Learning Set 2
Animals and Their Habitats

Overview

Students will first learn how to use a program called CyberTracker for logging animal sightings in their schoolyard. Following this they will collect experimental data in the schoolyard and analyze these data to answer questions about how animals use different habitats to support different life functions.

Lessons

Lesson 1: How do I Track Animals in My Schoolyard?

This lesson introduces the students to CyberTracker by having them enter several "sightings" from photos provided by BioKIDS.

Lesson 2: How do Animals Meet Their Needs in the Schoolyard Habitats?

Using the schoolyard as their testing ground, students will use CyberTracker and observation tools to collect animal sighting data. Back in the classroom, they will analyze their data by looking at how different animals obtain food, shelter, and water within the schoolyard habitats.

Learning Set 2
Animals and Their Habitats

Before You Begin Learning Set 2

Lesson 1

- [ ] Read the *To The Teacher* section for Lesson 1.

- [ ] Read over the teacher instructions for CyberTracker found in the Before You Begin section, and become comfortable with the program.

- [ ] Contact Elena Jurasaite-Harbison (ejurasai@umich.edu or your University of Michigan support person to obtain your BioKIDS class ID number.)

- [ ] Prepare the materials for each team including Invertebrate, Vertebrate, and Track & Sign Guides (found in the student supply tote bags), CyberTracker practice photos (found in the teacher packet), and PDAs.

Lesson 2

- [ ] Read the *To The Teacher* section for Lesson 2.

- [ ] If necessary, arrange with your school for students to go outside and for additional adult support.

- [ ] Prepare a copy of the Schoolyard Habitat Map for each team.

- [ ] Prepare the materials for the students to take outside including student tote bags, the teacher tote bag (binoculars and nets only), and PDAs.

- [ ] Read the instructions for downloading the CyberTracker field data, found in the *Before You Begin* section.

- [ ] Arrange for students to use the computers with Internet access or the BioKIDS CD for 1 day. If computers are unavailable, you will need to print out Critter Catalog entries for each focal animal.

Lesson 1:
How do I Track Animals in My Schoolyard?

To the teacher:

Lesson 1 Overview:
This lesson introduces the students to CyberTracker, the animal-tracking program on the Personal Digital Assistant (PDA). Familiarize yourself with the CyberTracker program using the instructions in the *Before You Begin* section.

CyberTracker
The student notebooks include a shortened version of the CyberTracker instructions. Have the students enter the "animal sightings" from the photos provided into the CyberTracker program. These photos include ants in the dirt, a spider in its web, raccoon footprints, and a Downy woodpecker in a tree. Depending upon how many PDAs you have for classroom use, either have each student do the exercise independently or work in pairs.

There are three important items to remind students to enter in the beginning screens of CyberTracker. These three things only need to be entered at the beginning of each field data collection, not between animal sightings. You may want to go over these before passing out the photos.
1. Class ID: You will need to provide your class with your Class ID to enter into CyberTracker. This number will be determined by BioKIDS in order to not duplicate another classroom. You can obtain your number from your University of Michigan support person or by contacting Elena Jurasaite-Harbison ejurasai@umich.edu. 2. Tracker Name: For the CyberTracker introductory exercise, tell the students to choose "T" for test as they enter data about the photos. When outside in the next lesson, the students need to enter their tracker name into CyberTracker.
3. Zone letter assigned to their team.

Driving Question
How do I track animals in my schoolyard?

Learning Goals
Content
Students view, describe and identify organisms on the basis of observable physical characteristics and their structure.
Technology
Students use handheld computers to gather organized field data systematically.

Time
1 class period

Materials
- At least one PDA per team.
- One set of practice photos per team, found in the teacher tote bag.
- One Invertebrate Identification Guide, one Vertebrate Identification Guide and one Track & Sign Guide from the student tote bags per team.

Lesson 1: How do I Track Animals in My Schoolyard?

When outside, biologists collect data on what animals they see and how many of each kind they see. There are many methods of recording this data, from paper and pencil to sophisticated computers.

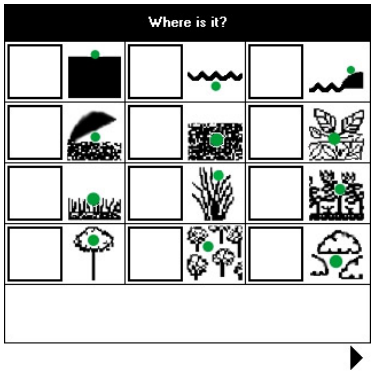
What is CyberTracker?

CyberTracker is a program developed for professional animal trackers in African animal reserves. CyberTracker runs on hand-held computers, such as Palm Pilot or a Handspring Visor. These hand-held computers are sometimes called Personal Digital Assistants, or PDA for short. The version used in BioKIDS has been changed to include Michigan animals you might see in your schoolyard. We will be using it in the schoolyard for a fast and accurate way to record animal sightings and signs.

1. Using the photos provided, enter data into your PDA. If you need help, there are instructions starting on the next page. Below are three tips to help you get started.

Three CyberTracker Rules to Remember

1. Pressing and holding on any icon on a screen shows what the icon means (it's name)
2. Right arrow ▶ advances to next screen
3. Down arrow (see figure to right) leads to more information



2. After using the program, describe the benefits of using CyberTracker on the PDA instead of paper to log animal data.

Several possible answers include:

- *If the paper gets wet the data may be lost.*
- *You do not have to read/write to use CyberTracker.*
- *The data can be put directly into a computer.*

CyberTracker Instructions

The next four pages explain how to use the CyberTracker program on the PDA. Once you get the basic idea, it's easy to use!

1. Turn on the Personal Digital Assistant (PDA).

2. Tap on the Home icon (bottom left side of the screen) to see all the programs on your PDA. (Tap means use the pen to touch the screen.) If you don't see CyberTrack er right away, switch to the "All" view.

3. Tap on the CyberTracker icon to start up the program.

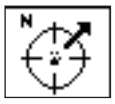
4. The following steps you have to do **only ONCE per field session.**

Class ID: Tap on the "BIOKIDS #" icon, then tap on the ▶ arrow near the bottom of the screen. Enter your class ID (your teacher will tell you the number). You will need to tap on the digits in order, like with a calculator. If you make a mistake, tap on "<" to erase the wrong digits. When your number is entered correctly, tap on ▶ to save your data.

Tracker Name: Tap on the N icon, then on the ▶ arrow near the bottom. You will see the list of tracker names. Tap and hold any icon to see the name if you don't recognize the icons, or refer back to where you chose your team name for a reminder.

When you are doing training sessions inside, choose "T" for test. When you are collecting data, select your team's tracker name. (The tracker names are explained in Activity 1.)

(From now on, we will leave out the part about tapping on the ▶.)



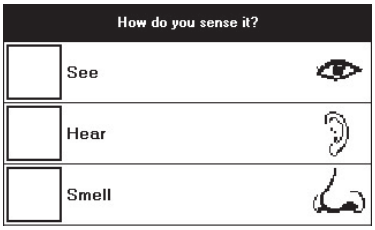
Zone: Your team has been assigned to work in a specific schoolyard zone. Select the zone from this list.

You may have already noticed that you can see your choices in the history bar at the top of the PDA screen. Check this to make sure your class ID, tracker name, and zone are correct.

5. The following steps you will do **for EACH entry** you make.

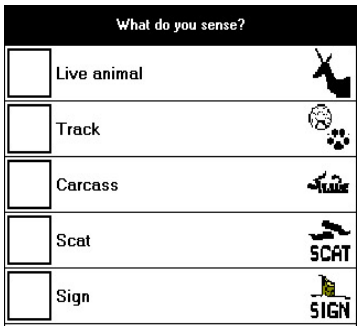
a) **Begin**

Tap on the "Begin" icon.



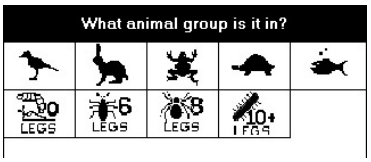
b) **Sighting Method**

Choose a sighting method: *See, Hear, Smell*. Mark how you are sensing the animal or its sign. You can select one, two or all three of these options, depending on how you observe the animal. (For example, you might smell a skunk but not see it.)



c) **Sighting Type**

Choose a sighting type: *live animal, track, carcass, scat or sign*. Indicate exactly what you are sensing. You can select one or more of these options. Scroll down to see the scat and sign options.



d) **Animal Group**

Choose the animal group that is appropriate for your animal.

Your choices here are: *annelids & mollusks, insects, arachnids, myriapods & crustaceans, birds, mammals, amphibians, reptiles or fish.*

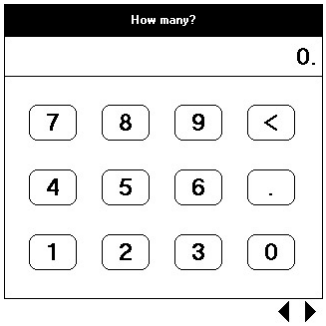
e) **Animal Name**

Use the Invertebrate, Vertebrate Identification Guides and Track & Sign Guide to help you identify the organisms.

For each Animal group, you work through one or more screens before you get to a list of animal names. Each list includes "other" and "unknown" as options. Use "other" when you are sure it is not on the list and "unknown" when you're not sure what the animal is.

Note about **invertebrates**: Because there are so many invertebrates in the world and in your schoolyard, some of these groups use more than one screen for identification. Whenever you see "…" in a name (such as "Slugs and Snails…" or "Butterflies…", that means it links to another screen with more choices.

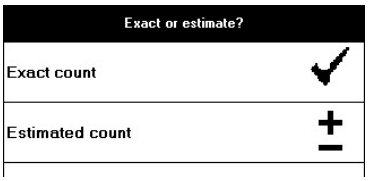
Whenever you see a scrollbar at the right side of the screen, it means there are more choices than what you see. You will need to scroll down by tapping the down arrow at the bottom or by dragging the dark middle part of the scrollbar.



g) **Count**

Enter the number of individuals you saw, heard, or smelled. If you saw a track or sign (instead of live animals), enter "1" here.

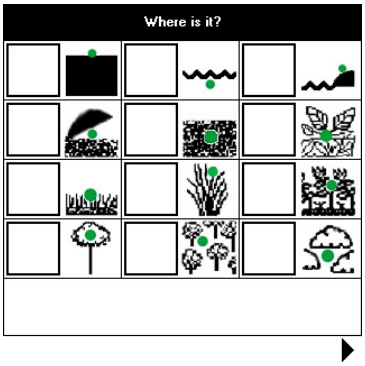
Enter numbers as on a calculator, and use "<" to back up over wrong digits.



h) **Exact or Estimate?**

Next mark if you entered an exact count or estimated count.

(For example, if you are looking at an anthill, you probably want to estimate instead of count! This is also true if you see a flock of birds fly overhead.)

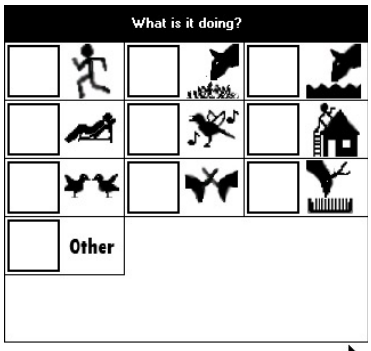


i) **Habitats**

Next you see a list of habitats. Tap the boxes next to the habitats where you see the animal. You can choose more than one habitat.

Remember to hold the pen down on a picture to see its description.

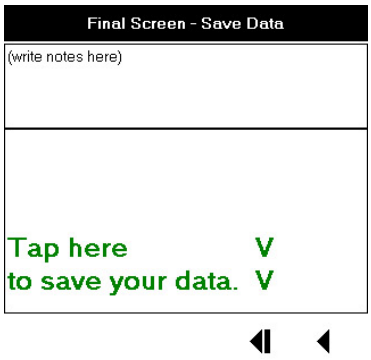
For a description of the habitats, you can ask your teacher to see *Part 3* in the *Reference Section.*



j) **Behaviors**

The final screen is behaviors and it works like the habitats. Choose one or more behaviors that your animal is doing.

For a description of the behaviors, see ask your teacher to see *Before You Begin* page xiv.



k) **Stop**

If there is anything extra you want to describe about your observation, the last screen is the place for it. You can tap on the "abc" rectangle to get letters to tap on to spell out your note. For example, if you are recording a squirrel nest, you could record "sign" as the sighting type, and type "nest" in this note area in order to be more specific. A note can say anything you want.

Finally, tap the ◀| button to save your data about this animal. You will return to the first screen, where you tap 

to enter your next animal sighting.

(Go back to step 5a in the directions if you need a reminder of what to do.)

NOTE: You MUST tap ◀| for the computer to save your entry.

TIP: The PDA turns itself off automatically after a certain time period to save battery power. When you turn it on, CyberTracker should be at the screen where you were when it went to sleep.

Lesson 2:
How do Animals Meet Their Needs in the Schoolyard Habitats?

To the teacher:

Lesson 2 Overview:
In this lesson, students will first go outside to collect animal sightings using the CyberTracker program. A CyberTracker Habitat Summary Table will be generated for use in both this lesson and Learning Set 3. Students will choose three focal animals to investigate using the Critter Catalog and learn about how each animals uses the schoolyard habitats.

1. Data Collection
Lead a class discussion about what type of data they should collect in their zones. Students will want to log the number of animals seen in the zone using CyberTracker and try to identify the animals. For their investigation students will be able to use the binoculars, magnifying glasses, invertebrate collection tools, and identification guides. Students can collect additional invertebrates if they are interested.

Have the members of each team choose a role from the table on their worksheet and go outside to their zones for data collection. Make sure students understand the responsibilities of each student role. This data collection will take from one to two class periods. Students will need to identify animals using the animal guides and record the information on CyberTracker and on their zone map.

***Before the data analysis part of this lesson, it is necessary to collect the PDAs and sync the data to obtain the CyberTracker Habitat Summary Table. Arrange with your University of Michigan support person for help with this if you are not comfortable with the process.*

2. Focal Animal Data Sheets
Give each team a copy of the CyberTracker Habitat Summary Table. Aid student teams in choosing both vertebrate and invertebrate focal animals for further investigation. Students should choose three focal animals that were seen multiple times within the schoolyard (not just their zone). Some suggestions of common animals include: a) ants, earthworms or

Driving Question
How do animals meet their needs in the schoolyard habitats?

Learning Goals
Content
- Students learn how animals meet their needs for food, water, and shelter in the schoolyard habitats.

Inquiry
- Students use appropriate tools and techniques to gather data.
- Students formulate explanations from evidence.

Technology
- Students use hand held computers to gather organized field data systematically.
- Students use technological tools to organize and transform data for analysis
- Students use technological tools for viewing and identifying animals.
- Students use Internet resources to research background science knowledge to support claims.

pillbugs and b) pigeons, starlings, robins or squirrels. If the summary table is not immediately available, lead a discussion about what animals were found in the schoolyard and choose three focal animals. Students can investigate the animal needs using the Critter Catalog in advance of getting the official CyberTracker Habitat Summary Table. Using their CyberTracker Habitat Summary Table and the Critter Catalog, have students gather information on the Focal Animals Data Sheets. The animal needs information can be found in the Critter Catalog (www.biokids.umich.edu/critters/).

If your class does not have access to computers, it may be necessary to print out the focal animal entries for the students.

3. Focal Animal Analysis Sheets
Using the information that students collected on the Focal Animal Data Sheets, have the students answer the questions on the Focal Animal Analysis Sheets. These questions address the concept of **niches**, and address how animals use habitats differently to meet their needs. As a class, discuss the concept of **competition** for resources and have students write the answers on the worksheet. The question asks: "How could you tell if two species were competing for a resource? Encourage students to think about the following: Imagine two species did have the same needs. What might keep them from competing?" Answers would be things like both species being limited by other needs, or the presence of a third species that eats them both and keeps them both at low enough population sizes that they don't compete, or some aspect of their biology (e.g. seasonal differences) that keeps them from needing the same things at the same time.

Time
5 class periods

Materials
- One Schoolyard Habitat Map per team
- At least one PDA per team
- One supply tote bag per team:
  – 1 pair of forceps
  – 1 magnifying lens
  – 1 shovel
  – Collection containers
  – Invertebrate Identification Guide
  – Vertebrate Identification Guide
  – Track & Sign Guide
- Teacher supply tote bag
  – 2 pair binoculars
  – 2 insect nets
- At least one computer with internet access or the BioKIDS Critter Catalog CD –ROM per team

Lesson 2:
How do Animals Meet Their Needs in the Schoolyard Habitats?

Name: _____ Team Name: _____

Using the CyberTracker program, Schoolyard Habitat Map, and the animal observation/ collection tools, you will now go outside to collect information about all the animals that you see in your zone. Each team will collect data in their assigned zone and then share it with the whole class. Have each member of your team choose a role.

Role	Job Description	Name of Responsible Team Member
Micro Observer	The **MicroObserver** will carry and use a shovel and Invertebrate Identification Guide to help find and identify the small animals.	
Macro Observer	The **MacroObserver** will carry and use Vertebrate Identification Guide to help identify the larger animals. This person will also use the Track & Sign Guide to determine if animals have been in the schoolyard.	
Mapper	The **Mapper** will mark on the Schoolyard Habitat Map where there are any animal sightings or signs.	
Tracker	The **Tracker** will be responsible for logging the animal sightings into CyberTracker on the PDA.	

Sample CyberTracker Habitat Summary Table

The animal sightings you collected on the PDAs have been downloaded into a CyberTracker Habitat Summary Table. A summary table is a chart that organizes the data so that it is easy to make calculations and see patterns in the data. Your team will get a copy of the CyberTracker Habitat Summary Table with data from the whole class. A sample summary table is shown below.

Habitat	Animal Group	Animal	How Many?	Location (Zone)
 Short grass	 6 LEGS Insects	Unknown beetle	13	A
 Short grass	 6 LEGS Insects	Bee	2	F
 Bare ground	 Mammals	Norway rat	1	D
 Bare ground	 Mammals	Rox squirrel	1	F
 In the soil	 10+ LEGS Myriapods and Crustaceans	Centipede	2	E
 Under rock or log	 0 LEGS Annelids and Mollusks	Earthworm	1	D
 In the air	 6 LEGS Insects	Bee	1	A
 Single tree	 Birds	American robin	1	F

Focal Animal Data Sheet 1

Name: _____ Team Name: _____

1. As a class, discuss what animals were found in your schoolyard. Choose three focal animals that were seen in many habitats for further investigation. Make sure you include at least one vertebrate and at least one invertebrate. Possible animals include: a) ants, earthworms or pillbugs and b) pigeons, starlings, robins or squirrels. If your CyberTracker Habitat Summary Table is available, use this information to back up your choices.

Focal Animal 1: _____

Focal Animal 2: _____

Focal Animal 3: _____

2. Now we will investigate the needs of each of the three focal animals.

a. Open the Critter Catalog (www.biokids.umich.edu/critters/) or get printouts for the focal animals from your teacher.

b. Review the following Critter Catalog sections for each animal:

"What do they eat?"

"What kind of habitat do they need?

"What eats them and how do they avoid being eaten?"

c. Fill in the charts on the next page for each focal animal.

Focal Animal Data Sheet 2

Focal Animal 1: _____

Food	
Shelter from Weather and Other Animals	
Predators	

Focal Animal 2: _____

Food	
Shelter from Weather and Other Animals	
Predators	

Focal Animal 3: _____

Food	
Shelter from Weather and Other Animals	
Predators	

Focal Animal Data Sheet 3

3. Using your CyberTracker Habitat Summary Table, place an "X" in the table below in the habitat boxes where animals were seen:

	FOCAL ANIMALS YOUR CLASS CHOSE		
HABITATS	Animal 1:	Animal 2:	Animal 3:
 bare ground			
 in the soil			
 short grass			
 tall grass			
 leaf litter or mulch			
 bushes			
 under something			
 in the air			
 single tree			
 trees together			
 in water			
 near water			

Focal Animal Analysis Sheet 1

Name: _____ Team Name: _____

Use the information from your Focal Animal Data Sheets to help fill in the worksheet:

1. Choose an animal that was seen in more than one habitat:
Focal Animal: _____
Habitat 1: _____
Habitat 2: _____
Habitat 3: _____

Small animals are often able to meet all of their needs within one habitat. Large animals need to visit more than one habitat to gather food, obtain enough water, and find shelter.

Scientific question:

Can a *robin* **meet all its needs (survive)**
(your focal animal)

in the air ?
(one habitat where animal was seen)

What is the main science concept covered in this question? ***Sample: Survive – In order to survive, an animal must live in a habitat that provides food, water, shelter, and space.***

Scientific Explanation:

Claim: There are two possible claims: that the animal could or could not survive only in one habitat, BUT most animals require more than one habitat to survive.
Sample: Robins could not survive only in the air.

Hint:
A claim is a complete sentence that answers the question.

Evidence: If the claim is negative, evidence would be examples of food/water/shelter/space that are NOT provided by the selected habitat. If the claim is positive, evidence would be examples of how food/water/shelter/space are ALL provided by the selected habitat.
Sample:
#1 – Robins cannot build a shelter in the air.
#2 – Robins do not find their food in the air.

Hint:
Evidence is observations, data, or information that support the claim. Explanations need ***two*** *or more pieces of evidence.*

Reasoning: To link claim and evidence, here students should explicitly describe if all animals needs are met or not met by the habitat selected.
Sample:
The air does not provide all that a robin needs to live.

Hint:
Reasoning tells why your particular evidence supports your claim.

Concluding Sentence: Therefore,
Here, students should reassert their claim.
Sample:
Therefore, Robins could not survive only in the air.

Hint:
Restate your claim in the Concluding Sentence.

Put it all together in a paragraph!

Robins could not survive only in the air. In order to survive, an animal must live in a habitat that provides food, water, shelter, and space. Robins cannot build a shelter in the air. Robins do not find their food in the air. The air does not provide all that a robin needs to survive. Therefore, robins could not survive only in the air.

Focal Animal Analysis Sheet 2

Name: _____ Team Name: _____

Scientific question:

If there was no rain for one year, would a robin visit habitats in different areas?

(your focal animal)

What is the main science concept covered in this question? ***Sample: Habitat – habitats provide animals with everything they need to live: food, water, shelter and space.***

Scientific Explanation:

Claim: There are two possible claims here, but the most likely claim is that lack of rain WILL drive animals to seek other habitats.
Sample:
If there were no rain for one year, robins would visit different habitats.

Hint:
A claim is a complete sentence that answers the question.

Evidence: If the claim is that the animal will move to a different habitat, then the evidence should be facts that indicate the current habitat no longer provides everything it is supposed to provide. Without rain, water and perhaps food may become an issue.
Sample:
#1 – Without rain, our schoolyard would have no water.
#2 – Without rain, berries and insects will dry up.

Hint:
*Evidence is observations, data, or information that support the claim. Explanations need **two** or more pieces of evidence.*

Reasoning: Here students should explicitly describe how lack of rain turns the schoolyard into an undesirable habitat. That is the link between the evidence and the claim that animals will leave.
Sample:
A schoolyard habitat without water or berries to eat does not provide robins with everything they need to live.

Hint:
Reasoning tells why your particular evidence supports your claim.

Concluding Sentence:Therefore,
Here, students should reassert their claim.
Sample:
Therefore, if there were no rain for one year, robins would visit different habitats.

Hint:
Restate your claim in the Concluding Sentence.

Put it all together in a paragraph!

If there were no rain for one year, a robin would visit habitats in different areas. Habitats provide animals with food, water, shelter, and space. Rain provides water in a habitat. Plants and invertebrates that robins eat will die without water. Without rain, the schoolyard habitats would not provide robins with food and water they need to survive. Therefore, if there were no rain for one year, a robin would visit habitats in other areas.

Focal Animal Analysis Sheet 3

Niche The unique role or way of life of a plant or animal species. Beavers and otters live in the same pond habitats in Michigan. While they live in the same pond habitats, they eat different things and so do not complete for food. Therefore, beavers and otters have different roles or niches in the pond habitat.

3. a. Choose two focal animals that share the same habitat:

Focal Animal 1: _____ Focal Animal 2: _____

Shared Habitat: _____

b. Based upon your research, describe any resources (specific food, water or shelter) that both species need.

c. Describe how the two animals may interact in the habitat (how the niches for the focal animals overlap).

Competition Competition occurs when two or more species need the same resource, but there is not enough for both of them. Animals also might compete for nesting spots, shelter or other resources.

4. As a class, discuss how you can tell if two species are competing for a resource. Describe two ways here:

(1)

(2)