Dec 10 Human Interactions Stations 5-8

Station 5: Fires and Fish Reading

Directions: Read the document, then answer the multiple choice questions based on what you've read.



Pacific Northwest winters are wet, and its summers are dry. Forests blanket the steep sides of mountains. Clear creeks and streams run in the valleys and are filled with fish. Yet one lightning strike can disrupt this idyllic picture. A wildfire sparked by lightning ignited the forest in the picture. It rapidly burned through thousands of acres. Firefighters spent days keeping it away from houses and other buildings. They built firebreaks and dropped water from planes. But what does this have to do with fish?

Trees and other forest plants have a large underground root system. The roots hold the soil in place. Leaves, needles, and bits of bark decay under the trees. They turn into a layer of humus on top of the soil. Loose leaves and needles cover the humus. This is called leaf litter. Leaf litter and humus together make up the forest floor. When it rains, water flows through the forest floor slowly. Much water is absorbed into the humus and the soil, nourishing the trees. The thicker the forest floor, the more water it absorbs, and the slower the water flows. The rest of the water carries a few leaves and needles along with a small amount of soil down to the valley. Everything in the surrounding forest canopy falls into the creek and is carried downstream. As a result of the filters found in the soils, the creeks and streams remain relatively clear. Wildfires, however, cause many changes to this process.

Wildfires are common in the Pacific Northwest in the summer. Wildfires are defined as fires that are unintentional and out of control. States spend millions of dollars each year to fight wildfires. Wildfires, however, are part of the normal life cycle of many ecosystems. For example, wildfires keep forest clearings open. Clearings provide habitat for deer and many birds. Some species of trees have seeds that germinate only after being exposed to the heat of fire. Lightning strikes during thunderstorms ignite most fires. Sometimes careless campers can also cause wildfires. The resulting wildfires are very hot. They burn trees, other plants, and the filtering leaf litter. During the heat of the fires, the humus becomes very dry and may burn as well. Some wildfires release gases that enter the soil and can leave behind a waterproof coating.

Wildfires usually occur during the hot and dry summers. In the fall, the wind and the rains return. Through erosion, they can carry away the dry humus and some soil. As a result, water runs down slopes in the forest quickly, and very little water is absorbed into the soil. Soil erosion is defined as the removal of soil through either wind or water, where the eroded soil is deposited somewhere else as sediment. Erosion is a natural process that has been going on for billions of years.

After a wildfire, fewer plants are left in the landscape than before the fire. This also means that there are fewer roots to hold the soil in place, so rushing water carries a large amount of soil directly into streams and creeks. With much of the soil washed into the creek, less soil is left for plants to grow in the

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following year. The clear water turns muddy. This is where we find out how fires affect fish. The increased rate of soil erosion after a fire can clog streams and creeks. In extreme cases, erosion can actually cause waterways to dry out. This leaves less habitat for fish. It affects their food source as well, as the aquatic insects that many fish prey on cannot breed in the murky waters. Perhaps most importantly, the murky waters make it hard for the fish to get the oxygen they need through their gills. Sometimes the fish actually can suffocate.

People have taken many steps to try to help prevent soil erosion in an effort to maintain healthy fish populations. Tree trunks from burned trees are cut down. They are then secured horizontally across the slope in a zigzag pattern. Water then has to flow around the trunks, slowing as it flows. This process helps to trap the sediments as they are carried downhill. Seeding grasses and other quick-growing plants provide much-needed ground cover. The grass roots help hold the soil in place until the forest has a chance to recover. Sometimes straw is scattered over the bare soil to prevent it from blowing away until the grass grows.

Prescribed burns are a better way to prevent large, uncontrolled wildfires and the resulting erosion. Prescribed burns are used to reduce the amount of fuel in the forest. This, in turn, can reduce the danger of large wildfires. In a prescribed burn, trained firefighters set a selected area on fire. They choose a season when animals will be least affected and make sure the wind will not blow smoke into someone's house or across a road. There are different ways for starting the fire and for confining it to the right area. In some parts of the country, trained volunteers are invited to help monitor the fire.

Prescribed burns have pros and cons. The benefits of prescribed burns include removing extra fuel and maintaining open space at low cost. The cons include air pollution during the burn and some wildlife deaths. Prescribed burns can also get out of control and require firefighters to put them out. As suburbs are built deeper into forests, prescribed burns become both more necessary and more difficult. They are necessary because less fuel means less chance of a wildfire destroying the homes. But they also present difficulties, because homes have to be protected during a prescribed burn.

The practice of prescribed burns is an attempt to maintain the health of the forest ecosystem, including the streams found within it. Healthy ecosystems provide many benefits to humans, and management practices are changing to improve ecosystem and human health.

1. A forester suggests raking up and removing leaves and needles from the forest floor. Which statement below describes the long-term effect this will have on the forest?

A Less soil erosion will occur.

B More humus will be created.

C Less water will be absorbed into the soil.

D More grass will grow under the trees.

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2. How does increased soil erosion affect the fish populations in a forest after a wildfire?

A Soil erosion leads to clogged waterways.

B Aquatic insects cannot breed.

C Murky waters make it hard for the fish to breathe.

D All of the above.

3. When the forest is very dry, park rangers prohibit campfires. What effect is this likely to have on wildfires?

A It eliminates almost all wildfires, because most are caused by careless campers.

B It reduces wildfires but leaves the possibility of fires caused by lightning strikes.

C It increases wildfires, because more people will set fires on purpose.

D It has no effect on wildfires, because campfires cannot cause wildfires.

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4. Which of the following is **NOT** a benefit of wildfires?

A They maintain forest clearings.

B They eliminate invasive plant species.

C They allow some tree seeds to germinate.

D They reduce leaf litter.

5. Which of the following human actions is **LEAST** likely to increase soil erosion?

A Replanting native trees after a drought.

B Increasing tilling on large farms.

C Building a suburb in a forested area.

D Paving rural roads and parking lots.

6. What do wildfires and prescribed burns have in common?

A Both occur most often in the summer during storms.

B Both are so hot that many animals die.

C Both can maintain forest clearings.

D Both are easy to manage and put out.

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Station 6: Design a Solution

Landfills are areas of space where trash is collected and left. All around Earth, landfills tend to have a great impact on the surrounding environment. In many cases, these impacts can be negative. It is important for designers of landfills to carefully consider the impacts that can occur based on their building and construction decisions. Watch the videos below to see how landfills work and how a landfill in India has impacted its surrounding environment.

Now that we know what landfills are, let's identify the problems with landfills. Brainstorm a list of problems that you identified with how landfills are made. Come up with at least 3 problems that you saw, and type them below.

Now let's create a solution!!

The Challenge

Construct a new landfill in your town that can:1) Hold a city's worth of garbage, (2) contain the waste during a heavy rain without allowing polluted water from the landfill to be mixed with drinking water, and (3) have a method of measuring and monitoring the impact of the landfill on the surrounding environment. Create a plan that will reduce the amount of waste that enters the landfill. Explain your solution below. For 50 bonus points on an assignment, draw a picture of your idea and email it to me at taylorpe@scsk12.org. I will add 50 points to your lowest grade!

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Station 7: How Humans Affect the Oceans

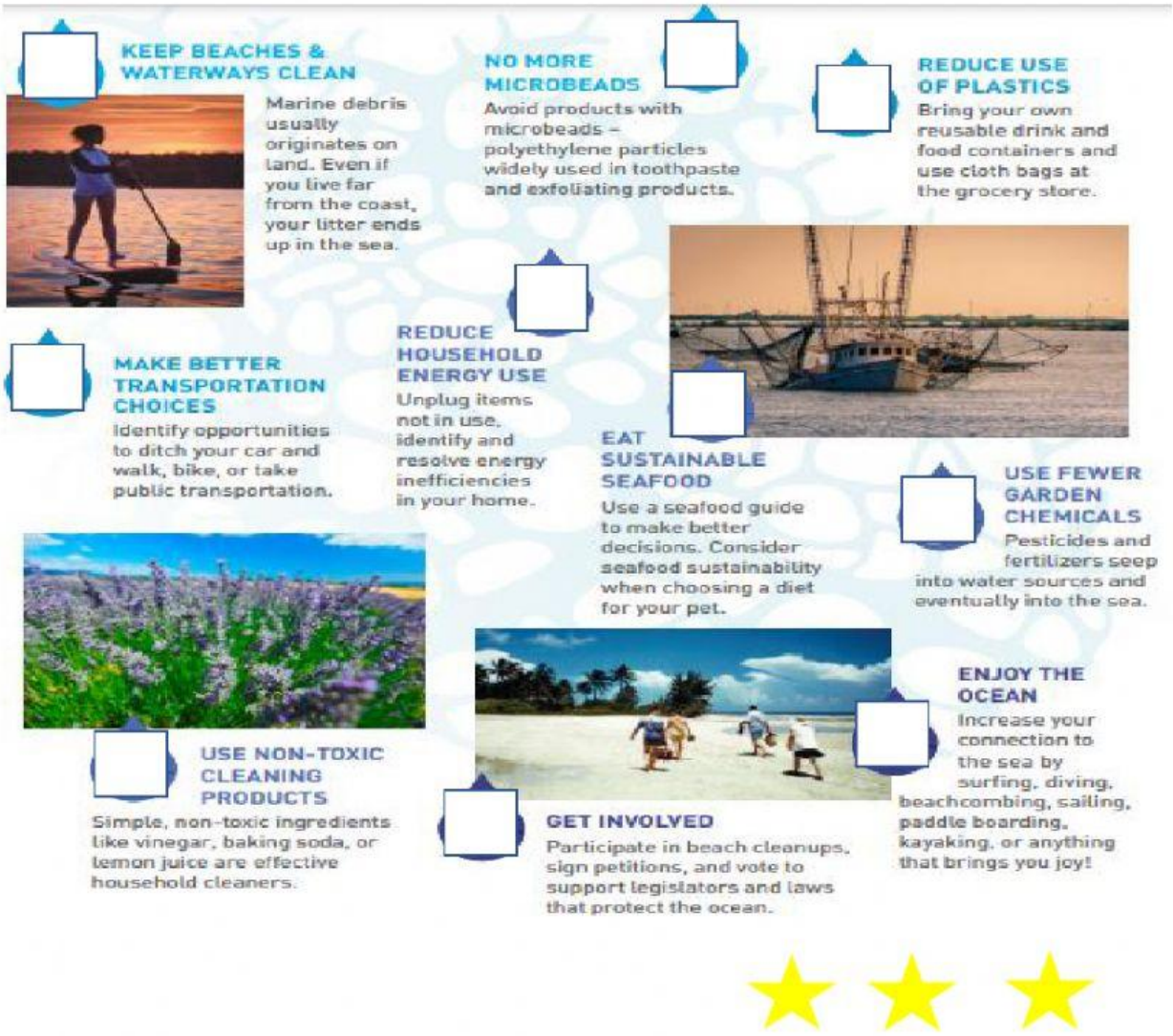
1. Directions: Watch the two videos to understand how humans impact the oceans. Then complete the activities below.

2. Directions: Match the action to the outcome. Then decide of that outcome has a positive or negative impact on oceans.

Action	Outcome	Positive or Negative Impact on Oceans?
Throwing trash into the ocean		
Drilling for oil in the deep ocean		
Creating artificial reefs		
Protecting endangered ocean species		
Increased demand for fish		

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3. Directions: Below you will see 10 ways that you can help positively impact the oceans. Place a star in the box next to the three ways that you would like to help the oceans, and then write a brief explanation below for why you chose those three ways.



I chose these three ways to help the oceans because...

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Station 8: Problem or Solution?

Directions: Fill out the table. Look at the topic in the left column and decide of this is a problem or solution. Then describe the topic in the Description column.

Topic	P or S	Description
Deforestation		
Conservation		
Restoration		
Overfishing		
Wildlife Preserve		
Pollution		
Dams		
Fossil Fuel Use		

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Once you have finished you can use the rest of your class time playing these games:

THE MAYOR

What would you do if you were mayor and your city was contributing to the greenhouse effect? That is what you will have to figure out in this game.
https://app.legendsoflearning.com/join/YXNzaWdubWVudC0zMzM0MDk=

THE STORY OF NATURAL RESOURCES

You will take a journey through a small community and see how they used and abused their resources, but you will also see how they fixed their resource problems.
https://app.legendsoflearning.com/join/YXNzaWdubWVudC0zMzMzODI=

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