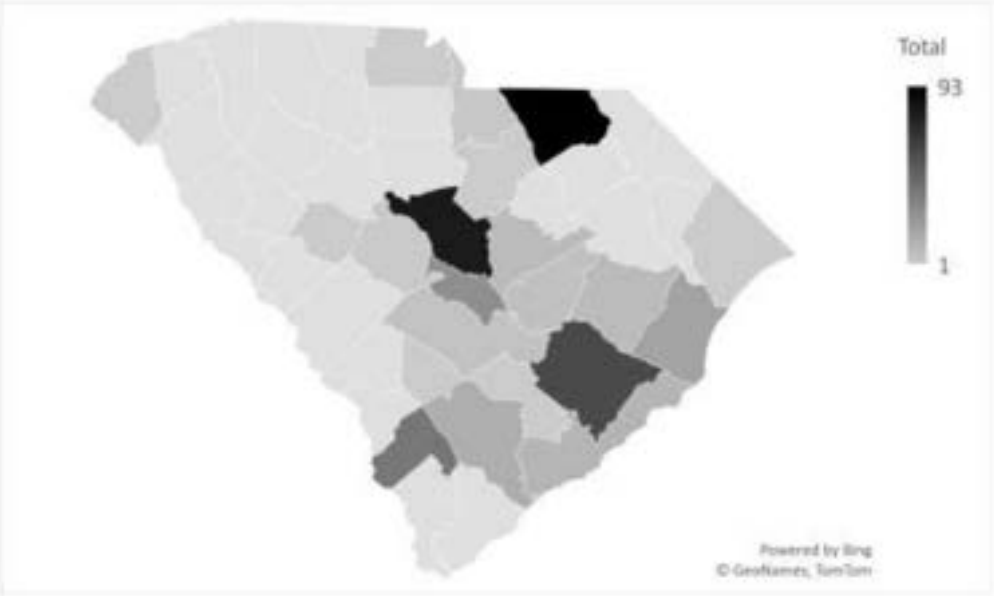

Figure 5. Counties reporting sightings by reported total for 2022.

Item 1. NatureServe Conservation Status February 2023.
https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.105485/Sciurus_niger

Be a Citizen Scientist!

Citizen Science is a partnership between the public (that's you!) and scientists.

You don't have to be a scientist to work on a real scientific study! Citizen Science enables people from all walks of life to advance scientific research.

SC Adopt-a-Stream

You can become a part of an active network of watershed stewardship, engagement, and education through hands-on involvement and a certified training process. Through their data collection, SC AAS volunteers play a needed role in monitoring and tracking water quality in areas not frequently monitored. As volunteers provide more baseline information about stream conditions, natural resource managers can make more informed decisions and use resources more wisely to solve water pollution and ecological stress in their communities.

Get going at https://www.clemson.edu/public/water/watershed/scaas/

Tracking Insect Species in SC

Are you looking for an opportunity to volunteer your time helping wildlife? Are you willing to help collect data on species and their habitats? SC Department of Natural Resources has opportunities for the public to help gather information that biologists and researchers can use in assessing species and their habitats.

Get going at https://www.dnr.sc.gov/volunteering/insects.html

SC Aquarium Citizen Science App

Make a difference by contributing to the study of local environmental issues like plastic pollution, sea level rise or invasive species. The app features a collection of environmental research projects led by professional scientists at the South Carolina Aquarium who need your help collecting data. Contribute to projects of your choice quickly and easily from your mobile device.

Get going at https://scaquarium.org/conservation/citizenscience/

Want other options?

Visit **www.scistarter.org** to find a project that interests you! There are HUNDREDS of projects that you can choose from!

BIRDS

Species	Location	Date/Time	Notes

CITIZEN SCIENCE

Nature as Teacher

The Margaret H. Lloyd
SmartState™ Endowment
at Clemson University

DATA BOOK

NAME:

BIRDS

Species	Location	Date/Time	Notes

CITIZEN SCIENCE

Nature as Teacher

The Margaret H. Lloyd
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DATA BOOK

NAME:

FUNGUS

Species	Location	Date/Time	Notes

INVERTS

Species	Location	Date/Time	Notes

FUNGUS

Species	Location	Date/Time	Notes

INVERTS

Species	Location	Date/Time	Notes

Related Games

Understanding Apex Predators

Game: Carrying Capacity
Association of Fish & Wildlife Agencies. (2020). Carrying Capacity In Project Wild: K-12 curriculum & activity guide (4th ed., pp. 55–60).

Game: Classic "Sharks & Minnows" changed to "Tigers & Prey"

Game: "Predator; The Forest Food Chain Game" by Ampersand Press

Where is Wildlife?

Activity: Map That Habitat
Association of Fish &; Wildlife Agencies. (2020). Map that Habitat In Project Wild: K-12 curriculum & activity guide (4th ed., pp. 73–77).

Game: Oh Dear!
Association of Fish & Wildlife Agencies. (2020). Oh Deer! In Project Wild: K-12 curriculum & activity guide (4th ed., pp. 42–50).

Culture & Conservation

Activity: Habitat Heroes
Association of Fish &; Wildlife Agencies. (2020). Habitat Heroes In Project Wild: K-12 curriculum & activity guide (4th ed., pp. 499–502).

Activity: Fabled Fauna
Association of Fish &; Wildlife Agencies. (2020). Fabled Fauna In Project Wild: K-12 curriculum & activity guide (4th ed., pp. 281-283).

Glossary

Adaptation- the process by which a species becomes fitted to its environment

Advocate- a person who speaks or writes in support or defense of a person, cause, etc.

Advocacy- the act of pleading for, supporting, or recommending

Apex Predator- a predator at the top of a food chain that is not preyed upon by any other animal

Aquatic- of, in, or pertaining to fresh water

Bark- the outer covering of woody plants

Cambium- a layer of delicate tissue between the inner bark or phloem and the wood or xylem, which produces new phloem on the outside and new xylem on the inside in stems, roots, etc., originating all secondary growth in plants and forming the annual rings of wood.

Carnivore- an animal that eats meat

Carrying Capacity- Maximum population size of the species that the environment can sustain indefinitely

Citizen Science- the collection and analysis of data relating to the natural world by members of the general public

Conservation- official supervision of rivers, forests, and other natural resources to preserve and protect them through prudent management

Consumers- a person or thing that consumes, in ecology consumers constitute the upper trophic levels. Unlike producers, they cannot make their own food. To get energy, they eat plants or other animals, while some eat both. Scientists distinguish between several kinds of consumers. Primary consumers make up the second trophic level. They are also called herbivores.

Continent vs. Country- a continent is a large landmass that is separated from other continents by the ocean, while a country is a single unit of land situated inside a continent

Culture- the customs, arts, social institutions, and achievements of a particular nation, people, or other social group; the arts and other manifestations of human intellectual achievement regarded collectively

Decomposition- the act or process of decomposing (breaking down)

Ecological Range- the spatial area where a species is found and is supported by the environment.

Food Web- a system of interlocking and interdependent food chains

Forest- a large tract of land covered with trees and underbrush; woodland

Growth Ring- a concentric layer of wood, shell, or bone developed during an annual or other regular period of growth

Habitat- the natural environment of an organism including its food, water and shelter.

Heartwood- the hard central wood in the trunk of a tree

Herbivore- an animal that eats plants

Keystone Species- a species on which other species in an ecosystem largely depend

Legislature- a deliberative body of persons, usually elective, who are empowered to make, change, or repeal the laws of a country or state

Narrative- a story or account of events or experiences

Niche- a place or position suitable or appropriate for a person or thing

Omnivore- an animal that consumes both plants and other animals

Predator- any organism that exists by preying upon, or eating, other organisms

Prey- an animal hunted or seized for food

Photograph- a picture produced by photography

Phloem- the part of a vascular bundle consisting of sieve tubes, companion cells, parenchyma, and fibers and forming the food-conducting tissue of a plant.

Ranger- a keeper of a park, forest, or protected area of land

Riparian- of, relating to, or situated or dwelling on the bank of a river or other body of water

Sandhill- a natural elevation of ridge or sand. Visually, the sandhills are often striking as islands of exposed sand and sparse vegetation in the midst of denser forest. Although soils across the southeastern Coastal Plain are typically sandy, sandhills are characterized by thicker sandy deposits one to twenty-five meters deep.

Sapwood- the softer part of the wood between the inner bark and the heartwood

State Representative- a person elected by a state to serve in the House of Representatives. he main duties of the House of Representatives are co-legislation and checking that the Government carries out its work properly. The House of Representatives also plays an important role in policy-making.

State Senator- a person elected by a state to serve in the US Senate. A state senator speaks with their constituents about problems, concerns or suggestions they have for the district. They take phone calls and listen to citizens who want to share their opinions. They read mail from the people in the district to find out their attitudes towards issues.

Steward- a person who manages property or affairs

Stewardship- the responsible overseeing and protection of something considered worth caring for and preserving

Terrestrial- pertaining to, consisting of, or representing the earth as distinct from other planets

Tree- a plant having a permanently woody main stem or trunk

Trophic Levels- each of several hierarchical levels in an ecosystem

Vernal Pool- seasonal pools of water that provide distinct habitats for certain plants and animals

Wildlife Management- management of natural resources to prevent exploitation, destruction, or neglect

Wildlife Reservation- an area of land that is protected and managed

Woodland- land covered with woods or trees

Xylem- a compound tissue in vascular plants that helps provide support and that conducts water and nutrients upward from the roots