Keystone Species: Dingoes

Grade Level

Grades 5

Objective

This activity is designed to start your at-home student(s) in recognizing themselves as scientists and in thinking critically about problem-solving. The goal is to teach concepts through discovery and to encourage using scientific thought processes. Feel free to adapt the lessons provided to better suit your students' abilities. Take these ideas, make them your own, and your students will have a greater chance of success.

Materials

Paper, plate, 3-4 straws (can use chopsticks or spoons as an alternative), 30-40 colorful candies like M&Ms or Skittles – mix of 4 colors. For the sake of this activity, we will use red, orange, yellow, and green (can use beads, dried beans, dried pasta, or pennies as an alternative, but will need to be able to color them). This activity is designed for three or four players, but can be modified to accommodate two.

Background Information

Feral, or wild, cats in Australia are a huge problem. It's estimated that they prey upon tens of millions of native animals each year, including marsupials, birds, reptiles, rodents, and frogs, and are responsible for at least 20 extinctions of native wildlife so far. The history of feral cats in Australia is largely unknown, but in the past few years, it's been estimated that there are between two and six million feral cats living on the continent. The only known predators of these feral cats are the wedge-tailed eagle and dingo.

Dingoes are an apex predator in Australia, meaning they are not preyed upon by any other animal. They play a vital role in Australian ecosystems by preying upon, as well as competing for food resources with feral cats.

Key concepts:

- Keystone species – a species on which other species in an ecosystem largely depend, such that if it were removed, the ecosystem would change drastically.

- Predator – an animal that naturally preys on other animals.
- Prey – an animal that is food for another animal.
- Ecosystem – a biological community of interacting organisms and their physical environment.
- Food web – all of the food chains within an ecosystem.
    - Producers – make their own food (plants and other vegetation).
    - Primary consumers – mostly herbivores (some omnivores) that consume the producers (e.g. insects and bettong).
    - Secondary consumers – eat primary consumers (e.g. feral cats).
    - Tertiary consumers – eat primary and secondary consumers (e.g. dingoes).
    - Apex predator – a predator at the top of the food chain that is not preyed upon by any other animal (e.g. dingoes).

- To learn more about dingo – https://resourcelibrary.clemetzoo.com/Animal/157
- To learn more about bettong – https://resourcelibrary.clemetzoo.com/Animal/1272

Procedure

1. Begin this activity by discussing ecosystems, food webs, and keystone species. Ensure your at-home student understands these concepts. Then discuss dingo ecology – range, habitat, diet, behavior, etc. Explain that the game will help identify how important dingoes are to their ecosystem as a keystone species.
2. Place 20 candies (five red, five orange, five yellow, and five green) on a plate and give each player a straw.
3. Assign each player a role to play – dingo, bettong, or feral cat. Each player will be allowed to remove certain colors based on what they eat. Dingoes eat bettong (orange) and feral cats (red), feral cats eat bettong (orange) and insects (yellow), and bettong eat insects (yellow) and vegetation (green). If more than three players, assign one more feral cat. If less than three players, one player should play the role of both the dingo and bettong.
4. Explain that the candies represent a healthy, balanced ecosystem full of producers and consumers. Because everything must eat to survive, they will compete with each other for food resources. Players will have 10 seconds to remove as many of their identified food items from the plate using only their straws.
5. At the end of each round, use the sheet below to record how many of each were left in the ecosystem. Once that number is recorded, double the amount that were left to account for "reproduction." For example, if three red, two orange, three yellow, and two green were left after round one, round two would start with six red, four orange, six yellow, and four green. Play a total of five rounds or until all food resources have been removed.
6. After each round, take time to discuss the following:
    - What happened in this round?
    - How many food resources are left and what are they?

    - What does that mean for the health of the ecosystem?
    - What patterns are emerging, if any?
7. In Game #2, dingoes (keystone species) will be removed. Assign each player a role, leaving out dingoes. If an odd number of players exist, assign one more feral cat. Follow the same rules as Game #1. After each round, take time to discuss the talking points listed above.
8. After Game #2 is complete, take time to discuss the following:
    - What was the difference between the first and second game?
    - How do dingoes effect the ecosystem?
    - Why are keystone species, like dingoes, important to ecosystems?
    - How can we, as humans, help ecosystems where dingoes live?

ADDITIONAL EXTENSION OF ACTIVITY USING SCIENTIFIC INQUIRY *(a worksheet has been provided at the end of this lesson plan for this extension)*: After you have played both games (with and without dingoes present in the ecosystem), discuss what you found most interesting. Based on those findings, formulate a comparative question experimenting with different ratios of feral cats (red), bettong (orange), insects (yellow), and vegetation (green) and situations that could occur in the wild. A good comparative question compares two things and cannot be answered by simply doing one thing (e.g. "will there be more vegetation left in the ecosystem if more bettong are present or more feral cats?" is better than "how much vegetation will be left if there no feral cats?"). Once you have your question, explore some predictions. What do you think the answer to your question will be and why? Next, make a plan for how you will collect your data and then implement it. Once you have collected your data, think hard about what you found. Consider creating a chart, graph, table, or diagram to analyze your findings. The last step of scientific inquiry is to share your findings. Who would be interested in seeing what you found? How can you prepare your findings to share with others?

Standards

Ohio Academic Content Standards
Grade 5 Life Science Topic: Interconnections Within Ecosystems All of the processes that take place within organisms require energy.

Game #1 – dingoes present in the ecosystem

	Feral cats (red)		Bettong (orange)		Insects (yellow)		Vegetation (green)	
	Started with	Ended with	Started with	Ended with	Started with	Ended with	Started with	Ended with
Round #1	5		5		5		5	
Round #2								
Round #3								
Round #4								
Round #5								

Game #2 – dingoes absent from the ecosystem

	Feral cats (red)		Bettong (orange)		Insects (yellow)		Vegetation (green)	
	Started with	Ended with	Started with	Ended with	Started with	Ended with	Started with	Ended with
Round #1	5		5		5		5	
Round #2								
Round #3								
Round #4								

Round #5								

Scientific Inquiry Worksheet:

1. **In the space below, write down any observations you found interesting from Game #1 and Game #2.**

2. **Write your comparative question:**

3. **Write your predictions:**

4. **Use the back of this sheet to collect and analyze your data.**

5. **Does the data support your prediction? Why or why not?**

6. **Who do you want to share your findings with?**