Prairie Warbler Survival

OVERVIEW: Parasitism is a term applied to many situations in the natural world. In the avian (bird) community, parasitism is not only observed between birds and blood-seeking arachnids and insects, but it is also observed among other birds during the egg-laying and nestling stage of development. Brown-headed cowbirds target prairie warbler nests by laying their own egg in the nest and sometimes destroy the tiny prairie warbler eggs. Once hatched, brown-headed cowbird nestlings are aggressive and much larger than prairie warbler nestlings; they out compete the prairie warblers for food and space (they often shove the prairie warbler nestlings out of the nest).

GRADE LEVEL: 6 – 8

TIME: 50-minute class period

SETTING: Classroom or outside

OBJECTIVES: Student will model the struggle for survival of nestlings in a typical prairie warbler family. Roles will include parents bringing food back to the nest despite obstacles, nestlings being fed in a 'pecking order,' and competition for space in the nest among nestlings due to cow bird parasitism. Students will explain how adaptations affect a species and will describe the importance of resources in a community.

LEARNING STANDARDS CORRELATED: Science GLE 0807.5.3; CLE 3210.2.1; 3255.3.6

QUESTION: How does parasitism from the brown-headed cowbird impact prairie warbler nestling success? What role does the surrounding environment play in nestling survival?

MATERIALS:

- Timer or stopwatch
- String to outline boundary of nest (if doing activity with younger students outside)
- Black or Pinto beans (1-3 lbs for prairie warbler food)
- Large White Lima Beans (5 beans total for the class – represents a cowbird)
- Plastic forks (1 per parent)
- Styrofoam plate with a rim (2 plates per nest = 12 plates)
- Small paper or plastic cups (1 per nestling, color-coded for a specific nest with bottom of cup numbered to indicate nestling feeding order)
- Prairie Warbler Assignment sheet – Cut out assignments for students to pick their role (for durability, assignments can be mounted on 3 x 5 index card, laminated); 30 prairie warbler roles included, adjust as needed for class size
- Class Data Sheet and Bar Graph Sheet (1 per student or team)

BACKGROUND: The Prairie Warbler is one of many birds that succumb to brown-headed cowbird parasitism. A few parents can detect something different and may rebuild their nest on top of the cowbird egg or even abandon the nest entirely. If the bird accepts the cowbird egg, it will eventually raise it as its own, despite any other sacrifices. Sacrifices usually include the cowbird pushing out the parental bird's own nestlings before they're ready to survive. The cowbird nestling also may be so aggressive that the other nestlings will not compete well for food and succumb due to starvation. Either situation is grim as we also consider the status of our native migratory bird population declines due to habitat destruction or habitat fragmentation in the cedar glades, as well as in their over wintering home.

PROCEDURE:

1. This works well at student desks that have been clustered together to model nests or colored string can be used to outline 6 nest circles on the floor or outside. Colors need to coincide with the assigned nests given students. String nests should be large enough for students to sit in without "falling out."
2. Plastic forks will be used by the parent prairie warblers to gather food (beans) but that can be adjusted to spoons for younger students. An extension to this activity would be to break tines off the fork and compare feeding success.
3. Place the plates of black beans around the room: some close to the nests, some far away, and some not easy to get to. Randomly distribute the 5 white lima beans into the piles. Do <u>not say anything</u> to the students about the lima beans representing a cowbird nestling; however, students that end up with a lima bean in their cup will have a competitive advantage when the numbers of beans per nestling are tallied up.
4. Each student will pick a Prairie Warbler Assignment card to determine whether they are a chick or a parent and in what nest they reside.
5. Students will move to their nests.
6. Distribute numbered nestling cups to each nest color. For example, Nestling# 1 will receive cup number 1.
7. Parents will each receive a fork to feed their nestlings.
8. Parents and nestlings wait to hear rules of the game.

<u>Rules</u>:

1. The parents may only pick up the food using their beaks (forks) and drop the food into the nestlings mouths (a small cup held at their chest).
2. The parents must follow the pecking order and feed nestlings in number sequence. For example, if the mother feeds nestling #1, then the father will feed #2; if the father returns back to the nest quicker, then he will feed #3. Who is feeding is not as important as the sequence.
3. When it is their turn, nestlings must chirp (quietly) to get fed. Once they have been fed, they must get quiet.

4. Parents will keep up with the number of trips they make or the number of times they feed nestlings.
5. The parents may **not** assist nestlings in **any** way. If nestlings fall out of the nest (leave their seat or move out of the string boundary), they are dead.

Start Activity:

1. Allow 5 minutes for parents to feed their young. You may need to adjust the time based on how skilled your parent birds are collecting beans.
2. Walk around the room and monitor the activity.
3. Gently remind the students of rules and their roles.
4. Keep track of nestlings that have died by falling out of their nest.

Stop Feeding:

1. When the time is up, have nestlings count the number of beans in their cup.
2. At this point, have a student raise their hand if they have a white bean. Tell them their nest has been parasitized by a cowbird and they are the cowbird. They will kick a nestling out of the nest and take all their beans; they will also take half the beans of the other nestlings in the nest.
3. Ask students with less than 15 beans to raise their hands. Any nestlings with less than 15 beans have died from starvation. (note: this number may need to be adjusted according to skill of 'parent' birds in class – walk around the room to determine this number)
4. Compile class data into chart, following instructions. To create a graphical representation of the data, students will complete the bar graph page handout.
5. To provide different points of view, at this time students will return to desks and discuss the activity. See sample guiding questions handout.

JOURNALING: Imagine you are either a nestling trying to compete with the cowbird or a young cowbird in the nest. Describe a one-person view of what you experience as a nestling and even consider an anthropomorphic attitude. Be very descriptive and consider your entries daily.

Lesson idea originally donated to MiddleSchoolScience.com by Meg W. Worksheet, Diagrams, Charts, and Questions by Liz LaRosa @ http://www.middleschoolscience.com 2004. Permission granted.
This lesson was adapted for the Prairie Warbler instead of Owls.

TEACHER NOTES: These slips account for 30 students. Red 2 parents, Orange 1 parent, Yellow 2 parents, Green 1 parent, Blue 1 parent, Purple 2 parents. Assume nestling #1is the oldest per nest. Have students pick slips until each one is in a nest. If you have less than 30 students, you can remove some of the slips or leave it to chance as they pick. I usually glue slips onto an index card and have the kids pick a card and put their names in pencil on the back. You can then reuse them every year and keep track of how many times a choice has been picked.

Red Prairie Warbler Mom	Orange Prairie Warbler Mom	Green Prairie Warbler Dad	Blue Prairie Warbler Mom	Purple Prairie Warbler Mom	Yellow Prairie Warbler Nestling #1
Red Prairie Warbler Warbler Dad	Yellow Prairie Warbler Dad	Green Prairie Warbler Nestling #1	Purple Prairie Warbler Nestling #2	Purple Prairie Warbler Dad	Yellow Prairie Warbler Nestling #2
Red Nestling Prairie Warbler # 1	Yellow Prairie Warbler Mom	Green Prairie Warbler Nestling #2	Purple Prairie Warbler Nestling #1	Purple Prairie Warbler Nestling #3	Yellow Prairie Warbler Nestling #3
Red Nestling Prairie Warbler #2	Blue Nestling Prairie Warbler #1	Blue Nestling Prairie Warbler #2	Blue Nestling Prairie Warbler #3	Purple Prairie Warbler Nestling #4	Yellow Prairie Warbler Nestling #4
Orange Prairie Warbler Nestling #1	Orange Prairie Warbler Nestling #2	Orange Prairie Warbler Nestling #3	Orange Prairie Warbler Nestling #4	Orange Prairie Warbler Nestling #5	Yellow Prairie Warbler Nestling #5

Directions:
1. Find your family color. Place **X's** in the boxes if you do not have that family member.
2. Cowbird nestlings write "cowbird" in their square and record bean total.
3. Mom & Dad Prairie Warblers - record the number of feeding trips.
4. Fill in the number of beans in your cup if you are a chick. If you died, state the reason.
5. Calculate your success rate. If five chicks were born into the nest and 1 died, you would divide 4 by 5 and then multiply by 100 to get an **80%** success rate.

Family	**RED**	**ORANGE**	**YELLOW**	**BLUE**	**GREEN**	**PURPLE**
Mom						
Dad						
Chick # 1						
Chick # 2						
Chick # 3						
Chick # 4						
Chick # 5						
Success Rate (# alive **divided by** # born) x 100						

Prairie Warbler Feeding Results

Total Number Beans Eaten per Nestling Prairie Warbler/Cowbird

R 1	**R 2**	**O 1**	**O 2**	**O 3**	**O 4**	**O 5**	**Y 1**	**Y 2**	**Y 3**	**Y 4**	**Y 5**	**G 1**	**G 2**	**B 1**	**B 2**	**B 3**	**P 1**	**P 2**	**P 3**	**P 4**		

Nestlings by Groups Based on Nestling Color

Student Questions for Group Discussion and Written Analysis:

1. Describe the family that you belonged and the role you played in that family.

2. If you were a parent, how did you feed your offspring? Who ate first? How did you collect your food; did you have a plan? Explain.

3. If you were a nestling, describe how you got your food and avoided falling out of the nest. Did you "fight" for food? Did any of your brothers or sisters not make it? Explain.

4. What are some possible outcomes for the nestlings if the parents never returned from finding food?

5. Which family had the highest success rate? Describe the members of the family and how the parents collected food.

6. What are some benefits and disadvantages in having a small or large prairie warbler family, two prairie warbler parents vs. one?

7. Describe a family scenario that would have a very low success rate. What scenario would have the best success rate? How many parents and nestlings? Explain.

8. What are some other factors that could affect the success rate of prairie warbler families?

9. Looking at your data, overall, which nestling ate the most food? The least food? Were there any families where each nestling was fed almost evenly? Were there any families where one nestling ate much more than its brothers or sisters? Explain your findings.

10. List at least three similarities and three differences between the prairie warbler families we pretended to be today and a human family.

11. Name at least three things you would do differently as a prairie warbler parent or nestling if we conducted the activity again.

12. What advantages did the cowbird nestling have over the prairie warble nestling?