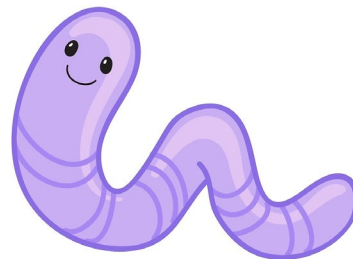
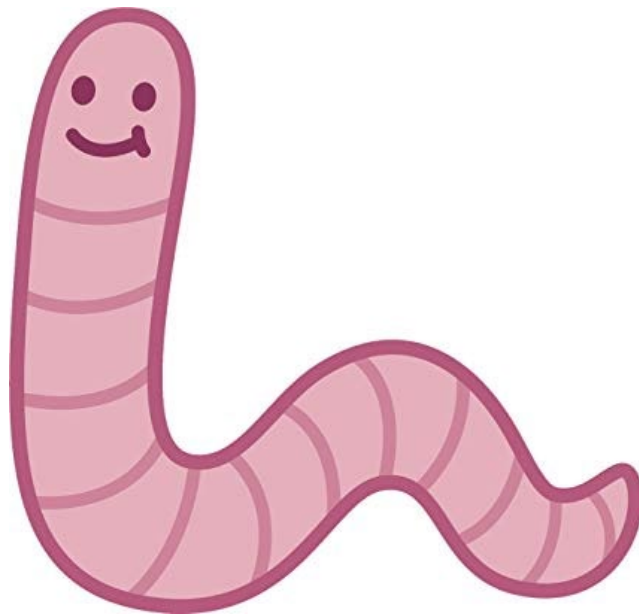
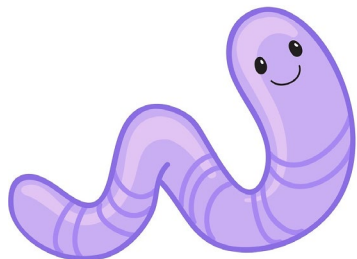


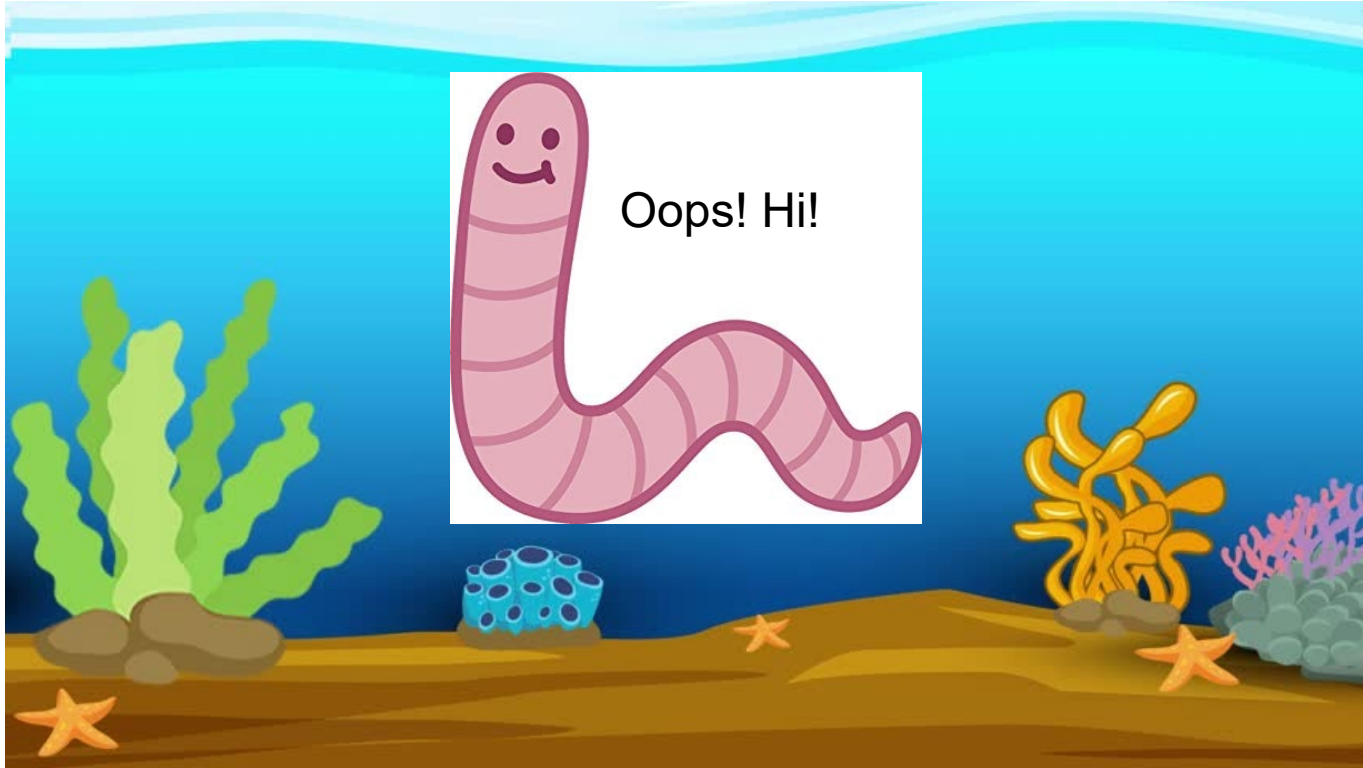


Worm Watch !!!



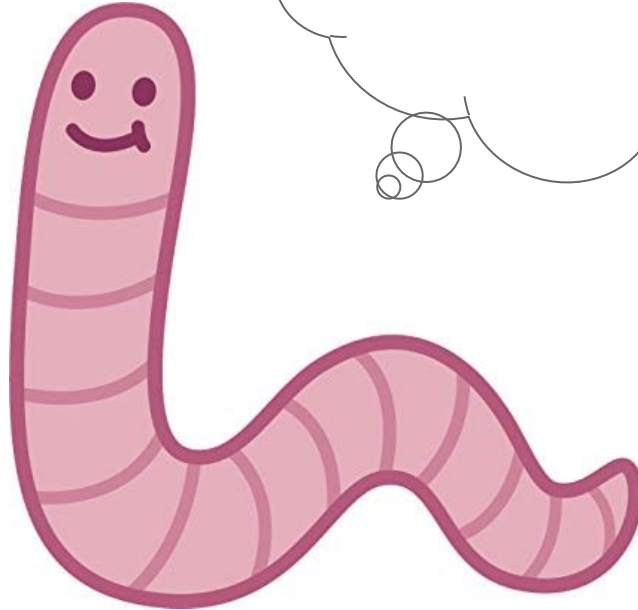


Earthworm? Ocean?

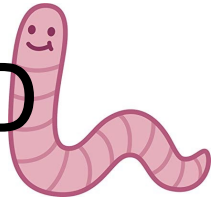


Hi! I am earthworm!
I live in the soil.

I can be good and bad
at the same time



GOOD



😊 HELP BREAK DOWN ORGANIC MATERIAL IN SOIL, FREE UP NUTRIENTS, CREATE PASSAGES FOR AIR AND WATER, SO PLANTS GROW FASTER.

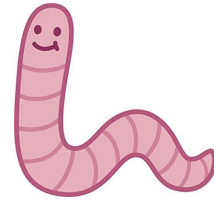
See the difference with chemical-free worm castings.

Plants grow up to 126%* larger and stronger, yielding more with organic, all-natural vermicompost from Dirt Dynasty.



*Verified by University studies from Cornell and North Carolina

BAD



INVASIVE SPECIES IN NORTH AMERICA FOREST:

DECREASE FOREST'S DIVERSITY

- EAT LEAVES IN TOP SOIL LAYER
- DISRUPT SYMBIOTIC RELATIONSHIP BETWEEN PLANTS AND FUNGI
- CHANGE PH LEVEL OF UPPER SOIL LAYER

CONTRIBUTE TO THE CLIMATE CHANGE

DISRUPT FOREST FLOOR STRUCTURE

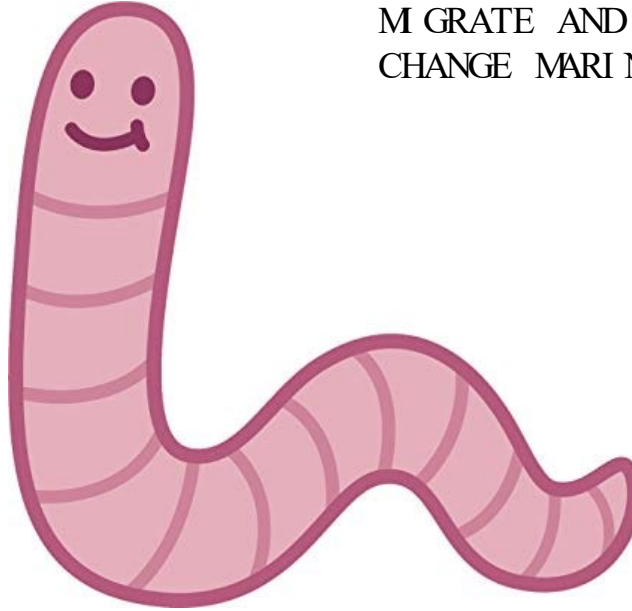
→ CARBON STORAGE IS EXPOSED →
MORE CARBON IN ATMOSPHERE

→ EARTH IS SURPRISED- CLIMATE CHANGE

CLIMATE CHANGE MAKES
OCEAN WARMER



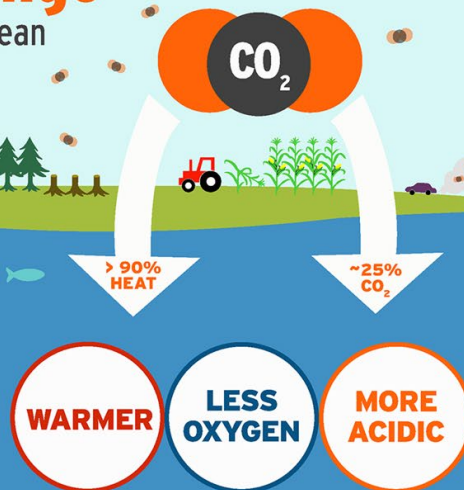
→ CORAL BLEACHING
→ AS COOLER WATER BECOMES
WARMER, MARINE SPECIES ALSO
MIGRATE AND BECOME INVASIVE,
CHANGE MARINE FOOD CHAIN.



Climate Change

A triple threat for the ocean

Burning fossil fuels, deforestation and industrial agriculture release carbon dioxide (CO_2) and other heat-trapping gases into our atmosphere, causing our planet to warm. The ocean has buffered us from the worst impacts of climate change by absorbing more than 90 percent of this excess heat and about 25 percent of the CO_2 , but at the cost of causing significant harm to marine ecosystems.



SEA LEVEL

Sea level rise is accelerating, flooding coastal communities and drowning wetland habitats.



BLEACHING

Warm-water coral reefs (marine biodiversity hotspots) could be lost if the planet warms by 2°C (3.6°F).



TOXIC ALGAE

Larger and more frequent blooms are making fish, birds, marine mammals and people sick.



HABITATS

Lower oxygen levels are suffocating some marine animals and shrinking their habitats.



ACIDIFICATION

More acidic water harms animals that build shells, such as corals, clams, and oysters.



FISHERIES

Disruptions in fisheries affect the marine food web, local livelihoods, and global food security.

Source: IPCC, 2019: Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)



Monterey Bay Aquarium
Research Institute

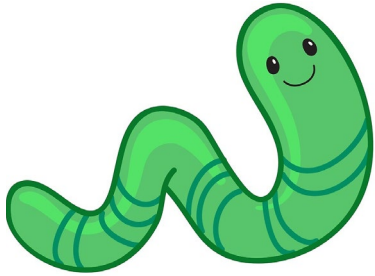


Monterey Bay
Aquarium

How do worms contribute to climate change?

Try to put them in correct order!

I will invade the forest lalala



This is the place I will cause intentional damage

I keep CO₂ in the soil
Then release it one at a time



CO₂ makes the earth warmer
→ ocean warmer
→ change marine lifestyle

Try what you've learned on the whiteboard

You can get one Gummy Worm and “Oreo Casting” if you get it right!

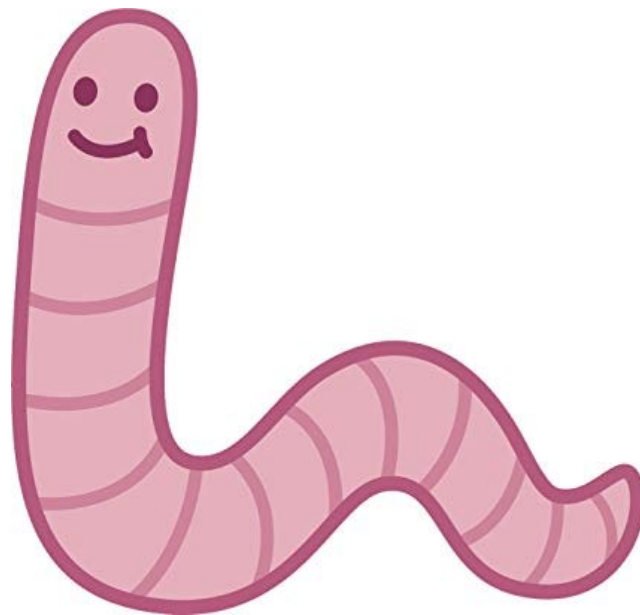


Thank you! Try other
stations if you like!



REMEMBER:
DON'T BRING ANY
EARTHWORMS IF YOU
ARE GOING TO THE
FOREST!

SOME MORE FUN
FACTS ABOUT ME
IF YOU ARE
INTERESTED!



1. Invasive earthworms?!

Invasion

of Non-Native Earthworms

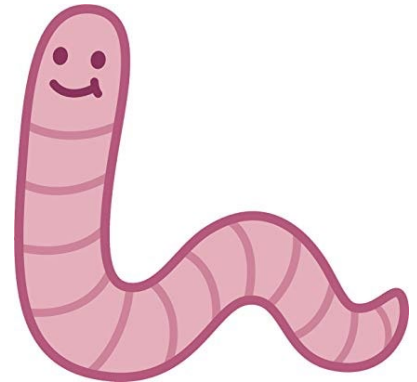
Earthworms are not native to the Great Lakes Region. They were all wiped out after the last glaciation. The current population, brought here by early Europeans, is slowly changing the face of our native forests.



- ☺ They crossed over in root balls or the dry ballast of ships during 1600s
- ☺ European earthworms thrived in the upper soils of forests and gardens.
- ☺ Native earthworms, if there were any, remained deeper underground.

2. They are good for gardens but ba

Worms help to increase the amount of **air** and **water** that gets into the soil. They break down organic matter, like leaves and grass into things that plants can use. When they eat, they leave behind **castings** that are a very valuable type of fertilizer.



Then what we do in the boreal forest

- Boreal forests have distinct components:
 - a thick layer of rotting leaves, mosses and fallen wood on top
 - mineral soil and organic soil on bottom
- Worms eat the leaf litters but don't burrow into soil
 - Leaf layer becomes thin and churned up
 - Plants which rely on the leaf layer cannot thrive, but more competitive grass do
 - Fewer trees grow in the forest
- Releasing carbon storage in forest floor into the atmosphere
 - Adds up to global warming

More info if you are super smart ;)

In gardens, earthworms convert the digestible carbon to a form that stays in the soil, which is called **stabilization** .

As the earthworms go about their soil-transforming business, they release carbon dioxide that was trapped in the soil. Overall, the researchers determined that earthworms' burrowing causes a **33% increase in carbon dioxide emissions, and a 42 percent increase in the emissions of another greenhouse gas, nitrous oxide.**

Most earthworm species in this area are **invasive** . They **eat up litter layers more quickly than the forests regenerate** . As a consequence, some tree species may not be able to survive a rapid decline in the litter layer. In a way, **these earthworms determine which trees will grow there in the future.**