Unit # 5
Why are predators important?

Introduction:

We want students to understand the biological and ecological role of predators in the ecosystem in more depth. While children often understand that the loss of large predators is a "bad" thing, we want to convey the point that predators are a critical part of maintaining balance and integrity in an ecosystem. They keep prey populations in check, provide carcasses for scavengers, and aid in the cycling of nutrients through the environment. All of these basic roles are affecting the entire ecosystem! By the end of this activity, students will have a basic knowledge of the interconnected dynamics of an ecosystem.

Discussion:

Why are predators important?

Ask, **"Who knows what 'extinct' means?"** Take a few answers. This may be a new word and worth writing down in their books. Also, the word *species* may be a new term.

Extinct- There are no more living members of a species

Species- A group of living things that share characteristics and are able to breed

(The word species can be difficult to define without examples- explain that domestic dogs and cats are different species, but all cats and all dogs do not look the same. However, you can breed a Lab with a Poodle because they are the same species, but not a dog with a cat!)

Ask the students, **"Why do some species become extinct?"** They may have a tough time with this question, but a good way to help is to refer to the Habitat Game they played. A prompt like, **"What do animals need to survive?"** may get their minds thinking in the right direction.

They will be able to identify with the lack of food, water, shelter or space from the game, but now we want to introduce another concept- carrying capacity. This is a word that they will most likely not know, so we will break it up.

Carrying- to hold on to something

Capacity- the maximum amount of something

Give an example either by description (the most beans they could hold in their hand is the capacity) or show them using some type of container full of dirt, marbles, water, anything.

Put it together in terms of species in a habitat-
Carrying Capacity- the maximum number of organisms an area can hold

Explain slowly: Within a habitat we do not just have one species in that area. In one forest habitat you could have birds, deer, squirrels, raccoons, bears and lots more. They all interact with each other and affect each other's food, water, shelter and space. We call this an ecosystem.

Ecosystem- an area where the plants and animals are interacting with each other and the environment

An ecosystem can be as small as a puddle holding little plants and insects or as large as an ocean. For our next game, "The Trophic Cascade", we will focus specifically on how predator-prey interactions affect the environment.

Trophic Level- The different "levels" of a food chain (general example: 1st level = plants, 2nd = herbivores, 3rd = omnivores, 4th = predators)

Cascade- A ripple or domino-like change/effect

Trophic Cascade- The effect caused by changing the numbers of individuals at one level in a food chain on the other members above and below them on the food chain

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Unit # 5
Title: Why are they important?

Activity:

The big idea that we want students to take away is that every component of a food chain is interconnected and each trophic level (plants, herbivores, omnivores, predators) supports those above and below them. To demonstrate this support, we will do an activity in which the students will quite literally support each other!

Part 1:

Go through your students and give each a role in this order: plants, herbivore, omnivore, and predator, until all students have a role.

1. Have them form a near-perfect circle in which everyone is facing inward and their shoulders are touching the person on either side.
2. Next, have them all turn to their right to face the back of the person now in front of them.
3. Now, have everyone take one small step to their left, or in towards the middle of the circle. They should get closer, but not be touching the person in front of them.

Once they are set up, tell them: **"You are a trophic cascade in a healthy ecosystem. Each member should have enough food to support their diets. On the count of three everyone will very slowly sit down on the lap of the person behind you."** Count- **"One. Two. Three."**

They should end up as one circle in which every person is sitting on a lap and has someone on his or her's, the weight should distribute fairly evenly. It may take a few tries before they get the concept, and some adjustments may need to be made if someone is much taller than the people around them.

Once the group gets the concept, the students are usually fairly eager to make it work and will figure it out quickly. Once they get it, applaud their efforts and point out that each level of the cascade, plant, herbivore, omnivore and predator are all supported! Have them stand back up.

Part 2:

Restart the activity at the point where the students are in a tight circle and are ready to sit down; if they weren't close enough during the first trial, this is the time to ensure they are very close. Before having them sit down, ask all the plants to raise their hands, then read this scenario:

"An area of forest is clear-cut and very important vegetation for herbivores is lost."

If your group is larger than 12, remove 2 plants from opposite sides of the circle; if its under 12, remove 1 plant. The remaining students should not move their feet to fill the gaps left by the removed plants. On the count of 3, have the students slowly sit down. If the circle was tight enough, they should still be able to sit without falling.

Once they have successfully made the trophic cascade support the remaining components, we will do the activity again with a different scenario.

Part 3:

Similar to Part 2, have the remaining students (all of those except for the plants) set up the circle nice and tight and read this scenario:

"As a result of the forest being clear-cut, there was not enough vegetation or habitat for all of the herbivores and omnivores to survive."

Remove one herbivore. Again, instruct remaining students not to move their feet. Have them try to sit once again.

If your group is large enough, continue with "Removal Scenarios" until they cannot possibly hold each other up. Then, try "Adding Scenarios." There are some examples below, but feel free to be creative or use local examples.

Run through as many scenarios as you like, experimenting with adding and removing different "trophic levels." It should be clear that **every trophic level is necessary to support the others**. Stop activity when students become disengaged.

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Activity continued:

Removing Scenarios:

- A predator was killed by a hunter - remove one predator
- An omnivore was hit by a car - remove one omnivore
- There was a drought that limited plant growth- remove an herbivore
- A predator was too malnourished to raise her young - remove two predators
- New construction destroyed habitat - remove any 4 components

Adding Scenarios:

- There was a lot of rain this year and plants are doing well - all plants and herbivores return
- Land was set aside as protected habitat - return one of each component
- A wildlife conservation group successfully put a tunnel under a highway for wildlife to safely cross - all animals return

Debrief:

Simply asking, **"What happened?"** may be enough to get a thought-provoking conversation started.

You should also ask more direct questions such as:

- **"What happened when we removed some plants?"**
- **"What happened when we added _____?"**
- **"What happened when one spot in the circle fell?"**

By the end, students should understand that **every trophic level in an ecosystem supports the others, and that changes to even one level can have effects on the others.**

Optional Extension:

Do your own experiment outside- Find a small patch of grass that you do not mind disturbing. Place a piece of wood or other flat, heavy object on the ground and trace or mark its outline. Remove the object, then have students carefully search the outlined area for living things. If you have a camera, take a picture of the patch of grass and all the insects/animals that students find. Return the object to the outlined area. Revisit it a week later and have the students make observations (Did the color of the grass change? Are there different insects? More or less insects? etc). You can stop there, or put it back and let it sit for another week (again making observations afterwards). Upon conclusion, have a discussion. If the area under the object was an ecosystem, what about that ecosystem changed? Why? Relate this to larger ecosystems and how habitat change affects the trophic system (Vegetation dies, so herbivores decline; herbivores decline, so predators decline. A change at the lowest trophic level - vegetation - affects every trophic level!).

Predator of the day:

#5: The Grizzly Bear! Refer to the Predator of the Day packet

Photo Credit: Jenny Fitzgerald

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