Disperse or Decease

In this activity, students learn about how dispersal helps young animals find a home and spread the family genes into another area. Then, in the role of their favourite animal, they try to help their offspring disperse into new habitat areas - or deal with the horrible consequences! Students practice their basketball skills as they learn what kinds of parks are easily colonized.

Note: this activity is adapted from one developed by the Province of British Columbia, found in an activity guide entitled "Protected Areas: Preserving our Future."

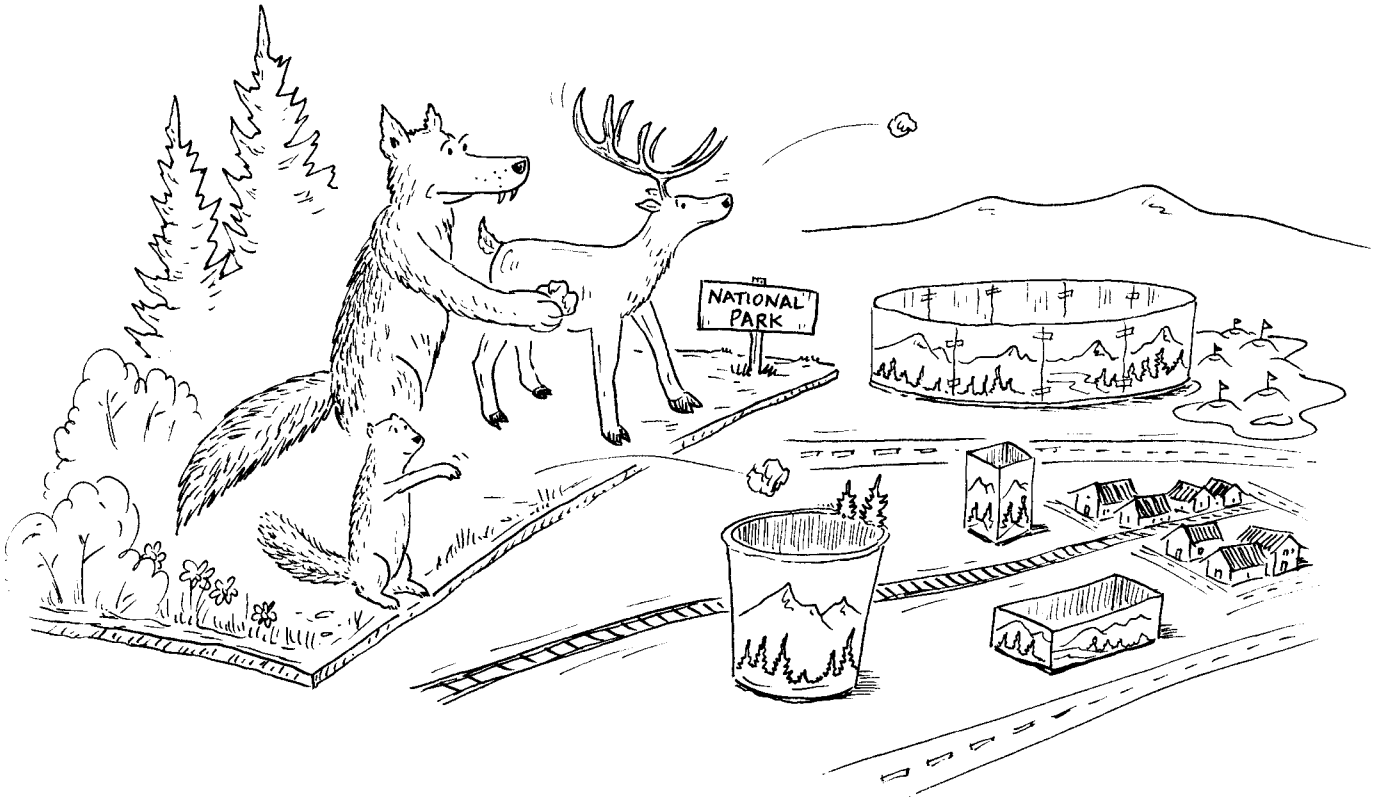
Materials

You will need at least a dozen clean scraps of paper from the paper recycling bin per student; half a dozen containers of similar sizes (these can be gallon ice cream containers or similarly sized receptacles); and six containers of dramatically different sizes (e.g. a large box, the classroom garbage can, a large mug, etc. All containers should be as deep as possible.)

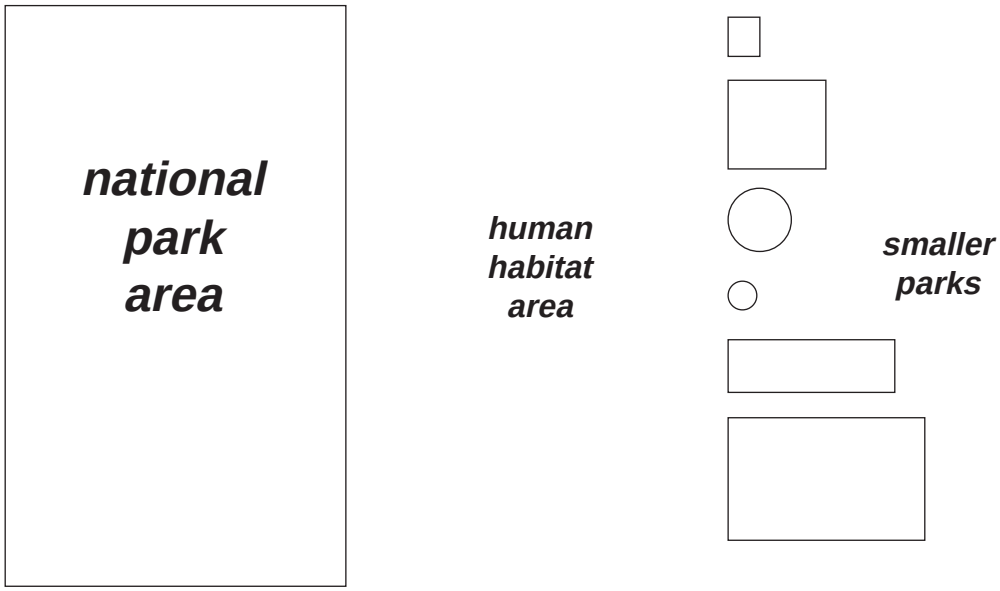
Instructions for the Teacher

1. Ask students if they plan to always live at home. They'll probably say "No!" Tell them that the same is true for ALL young animals, and that they'll learn more about how this works in this activity.

Ask students to define the following terms. The answers are included below:



- ***Dispersal***: this is a process in which animals move from place to place within their habitat. It is commonly used to mean the movement of adolescents away from their family group to an area where they begin life as an adult. (Note: this term is also used to describe the movement of animals AND plants; however, this activity focuses on animal movement).



- ***Colonize***: this is derived from the word 'colony', which is a portion of land that is an outpost of a larger 'mother ' country. Colonization in the animal world refers to a process in which animals disperse into an area previously uninhabited by their immediate family.

The Area Effect

2. Spread the containers out in the pattern shown above. All containers must be the same distance from the largest rectangle, which you should refer to as the "national park area".

3. Distribute the paper to the students, and ask them to wad up the paper to create a dozen projectiles that they think they could throw with a fair degree of accuracy. (As an option, have them mark their paper with their initials on the outside, or use some other distinguishing feature so that they can be identified later by each student).

4. Invite the students to enter the national park area (it should be large enough and long enough to comfortably hold all of them). Tell them:

    - **In this game, all of you will take on the role of a wild animal that might live in a national park. What kind of animal would you like to be?**
    Have students decide which animal they want to be (it doesn't change their performance in the activity, but it does turn out to be important during the discussion at the end).

Tell students:

"In this activity, you are all parent animals. You have a large, healthy family, and all your children are old enough to leave home. These juvenile animals will be represented by paper balls you have made.

"But the national park is overflowing with these juveniles! The only place that the juveniles can find good habitat and reproduce is in one of the adjacent parks, which although they are of different sizes all offer suitable habitat for your animal. Each of the parks is surrounded by settled human farmlands, towns and cities, and your animal cannot live there. But you can travel across these areas if you are lucky.

"There are two good reasons that it would be good if your juvenile paper ball could 'colonize' these parks. This is because there are two problems in the array of parks: One is that a large forest fire had eradicated all species from two adjacent parks (indicate two adjacent parks of different size).

"The other problem is that ALL of the other parks are isolated, and even the wildlife populations in the larger parks are beginning to suffer from inbreeding. New genetic stock from the national park is desperately needed to help those populations survive in the long term.

"So... when I say "Disperse!" you will have exactly one minute to help all of your juveniles disperse into the nearby parks. To represent the long and dangerous voyage through settled land, you will throw your juveniles. You can choose any park as a target. Any jostling or elbowing at the edge of your national park will not be permitted."

5. Say "go!' and let the students start throwing. Distances should be such that there are lots of paper balls that miss their target. After one minute is up, count the number of balls inside each container. Then have students collect and count their paper balls.

6. Ask the students:

- **What happened to those juveniles that fell onto the floor?**
  Without the food, water, and shelter afforded by the habitat found in parks, juveniles will eventually die. Travelling through inhospitable land is a hazardous activity; this is the reason the juveniles of most species have high death rates in their first year.

- **How many of your offspring made it into a park?**
  Have students indicate with a show of fingers, and highlight the most successful families (i.e. those with a certain number of juveniles that made it). Remind students that it is the most successful parent "throwers" that are most likely to have their family genes occur in subsequent generations.

  Summarize your date in a table, and plot your results on a rough graph. You may wish to have students do this more exactly, calculating the area of each island.

Tell students that they have just discovered the "Area Effect:" parks of larger area are more likely to be colonized by juveniles than smaller parks. For this reason, smaller islands have fewer species than large islands.

The Distance Effect

7. Spread the six identical containers out in the pattern shown below. All containers must be the same size - the only difference is their distance from the national park.

   Again, invite the students to disperse into as many of the 'islands' of habitat as possible. Because students may try to get as close to the parks as possible, you may wish to avoid jostling for position by dividing students into four or five groups and give them each a minute to disperse their balls. Again, count the number of balls inside each container, then have students collect and count their paper balls.

8. Summarize your date in a table, and plot your results on a rough graph. You may wish to have students do this more exactly, measuring the distance from the national park to each island.

9. Tell students that they have discovered the 'Distance Effect": the further an island of habitat is from the national park, the less likely it is that colonization will occur.

Concluding Discussion

10. Ask the students:
    - **In a few ways, this activity is not realistic. Why?**
      Students should realize that some animals that are more sensitive to human presence would not be able to disperse through the settled landscape of farmland and human habitation - particularly if there were a lot of towns and cities in that landscape.

      Also, when it comes to dispersal, 'not all animals are created equal'. Those students that chose to be fast-flying birds are able to disperse much easier than slow-moving

ground mammals such as bears.

- **How could human use of the landscape make it easier for animals to disperse?** Suggestions might include:
  - preserve or create wildlife travel corridors between all parks
  - build overpasses or underpasses to help animals cross train tracks and roads
  - create "mini-parks" along the way to give animals a chance to rest and find food as they travel
  - in farming areas, leave hedgerows and hedges to provide animals some cover as they travel
  - have slower speed limits and warning signs in areas used extensively by dispersing animals

11. (Advanced level only) As a last activity, show students the graph entitled ***Species/area Relation for New Guinea***. Point out to students that each of axis of this graph is a logarithmic scale. Ask students to interpret this graph. They should be able to state: "When area vs. number of species is plotted on log-log paper, it forms a straight line. This shows that the larger the island, the more species that are likely to live there". This is a visual representation of the Area Effect.