

# Middle School Activity: Nature Survey

*Documenting biodiversity in an area is one way that scientists can tell if the ecosystem is healthy or in danger. If an ecosystem is becoming dominated by a single species, it can collapse with the slightest threat.*  
(NGSS Disciplinary Core Ideas MS.LS2.A Interdependent Relationships in Ecosystems)

## Pre-Activity Questions

- What makes an ecosystem healthy?
- What is **biodiversity** and why is it important?
- What is a **native plant** or **animal**?
- Why are native plants and animals important when looking at biodiversity?

## Activity

- Nature is full of a huge range of complex ecosystems. Each has many different plants and animals that are all interconnected and rely on each other in different ways. It goes far beyond a simple food chain, but is closer to a food web. There are redundancies and extra connections built into an ecosystem that allows it to be flexible and adapt to changes. Black Bears don't **ONLY** eat berries. They eat a huge range of foods that are available at different times of the year.
  - Think about it like a car. If a single bolt in that car is removed, it will likely still run. As a passenger, you may not even notice that the bolt is missing. But what happens if we remove a quarter of the bolts? Half? All? There's a breaking point in which the car will suddenly collapse and no longer function.
  - What if we removed an engine instead of a bolt? That has catastrophic consequences even though it's just one.
  - A single bolt would be a single species like a specific type of flower in our ecosystem (car). An engine would be a keystone species like an oak tree. Different species have different significance in an ecosystem depending on how many others solely rely on that species.
- As humans expand and develop natural areas, we are pushing out many native species and - in many cases - reducing biodiversity. We are removing not only engines but handfuls of bolts. Some of those bolts are being replaced by screws (non-native species) that seem to do well in the gap we created, but they don't actually fill the same ecological role of the species we removed. Sometimes this has unexpected consequences.
  - **MILKWEED** is an excellent example of this phenomenon. With the alarming decline of the iconic monarch butterfly, there was a huge push for people to plant milkweed, the monarch butterfly's larval host plant. There is a Tropical species of milkweed that is not native to California, but is more readily available at nurseries, has flashier orange flowers,

and stays green all year round. With the best intentions, gardeners placed these milkweed plants all up and down California. We were all delighted to see caterpillars appear on the plants, munching and growing. But monarch butterfly populations did not bounce back.

- After some research, it was discovered that the evergreen milkweed was encouraging monarch butterflies to halt their epic migration up and down the coast. Native milkweeds all go dormant in the dry season, forcing monarchs to stop laying eggs and move on. The year round availability of food, however, kept them in place.
- Monarchs are plagued by a naturally occurring parasite called *Ophryocystis elektroscirrha* (or OE). This parasite naturally kills weaker monarchs during migration and dies off when the milkweed goes dormant in the summer. This minimizes the spread to the rest of the flock. When monarchs don't migrate and the milkweed doesn't die off, the parasite builds and begins to infect vast majorities of the population.
- This all may seem quite catastrophic. If we tug on even the tiniest string, an entire population could collapse, but that's why it's important for us to have biodiverse, native ecosystems and for scientists to track the health of them.

## Create your Own ...

### Materials

- Measuring Tape or Ruler
- Rope or Twine
- Paper to record observations or your nature journal
- Pencil, pen, colored pencils, or markers

### Steps

1. Go outside and **measure** out a 12-inch x 12-inch square using the **rope** as a boundary.
  - a. This is your survey area and how scientists record data in natural spaces.
2. Investigate the different flora and fauna found within the square.
3. **Write** or **draw** your observations on a piece of **paper**.
  - a. OPTIONAL: Use your **nature journal** to keep track of your area.
4. Compare and contrast different areas of observation.
5. OPTIONAL: Track how an area changes at different times of the day and with different weather. If you plan to leave your survey square out for a long period of time, you may want to pin it down with a rock at each corner.
  - a. Please note: many parks practice 'leave no trace' and ask that all man-made materials are taken away when you leave. Please only leave a designated survey area if you are in your yard.

## Post-Activity Questions and Activities

- How can humans help native plants and animals and keep balance in ecosystems?
  - Check out [oaklandzoo.org/pollinators](http://oaklandzoo.org/pollinators) to find out how you can take action for pollinators.