THE JACKSON ZOO

Zoo Connections Curriculum

Survival of the Fittest:
Animals' interactions and adaptations to survive in their habitats

5th grade

Curriculum is aligned with the Mississippi Academic Framework. Lessons and support material are provided in the following areas:

Life Science – 3a, 3e; Language Arts – 2b.4, 3a. 3d.1; Mathematics – 2b; Inquiry – 1d, 1e.

Pre-Visit

Vocabulary Words

Adaptation	Species	Omnivore	Consumer
Food Web	Herbivore	Carnivore	Producer
Decomposer			

Concepts

- Living organisms are interconnected.
- In order to survive and reproduce in their habitats, animals have adaptations.
- Living organisms have adapted to different environmental conditions in order to survive.

Activities

Vocabulary Words

Introduce the vocabulary words to your class. Review their meaning together. You can then pass out the **What's for Dinner? Word Search** for them to complete in class or at home.

The Flow of Energy in a Food Chain

A general rule for the transfer of energy is that 10% is passed onto the next organism in the food chain and 90% is given off as heat and other life sustaining functions. To demonstrate this visually, pull out a full bottle of juice - or any beverage the students like and explain it is an energy gift from the sun. Offer juice to all the students but explain that we can't get energy directly from the sun, so we need the food chain to help us out.

Step 1: Energy is given to the Earth where 90% goes to heating the earth and plants soak up the remaining 10%. Pour 90% of the drink into a different container to symbolize this energy loss given off as heat.

Step 2: Plants need energy to sustain their life. They will use 90% of the energy the sun gave them and pass off the remaining 10% to the animal that eats them. Pour 90% of the remaining drink into the other container.

Step 3: Humans are omnivores meaning we occasionally need to eat meat. The animal that got its energy from plants will pass energy on to us, but not before it uses 90%. Pour 90% of the remaining drink into the other container to show the energy loss.

Step 4: Finally it is our turn to get the energy. Divide the remaining drink up amongst your students and listen to them grumble. Turn this grumbling into a conversation about the flow of energy, the relationship of plants to the number of herbivores, omnivores and carnivores. (There are more plants than herbivores because an herbivore needs to eat lots of plants to get the energy they need). Then you can give the students a drink from the 90% container as a reward for a good discussion.

Eat But Don't Get Eaten

The amount of energy is reduced as it travels through the food chain. This means the top predators have to eat more animals in order to get the required amount of energy they need to survive. Play the following game to demonstrate why we need more producers than herbivores and more herbivores than omnivores, etc.

- Getting Ready
  - Set up a playing field that is between 30-50 ft^2.
  - Set 3-4 lily pads (green pieces of paper) out on the playing field.
  - Sprinkle cooked popcorn all over the playing field.
  - Prepare necklaces for students to wear to show the type of animal they are – mosquito, frog, hawk.
  - Have a snack size baggie available for each student
- Student Roles
  - Half the students are mosquitoes-can fly all over and pick up popcorn
  - Quarter of the students are frogs-must hop to catch mosquitoes
  - Quarter of the students are hawks-soar backwards to catch frogs
- The Game
  - The object is to fill baggies full of popcorn, which represents energy. The mosquitoes can fly around and pick it up but they must watch out for the frogs. If a frog hops up to them and tags them, the mosquito has to give his popcorn to the frog and go sit in an area designated for "eaten" animals. The frog then adds the popcorn to his baggie. The frog must be careful for the hawk that is soaring around trying to eat the frog. The frog is safe from the hawk on his lily pad only. If the hawk tags a frog, the frog must give the baggie of food to the hawk and go sit in the "eaten" section. If any animal fills his bag full of popcorn they move to in an area designated as "survived." The game ends when all of the popcorn is "eaten." If animals were unable to fill their baggies they sit in an area designated as "starved." Note that the frogs and hawks can only get their popcorn from the animals they eat and may not pick it off of the ground.
  - Record the results of round 1. Write down how many of each animal were eaten, starved, and survived.
  - Play 2 more rounds but vary the number of animals you have in each category. Example: Have most of the frogs turn into mosquitoes. Record the results after each round.
- Back in Class
  - As a class, create bar graphs of each round and look at the data collected. Which animal was the most successful in each round? Discuss why that is.

Food Web Activity

Have the students make a list of everything they ate for dinner the night before. Then working independently or in small groups have the students create food chains that trace their food back to the sun and have arrows that show the flow of energy. Some chains may be short and others long. They may have to do research to learn what animals eat in order to see how it gets back to the sun. Once they've made their chains, have the students use them to create one large food web showing how their food is interconnected and how energy is distributed.

Adaptations Activity

Review the definition of adaptation. Discuss with your students that they have adaptations too! Tell them you are going to play a game to demonstrate how important their opposable thumb is. Using masking tape or string, secure the student's thumbs to the palms of their hands, making them unmovable. Ask them to do several tasks such as tying/untying their shoes, writing their names, putting on their jacket, or any other activity that would usually involve using thumbs.

Once everyone has their thumbs back, use pictures to help the students identify the adaptations of some different animals. Ask them to think about where the animal lives and some things that would help it survive in its environment.

Bird Beak Adaptations

One can tell a lot about what a bird eats by looking at its beak. Bird's beaks are designed differently to help them obtain the food they need to survive. To help the students understand why beaks are different, have them complete the **Bird Silverware** activity sheet that compares bird's beaks to the eating utensils we use.

At the Zoo

Remind your students about what they have learned about adaptations and food webs. Have your students work individually or in small groups at the zoo to complete the **Adaptation Challenge Sheet**. Make enough copies for each student or group to have one. For ease, if you print it double sided the students will only have two pieces of paper to keep track of. Let your students help you teach. Ask them questions that help them discover the information they want to learn. Remind them to read signs and ask any zoo staff member or volunteer any questions that they have!

*While every animal is not listed on the Zoo Activity Sheet, we encourage you to visit all of the exhibits.

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What's for Dinner? Word Search

Find words that describe living organisms in the word search below and write them next to the correct definition.

Z	R	E	R	O	V	I	B	R	E	H	T	R
I	N	E	R	E	M	U	S	N	O	C	U	M
A	O	R	S	W	F	R	K	G	W	M	P	A
A	Y	R	B	O	Y	D	M	I	J	B	O	X
D	F	X	G	H	P	I	L	K	G	V	K	I
A	K	O	K	A	V	M	Y	H	T	L	Z	J
P	N	R	T	J	N	S	O	S	Q	Y	A	F
T	Z	T	N	V	D	I	F	C	R	A	X	B
A	S	E	I	C	E	P	S	F	E	R	Y	A
T	Z	E	R	O	V	I	N	M	O	D	F	Z
I	L	C	A	R	N	I	V	O	R	E	D	R
O	A	E	B	I	H	F	O	O	D	W	E	B
N	P	R	O	D	U	C	E	R	Q	F	I	O

1. _____ An animal that eats only plants for food.

2. _____ An animal that eats only other animals for food.

3. _____ A living thing that eats, drinks, or uses up something.

4. _____ A group of living things that share common features and are called by a common name.

5. _____ An animal that eats plants and other animals for food.

6. _____ A living thing that makes its own food from the sun.

7. _____ A way to show how living things are connected.

8. _____ A living thing that breaks downs other living things to return them to the soil.

9. _____ Anything an animal has or does to help it survive and reproduce.

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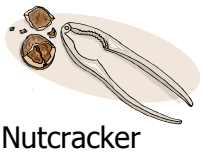
Bird Beaks and Silverware

Birds have pretty amazing beaks that help them eat. Their beaks even serve some of the same functions as our everyday eating utensils. Research the birds below and find out what eating utensil their beak most closely resembles and write what they eat in the correct space provided.

Bird	**Eating Utensil** (Circle the utensil the bird's beak acts like)	**What Does the Bird Eat?** (Include why you chose the utensil you did)
 Humming Bird	 Straw  Tweezers	
 Flamingo	 Nutcracker  Sieve	
 Bald Eagle	 Knife & fork  Nutcracker	
 Crane	 Tweezers  Straw	
 Parrot	 Sieve  Nutcracker	
 Rosette Spoonbill	 Tweezers  Spoon	

Food For Thought Questions

Why have birds adapted to have different beaks?

What do you think would happen if all birds had the same kind of beak?

Adaptation Challenge
Zoo Activity Sheet

All animals have adaptations which help them survive in their habitat. Today you will make observations to determine which animal you think would be the ultimate survivor in a particular habitat.

- Your animal contestants come from the water, land, and tree habitats.
- They have amazing adaptations and after doing close observations, it will be up to you decide who would be the ultimate survivor in their habitat and why.

Water Habitat

Beaver vs. Otter

Location: Building L on your Zoo Map

Similar Adaptations	Different Adaptations
1. 2. 3. 4.	<u>Beaver</u> 1. 2. <u>Otter</u> 1. 2.

Looking at their adaptations, which animal do you think would survive the best in a water habitat? 	Why do you think that?

Forest Habitat

Panther vs. Black Bear

Location: 14 and 15 on your Zoo Map

Similar Adaptations	Different Adaptations
1. 2. 3. 4.	Panther 1. 2. Black Bear 1. 2.
Looking at their adaptations, which animal do you think would survive the best in a forest habitat! 	Why do you think that?

Tree Habitat

Kookaburra vs. Great Horned Owl

Location: 17 and 18 on your Zoo Map

Similar Adaptations	Different Adaptations
1. 2. 3. 4.	Kookaburra 1. 2. Great Horned Owl 1. 2.
Looking at their adaptations, which animal do you think would survive best in a tree habitat? 	Why do you think that?

Post Visit

Students will do a research project to prove or disprove their justifications for selecting the winning animal they did. Pass out the **Challenging the Winner** activity sheet to each student to complete and their zoo activity sheets. This is an interdisciplinary activity and will cover the following areas:

English:

- Vocabulary: Students will properly use the vocabulary words to discuss and label the animals within their research project.
- Writing: Students will assemble a report of their findings. Their final product may be a **written report** and/or a **poster**. It is up to you how you want your students to publish their results.
    - The report should include:
        - Hypothesis
        - Data Collection
        - Results

Math:
Students will complete an input/output table and find the rule to show the loss of energy as it travels through a food chain.

Science:
Students will collect data and analyze their findings and determine if their predictions were accurate.

Resources

World Wildlife Website: www.wwf.org

- This website provides information about endangered animal species, current research projects and conservation techniques that occur around the world.

Conservation Snapshots: http://aza.org/conservation-snapshots/

- A description of the different types of animal groups and some problems each group is facing in the wild.

Panda Challenge: http://nationalzoo.si.edu/Education/ConservationCentral/default.cfm

- An interactive game where students explore animal habitats and discover ways people help protect animals.

Habitats: http://environment.nationalgeographic.com/environment/habitats/

- Plenty of information about the different habitats including maps, conservation efforts and the animals that live there.

Recommended Zoo Programs

Are you looking for another way to bring the lessons in this curriculum to life? We've got just the thing; when you're at the zoo stop by the Gertrude C. Ford Education building for a fun educational program that supports this material or have the Jackson Zoo come to you!

At the Zoo

Wild Classroom:

Web Spinning- Want to spin a web? First you will need the sun, and then maybe some bugs and worms. Oh, and don't forget the alligator! What kind of web has all of those things? A food web! There is a lot that goes into spinning one, come on out and learn how.

Animal Program:

Mississippi Wilds- Have you ever wondered what might be living in your back yard? Here in Mississippi it could be anything from otters to owls! Discover how these native animals are surviving during this look into their lives.

Home Sweet Africa- Come and explore Africa! Learn about the variety of environments that the continent offers as homes for its many animals. Find out how all of these environments are different and why different animals prefer different ones.

Let us Visit You

Zoo Mobile:

Habitat Sweet Habitat- What does it take to survive? For starters, a good home always helps. It's all about the habitat; animals have different physical and behavioral adaptations to thrive where they live. Let's discover a few of them!

For more information or to schedule any of these programs for your class, visit our website at www.jacksonzoo.org or call 601-352-2580 ext 240. All of these programs must be scheduled at least two weeks in advance.

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Challenging the Winner

Become a scientist to prove or disprove whether the animal you found to be the best suited to live in its habitat is supported by evidence. Select one habitat category from your Zoo activity sheet to do further research on. Walk through each step below and determine if your animal really is the best suited to survive in its habitat.

Hypothesis

The _____ is the best animal adapted to survive in a _____ habitat.

Data Collection

Look in books or go on the Internet to research both animals. Find at least 3 more adaptations for each animal that you did not see at the Zoo.

Example:

Animal	Adaptations
Lion	1. Large canine teeth to eat prey 2. Live in groups called prides which help each other catch food 3. Sleep long periods
Cheetah	1. Claws that don't retract to help while running 2.Black lines under eyes to keep sun glare out of eyes 3. Tail moves back and forth for steering 4. Large canine teeth to eat prey

Animal	Adaptations
	1. 2. 3.
	1. 2. 3.

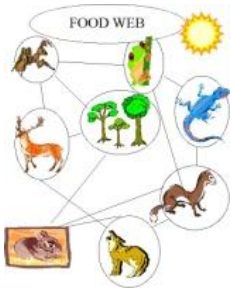
Fill in the blanks below to show the loss of energy in a food chain.

What does this table mean?

Sun	100%
Producer	
Herbivore	1%
Omnivore	
Carnivore	.01%

Rule x _____

Data Collection Continued



Make two food webs, one for each animal that you are researching. Put the food webs on a separate sheet of paper. Be sure to include at least 2 producers, 5 consumers, the sun and arrows to show the flow of energy. Write the name of each animal and plant on the food web.

Write all the producers, herbivores and so on from the food webs you just made into the table below.

	Food Web 1	Food Web 2
Producers		
Herbivores		
Omnivores		
Carnivores		
Decomposers		

Find someone who doesn't believe your animal is the best adapted to survive in that habitat. Why do they think that?

Conclusion:

Looking at all your data above, do you still believe your prediction is accurate? _____

Why or why not?

Publishing your Results:

Compile all of your information into 1 written report. Your report should clearly state your hypothesis, the data you collected and what your results are. Your report can be a written report and/or a poster. Your teacher will give you clear directions on how to complete this.