

# Habitat Selection

**Grade level:** 7-8

**Unit of study:** Population Ecology

## MI Grade Level Content Expectations:

- Science Processes

### S.IP.07.11

Generate scientific questions based on observations, investigations, and research.

### S.IP.07.12

Design and conduct scientific investigations.

### S.IP.07.13

Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens) appropriate to scientific investigations.

### S.IP.07.14

Use metric measurement devices in an investigation.

### S.IP.07.15

Construct charts and graphs from data and observations.

### S.IP.07.16

Identify patterns in data.

### S.IA.07.13

Communicate and defend findings of observations and investigations.

- Populations

### B3.5B (8<sup>th</sup> Grade)

Explain the influences that affect population growth.

**Key concepts:** habitat selection, density, scientific process

## Resources & Materials needed:

- Clipboards
- Stop watches
- Corn
- 'Bird Counts' Data sheet (pg. 3-6)
- Writing Utensil

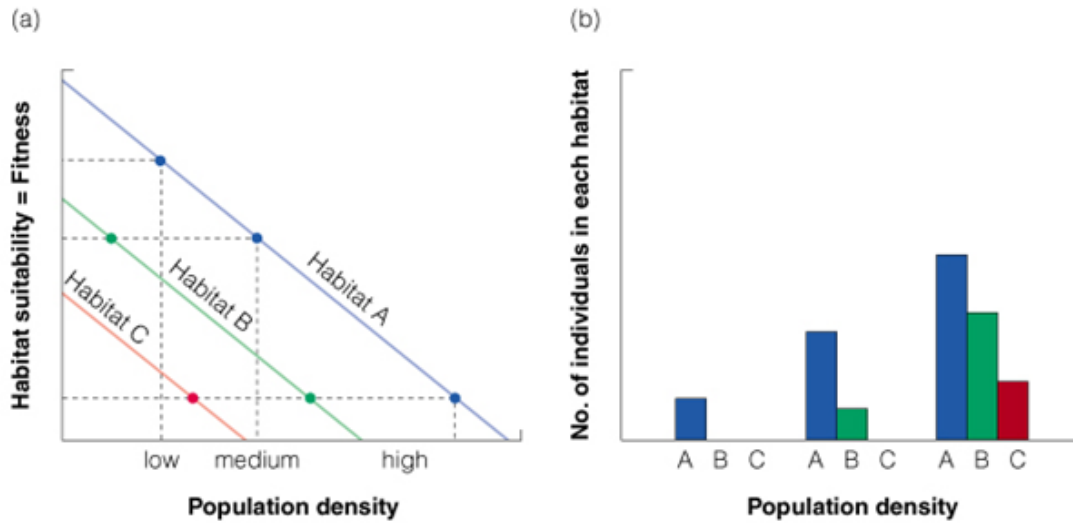
**Abstract:** In this lesson, students will explore why individuals in a patch select certain habitats. They will learn about Fretwell's Ideal Free Distribution theory, and they will conduct an experiment using this theory. Students will record data from the experiment about how many birds come to their station and the behavior of the birds. After running the experiment, the students will graph the data they found and answer questions about the data.

**Big Ideas:** Fretwell's Ideal Free Distribution theory predicts that the number of individuals in a patch is directly related to the amount of resources in that patch. The theory has two assumptions:

1. Organisms select the habitat best suited to their success (survival and reproduction)
2. Organisms are free to enter any habitat on an equal basis with residents

If this theory is true, organisms first choose to occupy the "best" habitat (the one with the most resources). As densities in the preferred habitat increase, this habitat becomes less suitable, and individuals will begin to choose to occupy the next most suitable habitat. As the densities in the second best habitat increase, individuals will begin to choose the third most suitable habitat. The end result is a distribution where at low density, only the best quality patch A is occupied; however, as density increases, patch B becomes occupied (at a lower density than A) and eventually patch C becomes occupied.

**Figure 1:** Population density graphs



### Experiment Procedure

1. We will test how the waterfowl (ducks, geese and swans) select their habitat by creating patches of different resource quality at the Kellogg Bird Sanctuary and observing the waterfowl distribution.
2. Divide into teams of 4. Each team needs a research area of about 10 feet along the shore of Wintergreen Lake. Habitat can be land or open water. Assign jobs (during the 20 minute experiment kids can take turns at different jobs).
  1. Corn Tossers
  2. Corn Toss Timer
  3. Bird Observer
  4. Data Recorder
3. Treatments (assign across the groups)
  - A. 1 piece of corn every 5 seconds
  - B. 1 piece of corn every 10 seconds
  - C. 1 piece of corn every 30 seconds
4. Every 30 seconds, count the number of each type of bird (geese, swan, or duck) visiting your area. Note if you observe any aggressive or territorial behavior.
5. After 20 minutes, combine your data with that of the other groups and plot densities for each habitat on the y-axis vs feeding rate on the x-axis.

**Conclusion:**

1. After completion of the experiment, have groups share out to the class their findings.
2. Ask them if their findings support Fretwell's Ideal Free Distribution and explain why.
3. If the results do not support Fretwell's Ideal Free Distribution, ask the students to provide a hypothesis (based on observations) for why not.

Names of Group Members:

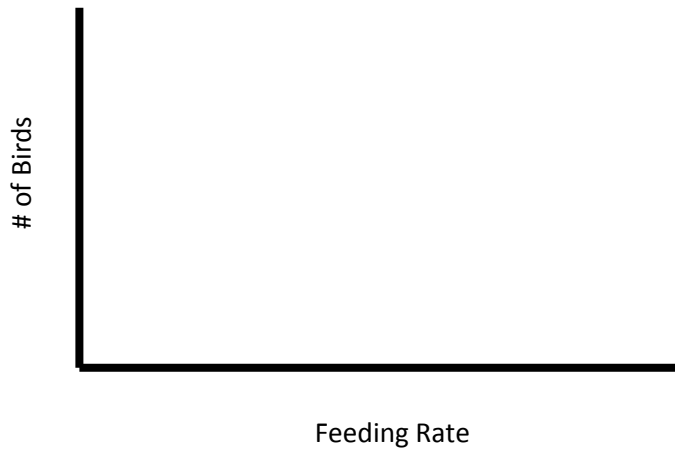
**Bird Counts**

Time	Treatment (5, 20, or 60 sec.)	# Geese	# Swans	# Ducks	Notes:
0:30					
1:00					
1:30					
2:00					
2:30					
3:00					
3:30					
4:00					
4:30					
5:00					
5:30					
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20:00					

Lab Questions:

1. Graph the density of birds in a patch vs. resource availability (feeding rate):



2. Do our data support Fretwell's Ideal Free Distribution? If not, provide one hypothesis (based on your observations) for why not.