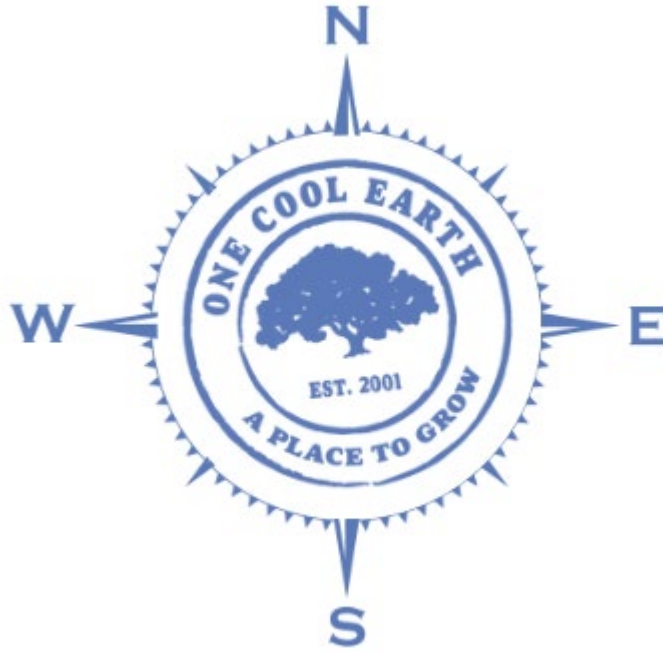


# Keystone Species



## North: Nature

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### **NGSS Standards:**

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

### **Lesson Overview:**

*Students will learn how beavers serve as a keystone species creating habitat for other species, and the positive impacts they have on drought, wildfires, and climate change. Students will learn about the impacts of marine debris on beaver habitats and how they can make changes to protect beavers.*

### **Materials:**

- A hose connected to a water source in the garden.
- Sticks and plant material (ideally found from the garden/school site).

- Printed [Examples of beaver dams vs human-made dams](#)
- [Beaver Brigade Powerpoint](#)
- Optional: a model beaver skull, track prints, and/or scat sample.

**Prep:**

Determine what area of the garden you will want students digging their stream channel in as well as from what areas they can select dam building materials.

**Vocabulary**

**Keystone species:** A species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically.

**Ecosystem:** A biological community of interacting organisms and their physical environment.

**Dam:** A barrier that stops or restricts the flow of surface water or underground streams, often resulting in a pool, pond, lake, or some other reservoir of stagnant water.

**Watershed:** A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.

**Marine Debris:** *Any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes (NOAA)*

**Activity Procedure:**

**Engage:** *Have you ever gone for a walk in the Salinas River before? Do you think there were any beavers living there? (if you have a beaver skull/ model, and/or track print and scat sample you can pass these around for students to explore).*

**Explain:**

*Beavers are a major part of the wetland ecosystem in the Salinas river and other rivers throughout the county. Beavers have strong teeth that are hardened with iron metal that enable them to chomp through wood. They strip off the bark which they use as a food source, and they use the hard inner wood to build dams and lodges.*

*When beavers build their dams they create pools of water which allow them to dive to safety from predators. These ponds are helpful for a variety of fish and amphibians that depend on them. These fish and amphibians are food sources for Snowy Egrets, Great Blue Herons, and Bald Eagles among other birds of prey. The pools also provide a source of drinking water in the summer months for a variety of*

*mammals like deer, foxes, and mountain lions. Many wetland plants also depend on these ponds to thrive. Because so many animals depend on the influence of beavers they are considered a keystone species. If beavers were to get pushed to extinction, just think about how many other species would be affected!*

*Beavers also provide an important service to humans too! With wildfires becoming larger, hotter, and faster due to climate change, we can thank beavers for creating effective firebreaks blocking the spread of wildfires.*

*By slowing, spreading, and sinking water before it reaches the ocean, beavers also help recharge our groundwater making our communities more resistant to drought. And it doesn't stop there. Soil stores carbon keeping it from entering the air as greenhouse gasses like CO<sub>2</sub>. But wet soil holds 10 to 12 times MORE carbon than dry soil. And what creature helps turn dry areas into wetlands? That's right, beavers.*

*Beavers are so important to our ecosystem, and the broader environment, including the ocean! Every drop of water that comes down from the clouds or comes out of the ground through a spring, is connected to our waterways. Wetlands and waterways always lead back to the ocean and our trash can be transported by waterways to the ocean! Trash is a problem wherever it is found.*

*Sometimes **marine debris** can get caught up in beaver dams. Our plastic sandwich bags that don't make it to the trash can can get swept downstream and eventually get caught in a beaver dam. Beavers potentially get entangled in plastic found in their habitats. Plastic can clog up streams and culverts that can reduce river flows downstream or even make the water itself heavily polluted. Although there are not many scientists who have studied the impacts of marine debris on beavers specifically, talking about this can help us reduce our waste and prevent marine debris, so that we can support our beavers. What are some ways we can stop plastics from entering our rivers and streams in the first place?*

*Now we will get to see how beavers work their magic by trying to make model beaver dams in our garden. Do you think ours will be as successful as beavers?*

**Action: Beaver Dam Model Making**

- 1) Invite students to collect sticks, woodchips, and plant material for making their dams.
- 2) Next show the students an area where they will dig out a channel like a stream.
- 3) After the channel has been dug the students can arrange their materials to construct a dam. Remind them that the purpose of the dam is to significantly slow the flow of water and create a big pond.
- 4) Now use a hose at the top of the channel to simulate stream flow. (If a hose is unavailable use a watering can).
- 5) Next, add some plastic to the stream and make observations about how the plastics get stuck in the dams.

**Reflection:**

*What worked well with our beaver dams? Were they successful at slowing water? Looking at the pictures of beaver dams and human-made dams, which one creates more biodiversity? Which one helps the ecosystem? What are some ways we might protect beavers in our community? How are beavers negatively affected by marine debris?*

**Additions:**

[Beaver Brigade Powerpoint](#)

**Sources:**

- [NOAA: What is Marine Debris?](#)
- [NOAA: Where Does Marine Debris Come From?](#)

More resources around marine debris can be found here: [NOAA Marine Debris resources for Educators](#)

This lesson was prepared by One Cool Earth under the Marine Debris Program of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.