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Introduction

As a part of the CNC education toolkit, a group of educators at institutions around the world has gathered and reviewed hundreds of resources about biodiversity and citizen science that are relevant to the City Nature Challenge. These resources are our recommended activities for ages 11-14.

This progression of activities is designed to introduce the concept of biodiversity and build observation and other field skills for the City Nature Challenge. At least some activities include outdoor and field components. See 'modifications' section below for ideas on how to make these activities work for you, whether you work with students in a formal classroom or a museum, nature center, after school program, homeschool, or other informal environment. See standards at the bottom for how these activities connect to Next Generation Science Standards (U.S.). You can search through the [full set of age 11-14 resources](#) for educator guides, classroom and field activities, media, and more!

New to taking students outside? Be sure to read through our [Guide to Teaching Students Outside](#) for tips on outdoor group management and teaching strategies.

Objectives: Students will...

- Identify the characteristics of major groups of organisms on earth and discuss global biodiversity
- Build observation, identification, and classification skills
- Apply observation and identification skills by creating a class field guide
- Explore City Nature Challenge results through data analysis

Activities

Activity 1: [National Geographic: Introducing Biodiversity and BioBlitz](#)

Students learn about the number of species identified globally in key taxa and use this information to make predictions about the biodiversity they may observe during a bioblitz (City Nature Challenge).

- **Type:** Lesson Plan
- **Activity Time:** 60 minutes
- **Setting:** Classroom or indoor space with technology access
- **Focal Science Practices:** Asking Questions, Making Observations, Drawing Conclusions and Communicating Information
- **Recommended Use:** This activity was written for the 2016 U.S. National Parks Service Centennial bioblitz. Modify by replacing the bioblitz with the City Nature Challenge, which is a 4-day bioblitz. This activity includes a guided powerpoint presentation, so requires use of a computer and projector.

Activity 2: [Encyclopedia of Life Bioblitz Skillbuilders](#)

These five short and simple 15-20 minute activities focus on building the skills of a naturalist: observation, identification using field guides, biological classification and defining characteristics, and understanding global biodiversity. Can be taught in order or independently.

- **Type:** Lesson Plan (5 activities)
- **Activity Time:** 15-20 minutes each
- **Setting:** Classroom or indoor space, or outdoor space
- **Focal Science Practices:** Making Observations, Drawing Conclusions and Communicating Information
- **Recommended Use:** If choosing a subset of these skill-builders, we recommend Skillbuilder 1 (observation), Skillbuilder 2 (drawing and identifying common birds), and Skillbuilder 4 (modeling biological classification) in that order. Skillbuilder 3 (How Diverse is Biodiversity?) is shorter version of the previous National Geographic activity, so could be used in its place. Skillbuilder 2 (ID that Bird!) focuses on birds from North America, but you can find versions for each continent in [this Google folder](#).

Activity 3: [Field Guide to the Biodiversity of your Schoolyard](#)

Explore, observe, and record the species around your schoolyard or other outdoor space and create an illustrated field guide or collection of the plants and animals students discover.

- **Type:** Lesson Plan
- **Activity Time:** 60 minutes
- **Focal Science Practices:** Making Observations, Drawing Conclusions and Communicating Information
- **Recommended Use:** This is a great follow-up for the EOL skillbuilders where students can apply their observation and field identification skills and create their own field guides. The [field guide template](#) provided may be more appropriate for the younger end of this age bracket; you can create a different template or have older students design their own journal pages.

Activity 4: [National Geographic: Analyzing Bioblitz Data](#)

Students explore observations from a bioblitz using iNaturalist data then create a class graph of data and draw inferences about biodiversity, invasive species, and endangered species.

- **Type:** Lesson Plan
- **Activity Time:** 60 minutes
- **Setting:** Classroom or indoor space with access to technology
- **Focal Science Practices:** Making Observations, Analyzing and Interpreting Data, Drawing Conclusions and Communicating Information
- **Recommended Use:** This is a nice activity for after the City Nature Challenge. This was also written for the National Parks Service (U.S.) centennial celebration bioblitz events in 2016. Replace the 2016 events with the City Nature Challenge and have fun with it!

Modifications

- All activities can be modified for informal settings.
 - If you do not have access to a green outdoor space or do not have a schoolyard with grass, consider putting window boxes outside your classroom or if possible building a small raised bed garden.
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- Most activities include materials for printing, however you have students design their own data sheets or species cards.

Extensions

- [Encyclopedia of Life Species Cards](#)
 - Explore the characteristics and behaviors of species using EOL's free species cards. Both premade species cards and template for participants to make new species cards from their own observations. Includes links and resources to multiple games and lessons/activities using the cards.
 - If you have access to a color printer, print cards and laminate (optional) to play games and or bring into the field as a guide. If you do not have a color printer, print the blank species card templates and have students draw real species they observe outside or even create their own species.
- Extend exploration throughout the year:
 - Begin the observations early to draw comparisons between seasons.
 - Encourage students to explore with their families at home.
 - Build a class bird feeder to increase the biodiversity you can see from the window.
- Explore the [full set of resources for age 11-14 here](#).

Relevant Science Standards

Next Generation Science Standards (U.S.)

- Performance Expectations
 - MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
 - MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
 - MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
 - Connections to Nature of Science:
Scientific Knowledge Assumes an Order and Consistency in Natural Systems: Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS4-1),(MS-LS4-2)
 - Science and Engineering Practices
 - Asking Questions and Defining Problems
 - Developing and Using Models
 - Analyzing and Interpreting Data
 - Using Mathematics and Computational Thinking
 - Constructing Explanations and Designing Solutions
 - Obtaining, Evaluating, and Communicating Information
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