



## Bioblitz Skillbuilders: Learning and Applying the Skills of a Naturalist

# Skillbuilder 3: How Diverse is Biodiversity?

### Key Question

How diverse is biodiversity?

### Objective

Students **explore misconceptions** about biodiversity by hypothesizing the number of animal species and comparing to scientific estimates.

Grades: 2-5

Time: 15 minutes

Location: Classroom

### Materials

- Post-it Notes
- Whiteboard or butcher-block paper
- Pens or pencils
- Biodiversity worksheet and answer key
- Projector (optional)

### Preparation

- Cut Post-it Notes into small strips and prepare sets of 10 Post-its for each student.
- On a large piece of butcher-block paper or white board, make a column for each animal group that is listed on the worksheet and label. Do not hang the paper until students have completed step 1 of the activity. Optional: Add an “other invertebrates” column for the animals outside one of the major invertebrate and vertebrate groups.
- Print one diversity worksheet for each student and an answer key for the teacher.

### Recommended Reading

Organisms are organized into different groups based on shared characteristics - both observable and genetic. We are able to classify organisms into a hierarchical system called taxonomy based on these characteristics. Worms have a certain set of shared characteristics, while sponges have another, as do all other groups of organisms. Visit the following EOL pages to learn more about animal diversity and taxonomy:

- [Biodiversity Articles](#)
- [What is an Animal?](#)
- [What is Biological Classification?](#)
- [What is Biodiversity?](#)

- *What is a Species?*
- *Biodiversity Educational Resources*

## Directions

1. **Engage:** Hand out Post-its and writing utensils to students. Tell students they have TWO minutes to write down the names of 10 animals, one on each Post-it. At the end of two minutes, hang up butcher-block paper on wall or whiteboard. Or, draw the chart directly on whiteboard.
2. **Explore:** Ask students, a few at a time, to bring their Post-its to the board and place the each animal in a column that best describes it. After all students have participated, ask a few questions:
  - a. *What patterns do you see? (In most cases, mammals has the highest number of entries, followed by birds, fish, or reptiles)*
  - b. *Did we represent all of the groups? If not, what groups did we NOT represent?*
3. **Explain** that organisms are organized into different groups based on shared characteristics. We are able to classify organisms into an organized hierarchical system called **taxonomy** based on these characteristics, from broad (kingdom) to specific (species). As humans, it is easy to characterize animals as the ones we see most often, but there is much animal diversity we don't pay attention to in the same way in everyday life. Plants have a certain broad set of shared characteristics, while sponges have another, as do all other broad groups (or phyla) of organisms.
  - a. Project (or pass around images of) examples of worms, echinoderms (sea stars, urchins), sponges (porifera), jellies and anemones (cnidaria). These are examples of different *phyla*, that are diverse groups of organisms that share a certain broad set of traits.
4. **Elaborate:** Now that students understand each animal group/phyla, ask them to fill out the "Guess" column of their diversity worksheet. How many SPECIES do they guess or hypothesize, based on what they know already, belong to each phylum/group? After 3 minutes, ask different students to share their hypotheses and reveal taxonomists' estimated numbers.
5. **Evaluate:** Lead discussion about animal diversity:
  - a. Which groups did students under-estimate, and which did they over-estimate?
  - b. Were any students close to the true number for a group?
  - c. What were students most surprised about?
  - d. Which of these animal groups do they think they could find in the schoolyard? Their backyards? The beach? Where else?

## Next Generation Science Standards

### Performance Expectations

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

3-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

### Science and Engineering Practices

- Asking Questions and Defining Problems
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions



Encyclopedia of Life  
eol.org + education.eol.org



This activity was developed by the Encyclopedia of Life Learning + Education Group as part of the Okaloosa SCIENCE grant, supported by the Department of Defense Education Activity (DoDEA) under Award No. H#1254-14-1-0004. Opinions, interpretations, conclusions, and recommendations are those of the author and are not necessarily endorsed by the Department of Defense. Learn more about this grant at: [www.okaloosaschools.com/okaloosascience/](http://www.okaloosaschools.com/okaloosascience/)

## Animal Diversity Worksheet

<b>Groups</b>	<b>Guess Number of Species</b>	<b>Scientifically Described Species</b>
Squid, octopus, bivalves, and snails (Phylum Mollusca)		
Crustaceans (Phylum Arthropoda)		
Arachnids (Phylum Arthropoda)		
Insects (Phylum Arthropoda)		
Fish (Phylum Chordata)		
Amphibians (Phylum Chordata)		
Reptiles (Phylum Chordata)		
Birds (Phylum Chordata)		
Mammals (Phylum Chordata)		
Total		

## Animal Diversity Worksheet Answer Key

Groups	Guess Number of Species	Scientifically Described Species*	Total Estimate* (unknown species not yet described)
Squid, bivalves, and snails (Phylum Mollusca)		85,000	200,000
Crustaceans (Phylum Arthropoda)		47,000	150,000
Arachnids (Phylum Arthropoda)		Over 102,000	600,000
Insects (Phylum Arthropoda)		Over 1,000,000	5,000,000
Fish (Phylum Chordata)		Over 31,000	40,000
Amphibians (Phylum Chordata)		Over 6,500	15,000
Reptiles (Phylum Chordata)		Over 8,700	10,000
Birds (Phylum Chordata)		9,900	10,000
Mammals (Phylum Chordata)		5,487	5,500
<b>Other Invertebrates (optional to use)</b>			
Sponges (Phylum Porifera)		6,000	18,000
Jellies, Corals, Anemones (Phylum Cnidaria)		over 9,700	Unknown
Earthworms (Phylum Annelida)		over 16,700	30,000
Sea stars and urchins (Phylum Echinodermata)		7,000	14,000
Total			

\*Estimates gathered from: Chapman, A. (2009). *Numbers of living species in Australia and the world* (2<sup>nd</sup> ed.). Parkes, ACT: Australian Govt., Dept. of the Environment, Water, Heritage, and the Arts