Oh Deer A game of animal populations

(adapted from Project Wild K-12 Curriculum and Activity Guide)
http://www.riverventure.org/charleston/resources/pdf/population%20study%20game.pdf

Objectives - Students will be able to:
1. Identify food, water and shelter as three essential components of habitat.
2. Describe factors that influence *carrying capacity* (how large a population a habitat can support)
3. Define *limiting factors* and give examples
4. Recognize that some fluctuations in populations are natural, while others result from   human impact

Method
Students portray deer and habitat components in a physical activity.

Materials
- an outdoor area large enough for students to run (ideal: playing field)
- cones to mark boundaries,
- paper and writing utensil (for teacher or adult chaperone to record data)
- optional: habitat component cards

Background
Students often think of a healthy ecosystem as "balanced", not realizing that every relationship and population is dynamic and changing over time as a result of many different environmental or cultural variables. Wildlife populations are not static; they fluctuate in response to a variety of stimulating and limiting factors.

Carrying capacity is the dynamic balance between the availability of resources and the population a habitat can support. Many factors related to carrying capacity determine the ability of a species to survive and to successfully maintain a strong population. All animals are dependent upon habitat, and the four basic components of habitat are food, water, shelter and space in a suitable arrangement. This activity emphasizes three of those habitat components – food, water and shelter – but the students should not forget the importance of the animals having sufficient space in which to live, and that all the components must be in a suitable arrangement for wildlife populations to reach their maximum size.

In nature, populations are prevented from reproducing to form a larger population than the habitat can support by limiting factors. Disease, predators, weather conditions and habitat destruction and degradation all limit the size of a population.

Procedure

Ask the students to define habitat. Ask if humans have a habitat. How about domestic animals? Ask if humans share habitat with wildlife.

Review the four essential components of habitat: food, water, shelter and space in a suitable arrangement. Tell the students they will be focusing on three of the habitat needs of deer in this activity. The essential components for survival of deer are food, water and shelter and space in a suitable arrangement, but in this activity we will assume the deer have enough space.

Ask the students to count off in fours. Have all the ones go to one area; all twos, threes, and fours go together to another area. Mark two parallel lines on the ground ten to twenty yards apart. Have the ones line up behind one line; the rest of the students line up behind the other line facing the ones.

The ones become deer. All deer need good habitat to survive. Again, ask the students what the essential components of habitat are for a deer (food, water, forest for shelter, and fields for browsing). The deer need to find food, water, shelter, and space in a suitable arrangement to survive. In this activity we will assume the deer have enough space in which to live.

- When a deer is looking for food, the student should place his "hooves" over his stomach.
- When a deer is looking for water, the student places his hooves over its mouth.
- When a deer is looking for shelter, the student should put his hands together over his head, making an arch.

A deer can choose to look for one of these needs during each round of the game; the deer cannot, however, change what it is looking for (e.g. when it sees what is available during that round). It can change what it is looking for in the next round if it survives.

The twos, threes and fours are all components of habitat: food, water and shelter. Each student is allowed to choose at the beginning of each round which component he will be during that round. The students depict which component they are in the same way the deer show what they are looking for (i.e. hands on stomach for food, and so on).

The activity starts with all the players lined up behind their respective lines (deer on one side, habitat components on the other side) and with their backs facing the students along the other line.

Begin the first round by asking all of the students to make their signs - each deer deciding what it is looking for, each habitat component deciding what it is. Give the students a few moments to put their hands in place-over stomachs, over their mouths, or over their heads.
NOTE: Switching symbols in the middle of a round can be avoided by having the students put on habitat component cards that show an illustration of what they are looking for, or what they represent. At the start of each round, students choose one of the cards.

When the students are ready, say, "Oh, Deer!" Each deer and each habitat component turn to face the opposite group, continuing to hold their signs clearly.

When the deer see the habitat component they need, they should run to it. Each deer must hold the sign of what it is looking for until getting to the habitat component with the same sign. Each deer that reaches its necessary habitat component takes the "food", "water", or "shelter" back to the deer side of the line. "Capturing" a component represents the deer successfully meeting its needs and successfully reproducing as a result. Any deer that fails to find food, water, shelter

dies and becomes part of the habitat. That is, any deer that died will be a habitat component the next round and so is available as food, water, shelter to the deer that are still alive.
NOTE: When more than one deer reaches a habitat component, the student who arrives first survives. Habitat components stay in place until a deer chooses them. If no deer needs a particular habitat component during a round, the habitat component just stays where it is in the habitat. The habitat component can, however, change which component it is from round to round.

Record the number of deer at the beginning of the game and at the end of each round. Continue the activity for approximately 15 rounds.

At the end of 15 rounds, bring the students together to discuss the activity. Encourage them to talk about what they experienced and saw. Discuss what role limiting factors played (when there was less of one habitat component available). Discuss how a larger population further depletes the habitat, and then a "die-off" occurs, reducing the population and bringing the two back into balance. You can introduce natural selection by pointing out how the fastest (or smartest) deer got to limited resources before the others.

Follow-up Classroom Activity:
1. Back in the classroom, use an overhead projector, flip chart, or chalkboard to post the data recorded during the activity. The number of deer at the beginning of the activity and at the end of each round represents the deer in a series of years. The students will see from this graph that a population is dynamic. The process is natural as long as the factors that limit the population do not become excessive to the point where the animals cannot successfully reproduce. The wildlife populations will tend to peak, decline, and rebuild; peak, decline, and rebuild-as long as there is good habitat and sufficient numbers of animals to reproduce successfully.
2. Ask the students what is realistic and unrealistic about this simulation? (Deer that do not survive do become recycled as nutrients but it is not instantaneous. Deer need all habitat components to survive. Poor habitat usually results in a weakened individual that succumbs to disease, not instant death).
3. In discussion, ask the students to summarize some of the things they learned from this activity. What do animals need to survive? How do these components influence carrying capacity? What are some "limiting factors" that affect the survival of animals? How do factors that limit carrying capacity affect the health, numbers, and distribution of animals? How do these factors affect competition within a species? Why is good habitat important for animals? Are wildlife populations static, or do they tend to fluctuate as a part of an overall "balance" of nature? Is nature ever in "balance" or are ecological systems involved in a process of constant change?

Variations
1. After the students have played several rounds of "Oh, Deer", introduce a predator, such as a human hunter, mountain lion or wolf. The predator starts in a designated "predator den" area off to the side. The predator has to skip or hop. This impediment reduces the possibility of violent collisions between deer and predator. The predator can tag deer only when they are going toward the habitat and are tagged between the habitat and the deer lines. Once a deer is tagged, the predator escorts the deer back to the predator den. The time it takes for the deer to be taken back to the den simulates the time it takes to be "eaten". The "eaten" deer is now a predator. Predators

that fail to tag someone die and turn into habitat. That is, in the next round the predators that died join the habitat line. They will become food, oxygen, or shelter. During each round, keep track of the number of predators as well as the number of deer. Incorporate those data in the graphs.

2. After the students have played several rounds of "Oh, Deer", create different environmental scenarios which will alter the habitat available to the deer. Huddle the habitat components and tell them the situation and the limiting factor. Be certain the deer cannot hear you. Run through the constructed round with the limiting factor and then tell the deer the scenario. Have the students discuss these events and how they alter the graph.

Proposed Scenarios:
1. A severe drought occurs and oak trees produce few acorns in the fall.
   Limiting Factor: Food. No habitat components choose to represent food.
2. Humans build a subdivision, replacing farm fields and forest with houses and lawns.
   Limiting Factor: Shelter. No habitat components choose to represent shelter.
3. A factory is built which discharges toxic waste into a stream.
   Limiting Factor: Water. No habitat components choose to represent water.
4. A forest fire occurs, burning all vegetation.
   Limiting Factors: Shelter and food. No habitat components choose to represent shelter and food.

Nature Walk Bingo Cards

Objectives:

- Encourage students to observe everything around them on the nature trail using their sense of sight, hearing, touch and smell.
- Familiarize students with a few of the more common sights in the Virginia forest.

Materials:

One copy of the Nature Walk Bingo Card for the facilitator (or two can be used, if there is one adult at the front and one at the back of the group of students).

Markers/Pencils

Preparation:

Have 1 or 2 copies of the Nature Walk Bingo Card available for each group of students. The cards can be laminated and used more than once with wet erase overhead markers.

Procedure:

Tell the students they will be taking a short walk on the Camp Albemarle nature trail. They will be asked to observe everything around them using their eyes, their ears and their senses of touch and smell.

Whenever someone finds something on the card, they are encouraged to share it with the group, and will be given the card to mark off the item. Finding (or failing to find) items on the cards can be an opportunity for discussion with the group about various environmental topics.

Alternate Procedure:

Have copies of the Bingo Cards for each pair of students to mark.
Draw up and copy any variation of the cards you want to discuss, can include geology, bird sounds, soils, shapes.
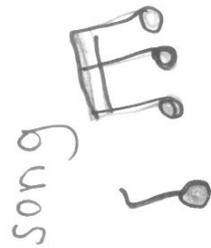
A flower that grows underground

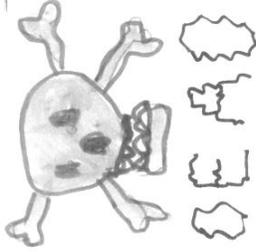3 sources of food for wildlife

a domestic animal

A bird song

SCAT

A tree with 3 different shaped leaves

Something DEAD

3 types of habitat

A raindrop's path to the Rivanna Reservoir

the State tree of Virginia

a plant with 3 jagged leaves

a sign of humans

Tree I.D.: This book (Forest Trees of Virginia) is available at TJSWCD offices. Tree ID can be done in the pavilion at Camp Albemarle, with a good selection of trees nearby.

Beech

Leaves 3 to 4 inches long, pointed at the tip and coarsely **toothed** along the edge. Bark is distinctly smooth.

Black Birch

Leaves **alternate**, 3 to 4 inches long. Break a twig for the distinctive smell of "root beer".

Dogwood

Leaves **opposite**, 3 to 5 inches long, wavy along the edge. Bark broken up into small 4-sided blocks.

Red Maple

Leaves 2-5 iches long with 3 saw-toothed **lobes**. Seeds are winged and fall in a spiral motion.

Sassafras	**Tulip Poplar** (or Yellow Poplar)
Leaves can have 1, 2 or 3 **lobes** of the shapes shown above, 4 to 6 inches long	Leaves are 4 to 6 inches long, with 4 **lobes**. Tulip-shapes flowers appear in April.
White Oak	**Wild Cherry** (or Black Cherry)
Leaves **alternate** and 5 to 9 inches long, deeply divided into 5 to 9 rounded finger-like **lobes**.	Leaves are **alternate** and pointed with edges broken by many fine, incurved **teeth**. Bark has a bitter-almond taste.

Shad Game......*or Hooks and Ladders*

This game designed originally to teach about salmon can be used for shad which are being restored in our area. (Source: http://sns.ucdavis.edu/index.php/activity_2_the_incredible)

Overview
In this activity, participants act out the shad journey from spawning ground, to the open ocean, and then back to spawning ground. In doing so, they begin to understand the unique characteristics of shad.

Background Information
This activity introduces participants to the interesting life cycle of shad by acting out a simplified version of it. Migratory fish face many challenges throughout their life cycle, including silt smothering the eggs, predators, pollution, disease, oxygen-poor water, high water temperatures, lack of food, and barriers such as dams and culverts. Only one or two from an egg nest (1/10 of 1%) make it back to their home streams to spawn.

Objectives
Participants will: (1) simulate the shad's journey from spawning ground to the ocean and back, and (2) identify obstacles these fish face at different parts of the journey.

Materials

- Large playing area (at least 50 feet x 100 feet)
- One long jump rope and two short ones
- Existing painted lines, rope, traffic cones or other boundary markers
- Two cardboard boxes
- 100 tokens (try to use biodegradable token – cardboard disk for example)
- Whistle (optional)

Advance Preparation

- o Set up the boundaries for the game as shown in the illustration below
- o About one-fourth of the playing area will be for the downstream journey to the ocean. It will include a dam turbine (long jump rope) and predators.
- o Half of the playing area will be for the open ocean, and will have two fishing boats (boxes) with fishers.
- o The remaining one-fourth of the playing area will be for the upstream journey back to the spawning ground. Here fish will pass through a fish ladder (crouching participants) and jump over a waterfall (broad jump).
2. The procedures for this activity assume a group size of about 30 participants. As you plan for the activity, add or subtract one predator and one fishing boat to adjust for a larger or smaller group.
3. Place the materials for the activity as shown:

- o Put the long jump rope in the turbine area.
- o Place the two cardboard boxes in the open ocean area.

- Scatter half the tokens on each side of the open ocean, just outside the boundary. Use biodegradable tokens please.
- Position the two short jump ropes at the waterfall area. They should be far enough apart to provide a challenging, but realistic, broad jump.
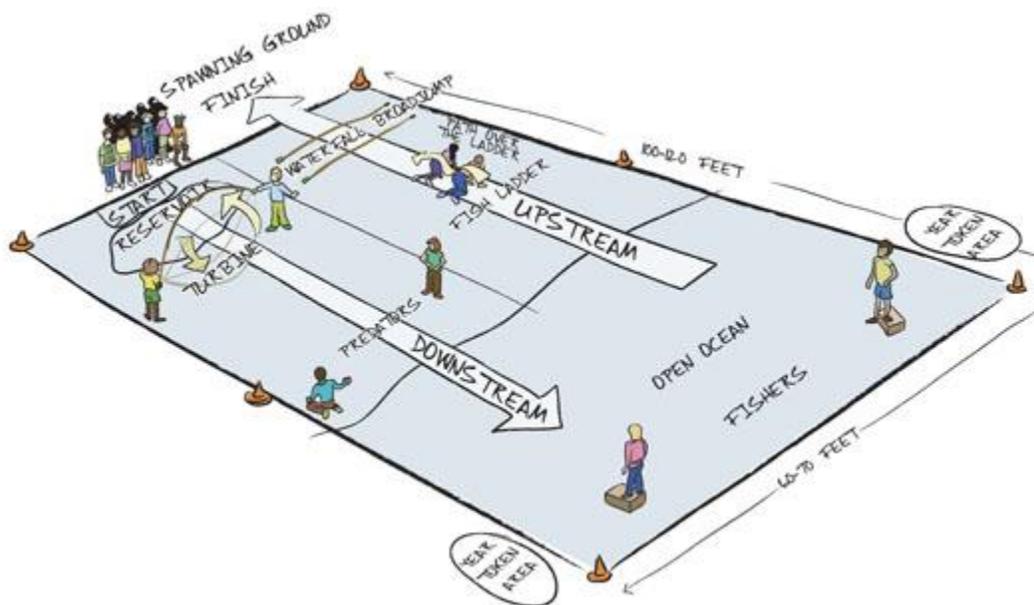
Lifecycle Game Setup

Setting the Stage

1. Begin by asking participants, "Why have people celebrated shad throughout the ages and why do they continue to celebrate shad? What makes these fish so special?"
2. Ask them, "What does the word 'migration' mean?" What are some reasons that people migrate? Why might shad migrate?"
3. Tell participants that to help them understand these questions, they will be acting out the amazing journey of the shad migration from the spawning ground to the ocean and back again, and including some of the obstacles that shad face along the way.

Conducting the Activity

1. Take participants to the playing area and explain that most of them will act as shad for the activity. Describe the journey that these "shad" must take:

   - Spawning Ground: All the shad start in the spawning ground. When you blow a whistle (or give other signal), they will start their journey downstream.
   - Dam Turbine: After they begin their journey, the shad face their first hazard - a dam turbine represented by two participants swinging the long jump rope. All shad must go through the turbine. If a shad is hit by the jump rope or a turbine operator's arm, it dies. Dead shad become part of the fish ladder (see Fish Ladder). The turbine operators may change the speed of the turbine to try to catch shad.

- o Predators: Once they pass the turbines, the shad must face two wildlife predators (who may be larger fish, birds, or mammals). These predators must use both hands to catch the shad. Upon catching a shad, the predator must escort the dead shad over to the fish ladder area (see Fish Ladder) before returning to catch more.
- o Open Ocean: All shad that make it past the predators reach the open ocean. Here, shad can be caught by fishers in fishing boats (boxes). The fishers must keep one foot in their box, but can slide the box around. As with the predators, they must catch shad with both hands and must escort any dead shad to the fish ladder area (see Fish Ladder) before returning to the ocean.
- o Year Tokens: Shad must swim back and forth across the ocean area and collect four tokens to represent four years of living in the ocean. They must cross the entire ocean before they collect a token, and they can only collect one token at a time.
- o Heading Upstream: After safely collecting four tokens, shad may start upstream. Here they encounter the fish ladder.
- o Fish Ladder: The fish ladder is made up of all the participants who were caught by predators or fishers. To make the fish ladder structure, participants crouch on all fours in a row, with a yard-wide space between them. The shad heading upstream must step over each person in the fish ladder. Predators may not harm the shad in the fish ladder.
- o Waterfall: After making it through the fish ladder, the shad must now jump over a waterfall. A shad must successfully broad jump the entire width of the waterfall to continue. If a shad fails, it returns to the bottom of the fish ladder to try again.
- o Predators: At the top of the falls, the shad must once again get past some predators (bears or eagles). Predators must catch the shad with both hands. If a predator catches a shad, it must escort the dead shad to become part of the fish ladder.
- o Spawning Ground: A shad surviving the entire course reaches the spawning ground and finishes the game.
2. Assign roles to participants:
   - o Choose two participants to be turbine operators. After all the shad have gone through the turbine, these participants move over to the waterfall to monitor the broad jump there.
   - o Choose two participants to be predators. They patrol below the turbines to catch shad heading downstream. When all the shad reach the ocean, these participants move to the top of the waterfall to catch shad before they enter the spawning ground. Predators must catch the shad by touching them with both hands. When they catch a shad, they must escort the dead shad to the fish ladder before they can catch more.
   - o Choose two participants to be fishers in fishing boats. The fishers must keep one foot in their boat (cardboard box). When they catch a shad, they must take the dead shad to the fish ladder.
   - o All other participants are shad.
3. Have participants go to their starting places. Blow the whistle (or give another signal) and help the group as it does the activity. The activity ends when all surviving shad reach the

spawning ground.

Wrap-Up

1. After doing the activity, lead participants in a discussion about it:

   o How many shad did we have at the beginning of the activity? How many did we have at the end? Do you think this survival rate is realistic? Why, why not?
   o Which obstacles were the most difficult for the shad in our activity? Which caused the most losses? Which obstacles do you think are the most treacherous for real shad?
   o What are some of the organisms that depend on shad?
   o In what ways was this simulation realistic? In what ways was it unrealistic?
   o What threats and obstacles do shad face in their life cycle that are not represented here?

Enrichment

- Ask for participant suggestions for how to modify the game to add other obstacles or elements. Play the activity again with the modifications.
- Research ways that dams can be designed or modified to be more fish-friendly, allowing migrating fish to go downstream and upstream safely.

SCAVENGER HUNT

Write down what you find or tick off each item as you find it

1. Listen for sounds not made by people or machines – name 3 of them

   ………………………………………………………………………………

   ………………………………………………………………………………

   ………………………………………………………………………

2. Locate something smooth ……………………………………………………

3. Locate something rough……………………………………………………….

4. Find a spider or a spiders web ……………………………………………….

5. Find some flowers, what color are they? ……………………………………

   ………………………………………………………………………………

6. Find items in nature with the colors of the rainbow:

   Red:…………………………………………………………………………

   Yellow:………………………………………………………………………

   Blue:…………………………………………………………………………

   Orange:………………………………………………………………………

   Green:…………………………………………………………………………

   Purple:………………………………………………………………………

7. Locate a birds nest in a tree …………………………………………...……

8. Find a twig that looks like a letter…………………………………….....……

9. Find a rock in the shape of an arrow head……………………………………….

10. Locate some insect holes, what insect made them?……………………….

    …………………………………………………………………….................……

11. Locate signs of animals, what animal is it?…………………………………

    …………………………………………………………………………………

12. Find three things that smell different, what are they? ………………………….

    1………………………………………………..………………….................……

    2……………………………………………………..……………….................……

    3……………………………………………………..……………….................……

13. Make one other observation of your own, what have you noticed today?

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