Carolina Biological Supply Company

Hands-On Activities to Model Sampling, Habitat Degradation, and Animal Choice

#carolinaworkshops

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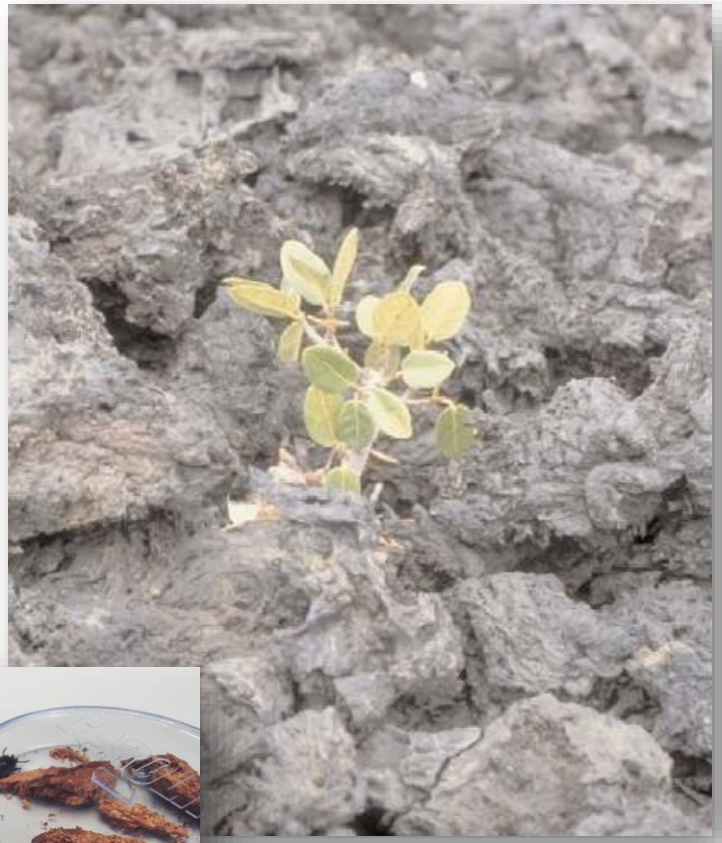
Session Objectives

- **Model and evaluate transects as a technique of organism sampling.**
- **Determine the effects of habitat degradation using choice chambers.**
- **Investigate organisms' habitat preference using choice chambers.**



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Workshop Overview

Sampling organisms using transects

- **Random sampling**
- **Calculations**
- **Transect activity**

Habitat degradation

- **Types**
- **Locations**
- **Effects on organisms**
- **Habitat degradation with choice chambers activity**

Inquiry with choice chambers

- **Habitat preference experimental design and data collection**

Building Toward 3-Dimensional Learning

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking	• Life Sciences LS 2: Ecosystems: Interactions, energy, and dynamics • Earth and Space Science ESS 2: Earth's systems • Earth and Space Science ESS 3: Earth and human activity	• Cause and effect: Mechanism and explanation • Scale, proportion, and quantity • Energy and matter: Flows, cycles, and conservation[1]

1. NGSS Lead States, *Next Generation Science Standards: For States, By States* (Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org.

Learning Context

- **Advanced Placement® Environmental Science**—Population, population shifts, and human impact
- **High School and Middle School Earth/Environmental Science**—Population and human impact
- **High School and Middle School Life Science**—Population, ecosystems, and interactions

Safety Issues

- **Personal protective equipment**
  Gloves, goggles, and lab aprons
- **Handle animals with care**
- **Clean workspace**
  Clear table tops and stow electronic devices

- ***Rotate activities every 30 minutes.***

Activity 1: Estimating Population Size

Objective:
Model and evaluate transects as a technique of organism sampling.

If a habitat had been impacted, how would you *sample* the organisms to *estimate the population*?

Four Methods of Population Sampling

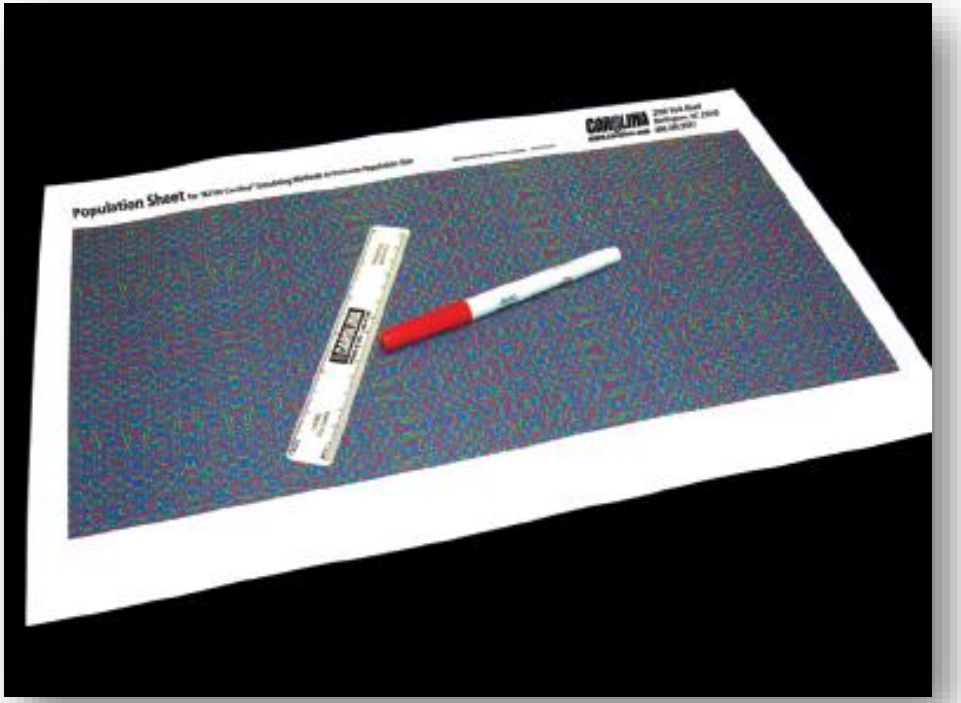
1. Population cover with transects
2. Population density using quadrats
3. Population size through mark and recapture
4. Population size through removal sampling

Today we will cover transects.

Transcects

Materials

- **Population Sheet**
- **Overhead Marker**
- **Ruler**
- **Calculator (or phone)**



***What is the importance of a *random sample*?**

***How do we *model* a random sample here?**

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Group Feedback

- **Discuss 1 situation for which transects would be appropriate.**
- **Discuss 1 situation where transects would not be appropriate.**

Activity 2: Habitat Degradation

Objective: Determine the effects of habitat degradation using choice chambers.

- **What factors impact a population?**
- **What is habitat degradation?**
- **What are some examples in your local areas?**
- **What organisms are being impacted?**

Examples of Habitat Degradation

- **Deforestation**
- **Shaded waterways that are now exposed to sunlight**
- **Sediment runoff from construction**

Habitat fragmentation is the separation of populations into isolated patches of habitat, which decreases the gene pool of a species and potentially leads to inbreeding and loss of genetic diversity.

Does habitat degradation impact habitat preference? How could students test this?

Make a Choice—Habitat Preference

Objective: Design an experiment to determine the preferred habitat for the organism(s) of your choice.

***Science and Engineering Practices**: Asking questions, and planning and carrying out investigations*

For your consideration:

- Are there interactions among individual organisms?
- Are there interactions among types of organisms?
- What abiotic factors impact habitat choice?
- What biotic factors impact habitat choice**?**

Get creative!

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Activity 3: Setup Materials

Optional materials

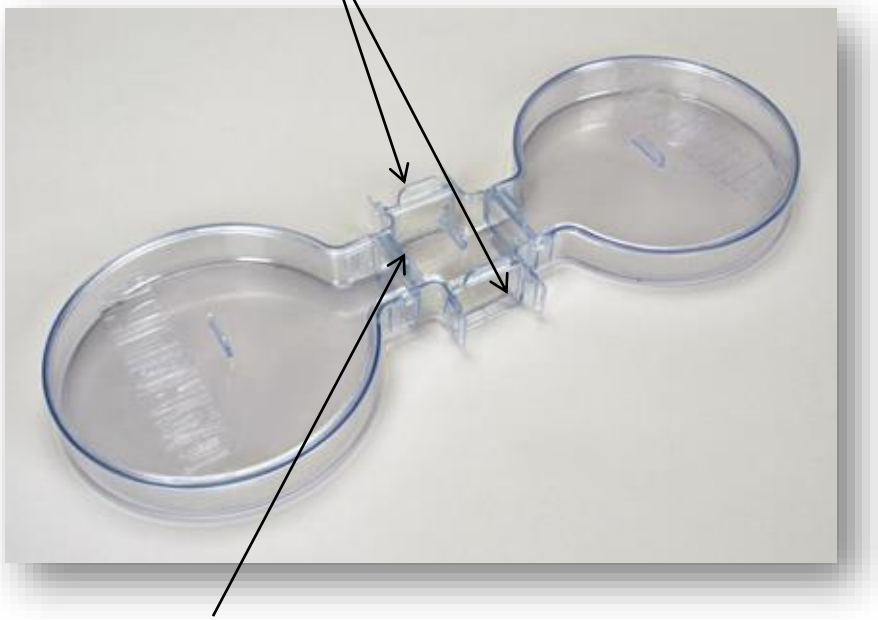
- Hot packs (warm/ambient)
- Black choice chambers (light/dark)
- Water (wet/dry)
- Soil (substrate)
- Food preferences

Optional organisms

- Bessbugs
- Millipedes
- Pill bugs
- Roaches

Please do not choose variables that may harm the organisms.

Add another chamber to each side if needed



Four removable gates to control access

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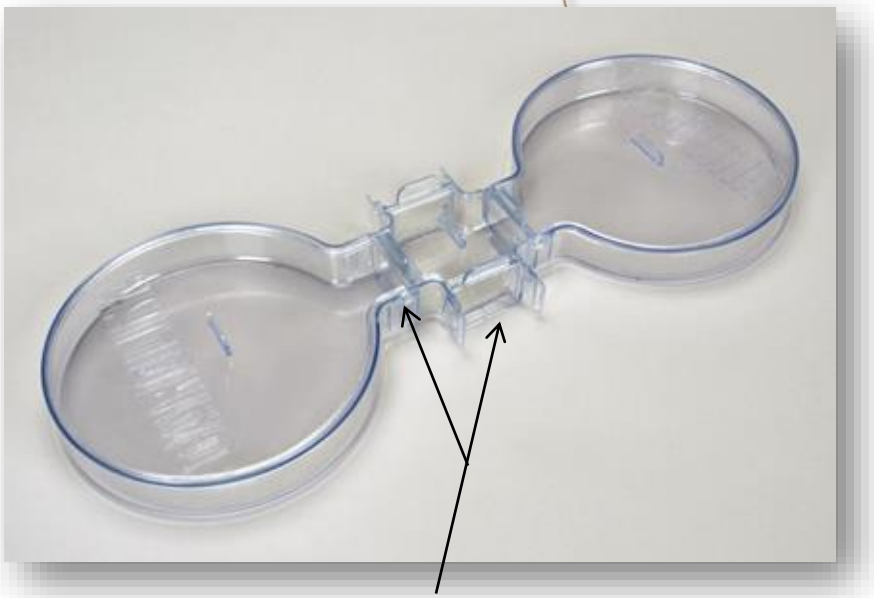
Activity 3: Habitat Preference

- **Able to use larger organisms (hissing roaches, millipedes, bessbugs)**
- **Apparatus can become a 2-, 3-, or 4-choice chamber**
- **Offers the ability to do a control and 3 additional testing parameters**



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Want to Test More Parameters?

- **Split into groups of 4 or 5 at your table**
- **Determine which organism you want to observe (millipedes, bessbugs, roaches, or pill bugs)**
- **Build a 2- to 4-chamber apparatus at your table**
- **Determine your testing parameters with materials provided (or your own ideas)**

Partner with another team to build a 3- or 4-chamber choice chamber.

Organism Habitat Preference

- **What did your team test?** *Asking questions*
- **Could you determine a "preference"?** *Analyzing and interpreting data*
- **What would you alter next time?** *Planning and carrying out investigations*
- **How important is a control?** *Planning and carrying out investigations*
- **Why is it important not to test too many parameters at once?** *Planning and carrying out investigations*

How would you use this experiment to model how humans impact habitats?

Carolina Science Kits

Carolina EcoKits®: Habitat Degradation (item #187208)

Carolina® Large Choice Chamber Kit and Black Choice Chamber (items #143051 and #143055)

Carolina EcoKits®: Estimating Population Size (item #187006, *left*)

Investigations Using Large Choice Chambers Kit (item #143054, *right*)

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Carolina Offers Free Resources to Support Teachers

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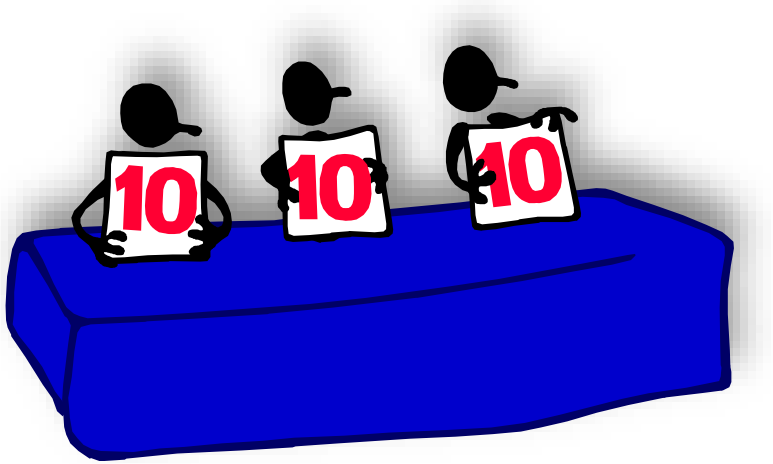
Evaluations: Share Your Thoughts

We are striving to make our workshops great!



Please evaluate this session and presenter on a scale from 0 to 10 (10 = best).

Please help us reset the room by gathering your belongings and exiting between sessions.

THANK YOU!