

# TEACHER OVERVIEW

Ecological Impacts  
6th — 8th Grade

## Nature Vision Student Packet

The materials contained within have been created by Nature Vision, an environmental education nonprofit organization that brings programming to schools and local greenspaces for over 70,000 PreK-12th grade students each year in King and Snohomish Counties. This work from home curriculum materials packet is designed to foster an understanding of the importance of water and its integral role in supporting life and shaping our planet. Packets can be completed either independently, or with the help of an adult caregiver. Each day of the week offers materials building on previous days learning, offering a variety of activities including, art, writing, and field exploration.

These materials are provided to you by City of Auburn Utilities, City of Bothell, City of Lynnwood, and grants from King County Flood Control District, and King County Wastewater Treatment Division. Learn more by visiting:

- City of Auburn Utilities: [https://www.auburnwa.gov/city\\_hall/public\\_works](https://www.auburnwa.gov/city_hall/public_works)
- City of Bothell: <http://www.bothellwa.gov/surfacewater>
- City of Lynnwood: <https://www.lynnwoodwa.gov>
- King County Flood Control District: <https://www.kingcounty.gov/services/environment/water-and-land/flooding/flood-control-zone-district.aspx>
- King County Wastewater Treatment Division: <https://www.kingcounty.gov/depts/dnrp/wtd.aspx>

*Thanks to Cascade Water Alliance for providing the accompanying series of student packets: Ecosystems, Watersheds, and Humans and Water. To learn more please visit: <https://cascadewater.org/>.*

This unit supports NGSS Performance Expectations across various disciplines, as well as supporting K-12 Integrated Environmental and Sustainability Standards. These are listed at the bottom of this page. Teachers will be supplied with PDF formats of materials to be emailed to families, or teachers may print and send to students to complete at home.

This packet begins with an introduction to watersheds and the stormwater that flows through them. Students continue looking at watersheds while thinking about pollution and the issues it can cause. Students then learn about different habitats and the impact pollution can have on them, starting with salmon and river systems. They continue with activities centered around wetlands and the Puget Sound. Finally, students complete their week with a reflection on stewardship and what they can do to help keep the environment clean and healthy for all living things.

If you have any further questions or concerns regarding this packet, please email our Office Coordinator at [info@naturevision.org](mailto:info@naturevision.org).

### Grades 6-8

**Supports NGSS Performance Expectations:** MS-LS1-5, MS-LS2-4, MS-LS2-5, MS-ESS3-3, MS-ESS3-4, MS-ETS1-1.

Grades 6-8
Day 1 - Watersheds and Stormwater
Day 2 - Rivers and Salmon
Day 3 - Wetlands
Day 4 - Puget Sound
Day 5 - Stewardship

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# PARENT/CAREGIVER OVERVIEW

Ecological Impacts  
6th — 8th Grade

Welcome to Nature Vision's student packet for home use. Nature Vision is an environmental education nonprofit organization that brings programming to schools and local greenspaces for over 70,000 PreK-12th grade students each year in King and Snohomish Counties. We are excited to be offering this version of our programming directly to students at home!

This packet is designed to be completed over the course of one week, with each day focusing on a different aspect of environmental science and stewardship. The majority of these materials can be completed independently, but we thought it would be important to provide background information for any adults who may be helping to complete or answer questions. We've included the basic learning objectives for each day along with some vocabulary.

These materials are provided to you by City of Auburn Utilities, City of Bothell, City of Lynnwood, and grants from King County Flood Control District, and King County Wastewater Treatment Division. Learn more about caring for our water by visiting:

- City of Auburn Utilities: [https://www.auburnwa.gov/city\\_hall/public\\_works](https://www.auburnwa.gov/city_hall/public_works)
- City of Bothell: <http://www.bothellwa.gov/surfacewater>
- City of Lynnwood: <https://www.lynnwoodwa.gov>
- King County Flood Control District: <https://www.kingcounty.gov/services/environment/water-and-land/flooding/flood-control-zone-district.aspx>
- King County Wastewater Treatment Division: <https://www.kingcounty.gov/depts/dnrp/wtd.aspx>

Challenge yourself to post all the things you are doing with your friends and family to prevent pollution and protect our water!

- City of Auburn Utilities: Tag @auburnwa and include the hashtag #auburnwa
- City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- King County Flood Control District: Tag @KingCountyDNRP
- King County Wastewater Treatment Division: Tag @kingcountywtd

*Thanks to Cascade Water Alliance for providing the accompanying series of student packets: Ecosystems, Watersheds, and Humans and Water. To learn more please visit: <https://cascadewater.org/>.*

*Please contact [info@naturevision.org](mailto:info@naturevision.org) with any questions or concerns  
Stay connected with Nature Vision! Follow us for updates @naturevisionorg*



**NOTE: Students may require support in reading directions and/or completing some tasks. While many activities in this packet are creatively oriented and open ended, you may consult the answer key located at the back of the packet for additional assistance or guidance.**

Unless otherwise noted, images courtesy of freepik.com

# PARENT/CAREGIVER OVERVIEW: DAY 1

## Watersheds and Stormwater

**Background Information:** A watershed is an area of land that allows water to flow off and drain into rivers, lakes, streams, and oceans. It is important to recognize the value of having clean, unpolluted water available for every living thing in the watershed. The water that falls as rain and snow can also be called stormwater. As this stormwater flows, it can pick up unwanted bits of pollution from all around the watershed, carrying it downstream into new environments.

**Learning Objectives:** Students will learn what a watershed is and how stormwater flows through it. They will start to identify some forms of pollution and recognize the ways in which these pollutants might be harmful to people, plants, and animals in nature.

### **Main Activity: Passing Through the Watershed Game**

- **Overview:** Students play a simple board game that simulates the way water flows through a watershed, picks up pollution, and interacts with plants
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Interacting with Your Watershed**

- **Overview:** Students explore two websites — a USGS map highlighting their local watershed and a game designing their own landscape — that offer insight to their watersheds
- **Parent/Caregiver Tasks:** Provide technical support and supervision while online

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 2

## Rivers and Salmon

**Background Information:** Rivers are critically important areas in nature, serving to connect different locations through the movement of water. They bring water from the mountains to the oceans and interact with countless living and non-living things along the way. In Washington, rivers are a crucial habitat, especially for the 5 species of Pacific salmon. These salmon provide food and energy for predators and scavengers, and even become fertilizer for river-side plants and trees after they die. Those plants then provide benefits for salmon by keeping soil from rushing into the river and by providing shade to keep the water cool. All along the way pollution can accumulate in these waters and cause severe problems for salmon and other living things.

**Learning Objectives:** Students will become familiar with river systems, understanding their importance as a home or habitat for many living things. They will learn about salmon and see some of the connections between these fish and other plants and animals in nature, while also recognizing the dangers of pollution.

### **Main Activity: What Could Go Wrong?**

- **Overview:** Students randomly create 3 different river ecosystems by combining positive and negative possibilities from a series of lists. They will visualize the ecosystems they create, and discuss their pros and cons.
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Disappearing Salmon**

- **Overview:** Students analyze a hypothetical situation where all salmon have gone extinct by attempting to describe and/or draw the state of the river after 1 week, 1 year, and 10 years without salmon
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 3

## Wetlands

**Background Information:** Wetlands are areas of land that stay wet for the majority of the year. Depending on their location and vegetation, a wetland can be a pond, marsh, swamp, fen, bog, and slough – to name several. While they may be called different names, wetlands all share three same characteristics: water, saturated soil, and water-tolerant plants. A wetland is a vital ecosystem that provides food and nutrients as well as a habitat for a multitude of animal and plant species. Wetlands also prevent flooding by holding excess rainwater in the soil. The soil dually functions as a filter and traps pollutants that flow into wetlands through storm drains. Stormwater retention ponds are human-made wetlands created to add more wetlands to places where there are none, such as large residential areas, places with lots of concrete (e.g. malls, apartments, etc.), and areas at bottoms of hills that do not drain into a waterway.

**Learning Objectives:** Students will learn how wetlands may be known by many names but share three defining characteristics. They will understand how to identify wetlands and their unique traits. Students will discover the various functions of wetlands, the role of stormwater retention ponds, and the impact of polluted stormwater upon this ecosystem.

### **Main Activity: Wetland Filters**

- **Overview:** Students build a wetland model using household materials and observe how it is a natural filter
- **Parent/Caregiver Tasks:** Help students acquire materials, designate an appropriate space for activity, and provide supervision while student is outside or provide indoor alternative

### **Optional Activity: Finding Pollution Levels**

- **Overview:** Students examine a picture of a sample and uses a chart to determine the pollution level of a stream
- **Parent/Caregiver Tasks:** Help student use calculator, if needed

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 4

## Puget Sound

**Background Information:** Puget Sound is what we call the inland sea of Washington, an estuary where freshwater rivers and streams meet saltwater. Puget Sound is also considered the name of our local region surrounding this body of water; from the Cascade Mountains in the east, to the Olympic Mountains in the west, to Olympia in the south, and to the Canadian border in the north. Connected by the various waterways that flow through this watershed and drain into Puget Sound, the land and water surrounding Puget Sound is habitat to over 200 fish species, 100 species of sea birds, and 13 marine mammals species – it is a biodiverse region! Puget Sound is impacted heavily by stormwater runoff pollution. Surrounded by many major cities, storm drains lead polluted stormwater into Puget Sound, where it affects the life living there.

**Learning Objectives:** Students will learn the definition of an estuary and identify Puget Sound as a large estuary in our region, understanding that many local freshwater rivers and streams drain into Puget Sound. As Puget Sound is habitat to iconic and important species, students will understand the health of our animal and plant species is tied to the health of Puget Sound. They will be introduced to the impact of stormwater runoff pollution to the water quality of Puget Sound and how pollution can build up in the food chain.

### **Main Activity: Who Polluted Puget Sound?**

- **Overview:** Students write a story following someone who lives in the Puget Sound region, detailing various types of pollutants that enter Puget Sound as stormwater runoff pollution
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Biomagnification**

- **Overview:** Students learn about biomagnification and determine the accumulation of pollution in an orca
- **Parent/Caregiver Tasks:** None

### **Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: DAY 5

## Stewardship

**Background Information:** Stewardship is how we care for the natural resources that all living things need to survive – such as water. Stewardship can include conservation of natural resources, in addition to thinking and acting carefully about how we interact with the world around us. Humans impact their environment in many ways. A negative impact takes the form of pollution entering our environment. Stewardship remedies this impact and ensures a positive change that will keep our environment clean for all.

**Learning Objectives:** Students will combine their knowledge gained throughout the week to consider ways they can support the environment. They will learn to focus on pollution prevention by careful consideration of daily habits, behaviors, and usage of materials that will contribute to stormwater runoff pollution.

**Main Activity: Create a Stormwater Pollution Prevention Action Plan**

- **Overview:** Students create an action plan that outlines stormwater pollution prevention
- **Parent/Caregiver Tasks:** None

**Optional Activity: Volunteer Opportunities**

- **Overview:** Students research stormwater pollution prevention volunteer opportunities with various community organizations
- **Parent/Caregiver Tasks:** Assist student with access to online websites

**Optional Activity: Stormwater Stewardship Challenge**

- **Overview:** Students complete a daily stewardship challenge related to pollution prevention
- **Parent/Caregiver Tasks:** If needed, help the student share their work on social media

# PARENT/CAREGIVER OVERVIEW: VOCABULARY

## DAY 1

**Ecosystem:** A community of organisms and their environment

**Pollution:** Unnatural contaminants introduced to the natural environment

**Storm Drain:** A drain for large and excess amount of rainwater

**Stormwater:** Rainwater and snowmelt that flows over our land and city surfaces

**Watershed:** An area of land that allows water to flow off and drain into rivers, lakes, streams, and oceans

## DAY 2

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

**Organism:** A living thing

**Riparian Zone:** The areas adjacent to rivers and streams

## DAY 3

**Filter:** Passing through a device to remove unwanted material

**Hydric Soil:** Soil that is permanently wet

**Hydrophytes:** Plants that have adapted to live in water (i.e. hydro means “water”, phyte means “love”)

**Impervious Surface:** A surface that does not allow water through it, usually human-made like concrete or asphalt

**Storm Drain:** A drain for large and excess amount of rainwater

**Stormwater Retention Pond:** An artificial wetland created to capture excess water runoff and act as a filter

## DAY 4

**Biomagnification:** When pollution builds up in a food chain over time

**Estuary:** An area where freshwater and saltwater mix together

**Mercury:** A naturally occurring element that can cause pollution in the air and water, usually from burning coal, oil, or wood, or improperly disposing of products that contain mercury like thermostats and lightbulbs

**Phytoplankton:** Small, microscopic plants that drift around in water

**Zooplankton:** Animal organisms that drift in the water, ranging from microscopic to larger animals like jellyfish

## DAY 5

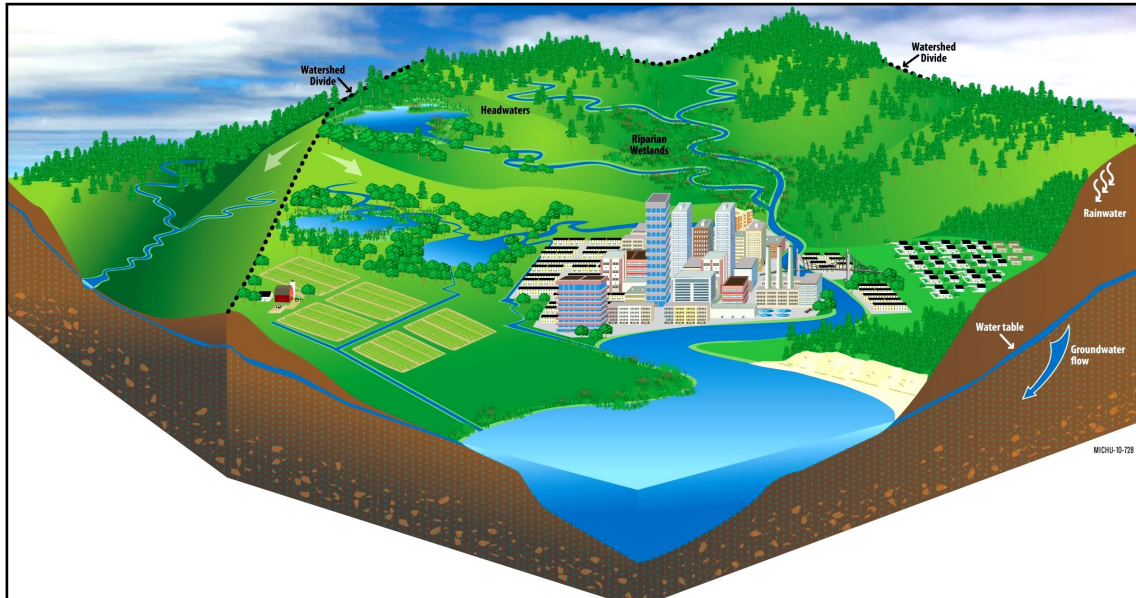
**Stewardship:** Taking care of something; being a protector



# DAY 1

## Watersheds and Stormwater

When water falls to the earth as rain and snow, it does not just stay in one place on the ground. Water is constantly moving, following the pull of gravity to flow downhill. To help us understand exactly how water moves throughout our local environments, we can divide our region into what we call **watersheds**. This word might sound like a shed filled with water, but it is not a building at all. Think about how dogs and cats shed their fur or a snake sheds its skin. A watershed is similar; it is how water moves off the land, or how the land sheds water. To put it simply, a watershed is all of the land that water falls on and then drains down to one low point.



A lot of that water that is pouring through the watershed is what we call **stormwater**. Stormwater is often referred to as rain water, and it is incredibly important for many different reasons. When stormwater is clean, it provides much-needed fresh water to many different **ecosystems** and environments. In our towns and cities, stormwater flows directly into **storm drains** located all around us before moving through pipes and emptying straight into a nearby river, stream, or pond.

Stormwater isn't always perfect, though. As is often the case, humans can have negative impacts on the world around them. Whether on purpose or by accident, people leave a large amount of harmful or unnatural materials, or **pollution**, in nature.



One amazing yet challenging property of water is its ability to pick things up as it moves across the land. If you pour a bucket of water over a pile of litter and loose soil, all of those items will get swept up and mixed with the water as it flows downhill. In a watershed, this means that pollution sources at higher elevations can wash downstream and pose a threat to ecosystems miles away! In addition, all of these different sources of pollution start to build up as more storm drains, rivers, and streams combine their waters together near the bottom of the watershed.

This week, we will investigate some of the different water-based ecosystems in our region, all while thinking about the impact our actions have on them.

### **Vocabulary**

**Ecosystem:** A community of organisms and their environment

**Pollution:** Unnatural contaminants introduced to the natural environment

**Storm drain:** A drain for large and excess amount of rainwater

**Stormwater:** Rainwater and snowmelt that flows over our land and city surfaces

**Watershed:** An area of land that allows water to flow off and drain into rivers, lakes, streams, and oceans

# Main Activity

## Passing Through the Watershed Game

Water interacts with both natural and human-made objects as it moves across the land, from the Cascade Mountains to the Puget Sound. In a healthy ecosystem, the water is able to flow freely and safely and provide life-giving resources to plants and animals. When pollution gets mixed in, however, problems start to arise!

**Materials:** Scissors, writing utensil

For today's activity, you will build and play a board game that shows how water flows down the watershed. You will work with game pieces — or tokens — that represent plants, storm drains, water, and pollution. As you play each turn, notice how the water tokens interact with and change the landscape when they move.

You will run through this game activity multiple times, changing the layout of the watershed each time to see the different ways the water can flow through and affect the watershed. To set up, cut out all of the plant, water, storm drain, and pollution tokens. If you don't have a print version, you can copy the activity on another piece of paper and use that!

Below are the general rules of the game. The next pages provide the 3 scenarios you will run through with the game. The pages that follow the scenarios contain the game board and the tokens.

### General Rules:

1. **Water Flows!** Water tokens move down 1 space each turn.
2. **Plants use water!** If a water token lands on a plant, turn it upside down. Next turn, instead of moving the water token you will turn it right side up. Your water token can now move normally on the next turn.
3. **Water carries pollution!** If a water token lands on pollution, it picks up that pollution and carries it wherever it goes. When that water token moves, the pollution moves along with it.
  - **Pollution builds up!** There is no limit to the amount of pollution that can be carried by a single water token.
4. **Plants help filter pollution!** If a water token is carrying pollution when it lands on a plant, 1 pollution token will get left behind and stay on the plant space.
  - **Plants can't stop everything!** Each plant can only hold onto to 1 pollution token at a time. If a water token is carrying 3 pollution tokens when it lands on a plant, 1 pollution token will get left with the plant and 2 will continue with the water token when it moves.
5. **Storm drains carry water away!** If a water token lands on a storm drain, it gets sent directly to the end of the board. If the water token is carrying any pollution at the time, that pollution gets sent to the end of the board as well.

### **Round 1: Natural Watershed**

#### **Setup:**

1. Place 1 water token in each of the spaces on the top row.
2. Randomly place 15 plant tokens in any open spaces on the board.

#### **Gameplay:**

1. At the beginning of each turn, move every water token down one space.
2. At the end of each turn, move the turn counter to the next space.
3. **Plants use water!** If a water token lands on a plant, turn it upside down. Next turn, instead of moving the water token you will turn it right side up. Your water token can now move normally on the next turn.

*How many turns did it take for all of the rain drops to make it to the Puget Sound?*

\_\_\_\_\_

## Round 2: Pollution Begins

### Setup:

1. Place 1 water token in each of the spaces on the top row.
2. Randomly place 15 plant tokens in any open spaces on the board.
3. Randomly place 10 pollution tokens in any open spaces on the board.

### Gameplay:

1. At the beginning of each turn, move every water token down one space.
2. At the end of each turn, move the turn counter to the next space.
3. **Plants use water!** If a water token lands on a plant, turn it upside down. Next turn, instead of moving the water token you will turn it right side up. Your water token can now move normally on the next turn.
4. **Water carries pollution!** If a water token lands on pollution, it picks up that pollution and carries it wherever it goes. When that water token moves, the pollution moves along with it.
  - **Pollution builds up!** There is no limit to the amount of pollution that can be carried by a single water token.
5. **Plants help filter pollution!** If a water token is carrying pollution when it lands on a plant, 1 pollution token will get left behind and stay on the plant space.
  - **Plants can't stop everything!** Each plant can only hold onto to 1 pollution token at a time. If a water token is carrying 3 pollution tokens when it lands on a plant, 1 pollution token will get left with the plant and 2 will continue with the water token when it moves.

*How many turns did it take for all of the rain drops to make it to the Puget Sound?*

\_\_\_\_\_

*How many pollution tokens ended up in the Puget Sound?*

\_\_\_\_\_

### Round 3: Humans Move In

#### Setup:

1. Place 1 water token in each of the spaces on the top row.
2. Randomly place 5 plant tokens in any open spaces on the board.
3. Randomly place 10 storm drain tokens in any open spaces on the board.
4. Randomly place 15 pollution tokens in any open spaces on the board.

#### Gameplay:

1. At the beginning of each turn, move every water token down one space.
2. At the end of each turn, move the turn counter to the next space.
3. **Plants use water!** If a water token lands on a plant, turn it upside down. Next turn, instead of moving the water token you will turn it right side up. Your water token can now move normally on the next turn.
4. **Water carries pollution!** If a water token lands on pollution, it picks up that pollution and carries it wherever it goes. When that water token moves, the pollution moves along with it.
  - **Pollution builds up!** There is no limit to the amount of pollution that can be carried by a single water token.
5. **Plants help filter pollution!** If a water token is carrying pollution when it lands on a plant, 1 pollution token will get left behind and stay on the plant space.
  - **Plants can't stop everything!** Each plant can only hold onto to 1 pollution token at a time. If a water token is carrying 3 pollution tokens when it lands on a plant, 1 pollution token will get left with the plant and 2 will continue with the water token when it moves.
6. **Storm drains carry water away!** If a water token lands on a storm drain, it gets sent directly to the end of the board. If the water token is carrying any pollution at the time, that pollution gets sent to the end of the board as well.

*How many turns did it take for all of the rain drops to make it to the Puget Sound?*

\_\_\_\_\_

*How many pollution tokens ended up in the Puget Sound?*

\_\_\_\_\_

**Final Questions:**

How did plants and storm drains affect how quickly the water moved through the watershed?

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Which round had the most pollution end up in the Puget Sound? Why do you think that is?

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If you were to design a fourth round, what would you change? Are there any experiments you would like to try out by changing the number of tokens, or maybe their layout on the board?

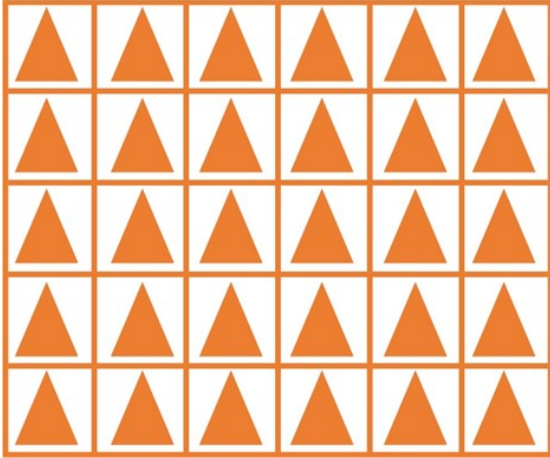
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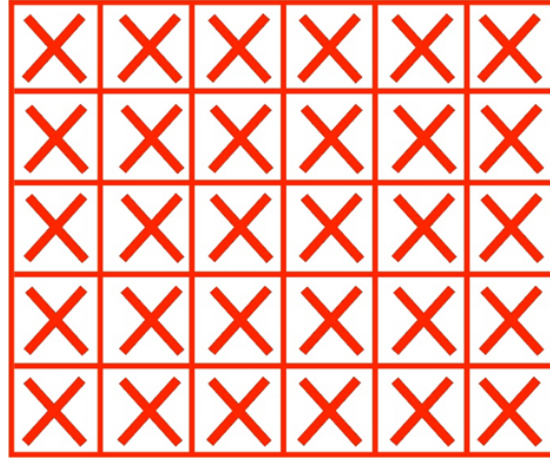




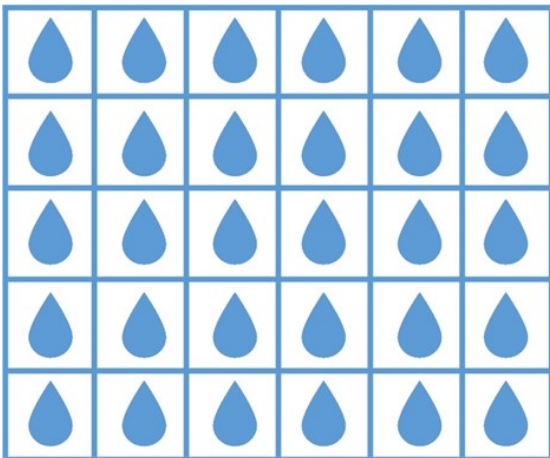
STORM DRAIN TOKENS:



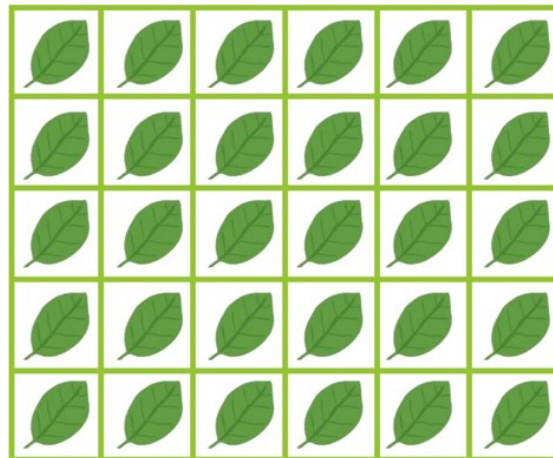
POLLUTION TOKENS:



WATER TOKENS:



PLANT TOKENS:



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City of Bothell



KING COUNTY FLOOD CONTROL DISTRICT



King County

Department of Natural Resources and Parks  
Wastewater Treatment Division



Nature VISION

# Optional Activity

## Interacting with Your Watershed

Do you want to learn more about your local watershed, or even design one of your own? Check out these online resources and explore your watershed.

**Materials:** Computer/phone/tablet, internet access

**With adult supervision, visit the following websites to learn more about watersheds:**

**USGS Interactive Watershed Map:** You can use this resource to zoom in on your local watershed, seeing how it fits into the larger watersheds around us and how it connects to all the nearby bodies of water.

[https://water.usgs.gov/wsc/watershed\\_finder.html](https://water.usgs.gov/wsc/watershed_finder.html)

**“Rock Your Watershed” Game:** This site hosts a mini-game where you can design your own watershed. You can click on each of the 10 sections, or parcels, of land and decide how it will be used. Will you fill your watershed with houses, businesses, farms, parks, or something else entirely? Once you have finished, you will receive a score based on how healthy and productive your landscape can be!

<http://water-rocks.herokuapp.com/game/index#>

**If you are unable to access these websites, you can still design your own watershed.**

To do so, simply draw a map of the area you live in and try to identify where water is flowing. Think about some of what might be going on in your watershed:

- Are there lots of roads, lots of natural areas, or both?
- Where does water tend to gather or pool?
- Where does the water start? Where does it end?
- How are people using the water? Are there homes, businesses, farms, or more?
- Is there anything in particular that might pollute the water?

## Optional Activity

### Stormwater Stewardship Challenge for Day 1

There are many ways to protect our waterways. At the end of every daily lesson, we will be sharing a challenge to help highlight what you've learned.

**Materials:** Writing utensil, computer/phone/tablet, internet connection

Water moving through our watershed does amazing things; it sustains plants and animals while also providing humans with recreation and exercise. However, our waterways are impacted by stormwater runoff pollution.

Think about a time that you've seen a problem with stormwater runoff pollution in your neighborhood. What was the specific issue? What were the specific types of pollution? How do you think this stormwater runoff pollution impacts the people, plants, and animals that rely on that water? What are the simple solutions to this stormwater problem?

**Create a piece of writing to share these ideas with your local city council. Be specific to why your city council member should care about the stormwater runoff pollution problem in your city.**

To share your writing piece, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean!

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
- If you live in City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

### Brainstorm Ideas

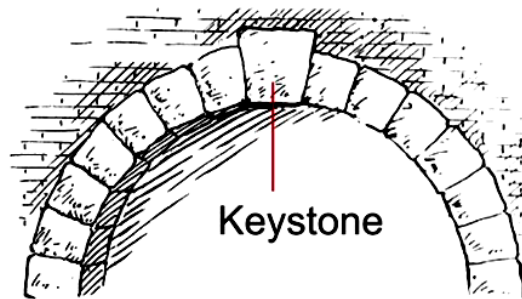
*Letter to City Council*

## DAY 2

### Rivers and Salmon

The first watershed ecosystem that we will investigate is that of the river. Rivers and streams are like nature's highways and roads, connecting different locations from the mountains to the forests to the oceans. They provide a home — or **habitat** — for countless plants and animals. The areas surrounding a river can also be referred to as a **riparian zone**, which serves to connect the river systems to the rest of the forest.

One of the most important members of river ecosystems in Washington is the Pacific salmon. Salmon are what ecologists call a **keystone species**, meaning that they are vital to the overall health of the ecosystem. The term keystone refers to the "keystone" of an archway, the top stone which holds the rest of the arch in place. Without the keystone, the archway crumbles and falls apart. Similarly, without salmon, the ecosystems they are a part of will be at risk of collapse.



As you learned in yesterday's activities, pollution from all across the watershed can build up in stormwater, often emptying out straight in local rivers and streams. This is very clearly not a healthy system for salmon and all of the other **organisms**, or living things, in our waterways.



When we protect and care for our rivers and salmon, it benefits every living creature around. Even the plants surrounding these waterways are crucial, holding soil in place with their roots and keeping the waters cool with the shade from their leaves.

If you were a salmon, which of these two river ecosystems would you prefer to live in?



### **Vocabulary**

**Habitat:** The home of a plant or animal

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

**Organism:** A living thing

**Riparian Zone:** The areas adjacent to rivers and streams

## Main Activity

### What Could Go Wrong?

Individual actions can have big impacts on the environment, especially when they involve rivers and other water sources that are moving through the watershed. What happens when all of these individual actions start to build up and combine? Will we create safe and clean river systems, or leave them dirty and polluted?

**Materials:** Writing utensil, dice (optional)

A healthy river ecosystem is made up of plants, animals, people, and more. On the next page you will find 3 lists, each one showing either a good or bad situation that might affect these waterways.

On the following pages, you will have 3 rounds to build different river ecosystems. Follow these instructions to complete your river:

1. For each list, roll one single die.
  - Low numbers like a '1' will always show very bad and unhealthy situations, while high numbers like a '6' will highlight good and positive scenarios.
  - If you do not have any dice, you can flip 6 coins instead, counting the number of 'heads' as your final number. You can also just choose a random number.
2. Record the number you rolled for each list in the space provided.
3. After you have selected a number from each list, write a brief description of your river based on the combination of your situations.
  - You might get lucky and create a healthy and thriving ecosystem, or you might find yourself with a damaged and polluted river!
4. Repeat these steps for each round.

**Example:** Imagine you rolled a 5, a 1, and then a 3. Based on the list on the next page, that means that the following is true for your river:

1. A community group in a nearby town has planted rain gardens to help soak up stormwater before it reaches the river. (**#5 on the Plants list**)
2. All fish in the river have died for unknown reasons. (**#1 on the Animals list**)
3. The state has built a new dam, preventing animals from moving up and down the river. (**#3 on the Humans list**)

You would now have to describe or draw this river system, explaining what has happened and providing some ideas for how the ecosystem could be helped or improved.



### **List 1: Plants**

1. People cut down and removed every single plant and tree in the area.
2. The local town chopped down all the trees, but left open fields of grass in their place.
3. Somebody planted non-native plants in their garden, which then grew out of control and took over the riverbanks.
4. After a wildfire burned them down, some shrubs and bushes are starting to regrow.
5. A community group in a nearby town has planted rain gardens to help soak up stormwater before it reaches the river.
6. The river is lined with tall, strong trees and there are numerous bushes, shrubs, grasses, and more all along the riverbank.

### **List 2: Animals**

1. All fish in the river have died for unknown reasons.
2. Poachers have illegally taken otters, beavers, and rabbits that live in and around the river.
3. Some salmon have returned to spawn and lay their eggs, but very few of the eggs actually hatched.
4. The river's water is full of aquatic insects, swimming around and providing food sources to fish, amphibians, and more.
5. Eagles are nesting near the river, feeding on fish and rodents.
6. The rivers are full of spawning salmon, providing food and nutrients to all kinds of life.

### **List 3: Humans**

1. People living near the river are throwing trash and other kinds of pollution directly into the river.
2. Nearby towns let people and businesses dump anything they want down the storm drains.
3. The state has built a new dam, preventing animals from moving up and down the river.
4. Volunteers went out to the riverbank to pick up trash and litter.
5. The city council passed a law forbidding people to use certain harmful chemicals in their yards and gardens.
6. A new State Park has been created, protecting all of the land within 2 miles of the river.

**Round 1:**

<b>Plants Number:</b>	<b>Animals Number:</b>	<b>Humans Number:</b>

Describe the situation you have created. Is this river a safe and healthy habitat? Why or why not?

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What could you do or change to improve this river ecosystem?

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**Round 2:**

<b>Plants Number:</b>	<b>Animals Number:</b>	<b>Humans Number:</b>

Describe the situation you have created. Is this river a safe and healthy habitat? Why or why not?

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What could you do or change to improve this river ecosystem?

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**Round 3:**

<b>Plants Number:</b>	<b>Animals Number:</b>	<b>Humans Number:</b>

Describe the situation you have created. Is this river a safe and healthy habitat? Why or why not?

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What could you do or change to improve this river ecosystem?

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# Optional Activity

## Disappearing Salmon

In the previous activity, you have seen just how important salmon are to our rivers and streams. You have also learned about some of the issues facing them. Now, imagine the worst case scenario: humans have created so many problems and so much pollution, that the Pacific salmon have all gone extinct! What would this look like in our environment?

**Materials:** Writing utensil, markers/colored pencils (optional)

Imagine what would happen to our river ecosystems if all salmon suddenly died off and disappeared. Now, think about what these areas might look like as time goes by and the loss of salmon begins to impact more and more parts of the environment. Think about the scenarios below and on the following page:

### **1 Week Later...**

It has been one week since the last of the salmon died off. Are there any plants or animals that are already starting to suffer? What is happening to them?

Describe the situation below, or draw a picture that shows what the river might look like:

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**1 Year Later...**

It has now been one full year since salmon went extinct. What has happened to the river during this time? Lots of animals used to feed on salmon; are they finding enough food anymore? What will happen to the animals, like insects, that salmon used to eat?

Describe the situation below, or draw a picture that shows what the river might look like:

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**10 Years Later...**

The world has been without salmon for a decade now. Have any other plants or animals gone extinct as a result? If they haven't died off completely, have their populations changed? Have humans done anything to help?

Describe the situation below, or draw a picture that shows what the river might look like:

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## Optional Activity

### Stormwater Stewardship Challenge for Day 2

Humans often have great influence on the world around them. Here in Washington, one of the largest issues is how toxic stormwater runoff pollution affects the salmon in our rivers and Puget Sound.

**Materials:** Writing utensil, computer/phone/tablet, internet connection

Investigate items around your home and identify any items that could harm salmon if found in our waterways as stormwater runoff pollution. Start with items that could be left behind on outdoor surfaces and wash away into storm drains with stormwater when it rains.

List the items found in your home that could harm salmon, then explain why that item is harmful to salmon. List what you could do to ensure these items never run off with stormwater.

1.

2.

3.

4.

5.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean!

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
- If you live in City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

# DAY 3

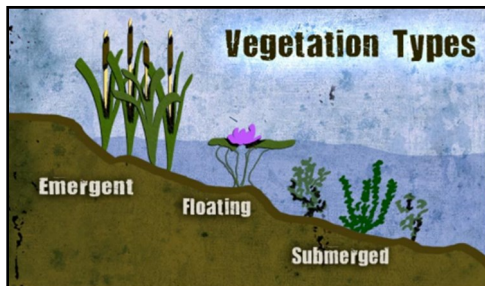
## Wetlands

Wetlands are places that stay wet for most of the year. You can usually find them in transition zones between land and water, such as ponds, swamps or creeks. Wetlands are found all over our watershed - in cities, your neighborhood, at your school, even in the forest! Some areas have had their wetlands built over, so **stormwater retention ponds** were created to help act as wetlands and collect extra water when it rains. You can usually find storm retention ponds in cities and places with lots of concrete. All wetlands (even human-made ones) share the same three characteristics:

1. **All wetlands need to have water!** It's no surprise that all wetlands have water. It can be a lot or little bit of water, but the water needs to be in the wetland most of the time. The water comes from rain collecting as it falls from the sky, or runoff water from **storm drains** that empty out into the wetland or storm retention pond.



2. **All wetlands have plants!** Special plants called **hydrophytes** have adapted to live in these wet places. There are three main types of hydrophytes: emergent, floating, and submerged. Plants that live in the wetlands tend to have big, flat leaves and air sacs to help float above the water. They also have finer roots than regular plants, since it is easier for the plant to absorb oxygen from the water than it is in dirt. Plants like cattail, skunk cabbage, or duckweed are all great examples of plants that love water and living in a wetland.



CATTAIL



SKUNK CABBAGE



DUCK WEED

3. **All wetlands have soil that is soaked with water!** The soil — called **hydric soil** — needs to be wet to help the hydrophytes grow. The soil in a wetland acts like a sponge by soaking up extra water. The spongy wetland soil helps make sure there is no flooding during large rain storms. By soaking up excess water, wetlands help keep our homes and streets free from water!



Soaking up extra water is an important job for wetlands and storm retention ponds. Streets, sidewalks, parking lots and other **impervious surfaces** cannot soak up water, which means the water will stay on the surface. This water can cause flooding, unless it has a place to go. Storm drains take that extra water and drain it into the closest wetland or stormwater retention pond. The spongy soil in the wetland or retention pond will soak up the extra water, and the soil and plants will trap any pollution that was mixed with the stormwater. This means the stormwater can be **filtered** or cleaned by the wetland, but it also means that pollution gets trapped in the wetland. Too much pollution can make it unhealthy for the many animals and plants that live there! Wetlands are filters in nature, helping to clean out pollution from the water as it joins larger bodies of water like rivers and lakes. Next time you see a pond, creek, or swamp, remember they are filters working to keep our watersheds healthy.

### **Vocabulary**

**Filter:** Passing through a device to remove unwanted material

**Hydric Soil:** Soil that is permanently wet

**Hydrophytes:** Plants that have adapted to live in water (i.e. hydro means “water”, phyte means “love”)

**Impervious Surface:** A surface that does not allow water through it, usually human-made like concrete or asphalt

**Storm Drain:** A drain for large and excess amount of rainwater

**Stormwater Retention Pond:** An artificial wetland created to capture excess water runoff and act as a filter



# Main Activity

## Wetland Filters

Wetlands help filter pollution in stormwater. The soil and plants in a wetland trap the pollution and clean the water. Let's make our own model of a wetland and investigate how they are great filters. Once you are finished with the model, brainstorm 3 ways to prevent pollution from reaching the wetlands.

### **Materials:**

- 2 small clear containers – like cups, plastic containers, jars, or bowls
- 1 small container (does not have to be clear) – like a cup, plastic container, can, jar, or bowl
- 1 tablespoon of soy sauce (or any dark liquid)
- 1 tablespoon of oil
- 1 sponge
- ½ cup of water
- 1 tablespoon of soil
- 1 small stick or leaf

Please ask an adult for permission first to gather materials and to go outdoors and for a safe place to do this activity, since you are working with water and other materials that can spill. A great place to do this activity would be right outside your home with an adult. A bathtub or sink are not good places as the drains can clog from the materials. **DO NOT drink anything.**

### **Part 1 – Make Your Wetland**

1. Take one small clear container and place it on a solid surface
2. Pour the ½ cup of water into the container — **This is your first part of a wetland!**
3. **The second part of a wetland is soil** — Add your 1 tablespoon of soil into the water
4. **Time to add your third part of a wetland — plants!** Take your one small container (not the clear one) and go look for one small stick or leaf that is already on the ground. **Go with an adult and don't pick living plants.**
5. Add the one small stick or leaf into your small container. Make sure you picked one that fits in your container.
6. Add the stick or leaf into the clear container with water and soil. **You have made a wetland!**

Does your wetland have all three parts: water, soil, and plants?

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**Part 2 – Filter Your Wetland**

1. Take your wetland in the small clear container and add 1 tablespoon of soy sauce. **This is pollution going into a wetland!**
2. Add in 1 tablespoon of oil. **This is more pollution!**

*What does your wetland water look like? Is it clean? Is it dirty?*

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*Make a prediction: What color will the water be after you pour it over a sponge?*

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3. **Time to filter the wetland water!** Take your second clear container (that has no water or anything in it) and put the sponge over the top.
4. Make sure the sponge stays on top of the container. Don't let it drop to the bottom of the container.
5. Slowly and carefully pour the wetland water with pollution over the sponge. **This is like the wetland soaking up the stormwater.**
6. Don't squeeze out the sponge but watch the water drip out of the sponge. **A wetland also slowly filters water.**
7. Look at the water that drips out of the sponge. **DO NOT drink this water!**

*Is the water that went through the sponge and dripped into the second clear container clean or dirty? Does it look cleaner than after you added the pollution to the wetland?*

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8. Take all the water you used and pour it over the soil and plants outside to not waste water. **Go with an adult to find a spot to do this that is close to home.**

# Optional Activity

## Finding Pollution Levels

When it rains, water mixes with pollution on the streets and sidewalks and runs down the storm drain into our wetlands. You can examine the water quality of a wetland by looking at what insects live in the water, as some insects can live in more polluted waters than others.

**Materials:** Writing utensil, calculator (optional)

Follow along with the scenario below and use the images, tables, and charts on the following pages to determine the pollution level of your stream. Tally up the number of each creature you find in your jar at each of the three streams; animals with a high point value can only survive in clean water, while animals with a low point value can be found even in very polluted waters.

### Scenario:

You take a class field trip to three local streams with Nature Vision. At each stream, you do an insect dip and collect a sample to determine how polluted the stream is. Take a closer look at your samples and count the creatures to figure out the health of each body of water.

Stream #			
Name	Score	# Found	Total Score
Dragonfly Nymph	9		
Cranefly Larva	1		
Leech	1		
Scud	4		
Aquatic Worm	2		
Midge Larva	1		
Caddisfly Larva	10		
Water Penny	6		
Mayfly Nymph	5		
<b>TOTAL:</b>			

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
61+ No pollution, excellent habitat

The pollution level of this stream is:

Stream 1



Stream 1			
Name	Score	# Found	Total Score
Dragonfly Nymph	9		
Cranefly Larva	1		
Leech	1		
Scud	4		
Aquatic Worm	2		
Midge Larva	1		
Caddisfly Larva	10		
Water Penny	6		
Mayfly Nymph	5		
<b>TOTAL:</b>			

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
61+ No pollution, excellent habitat

The pollution level of this stream is:

Stream 2



Stream 2			
Name	Score	# Found	Total Score
Dragonfly Nymph	9		
Cranefly Larva	1		
Leech	1		
Scud	4		
Aquatic Worm	2		
Midge Larva	1		
Caddisfly Larva	10		
Water Penny	6		
Mayfly Nymph	5		
<b>TOTAL:</b>			

Pollution Level	
0-10	Very Polluted
11-20	Polluted, poor habitat
21-40	Some pollution, fair habitat
41-60	Little pollution, good habitat
61+	No pollution, excellent habitat

The pollution level of this stream is:

Stream 3



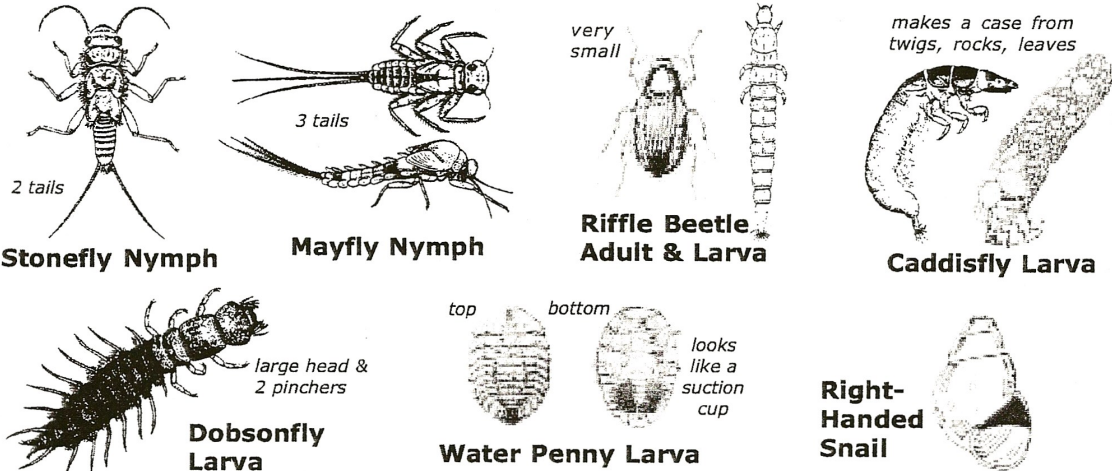
Stream 3			
Name	Score	# Found	Total Score
Dragonfly Nymph	9		
Cranefly Larva	1		
Leech	1		
Scud	4		
Aquatic Worm	2		
Midge Larva	1		
Caddisfly Larva	10		
Water Penny	6		
Mayfly Nymph	5		
<b>TOTAL:</b>			

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
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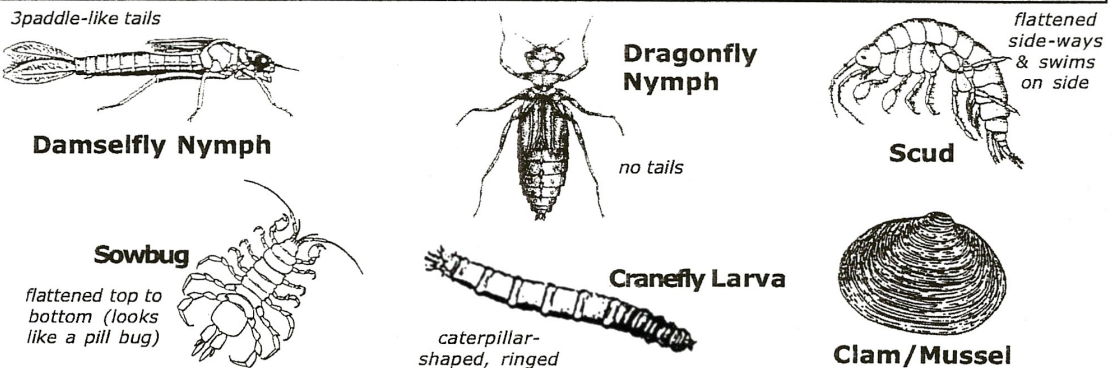
The pollution level of this stream is:

# Macroinvertebrate Identification Key

## GROUP 1 – Very Intolerant of Pollution



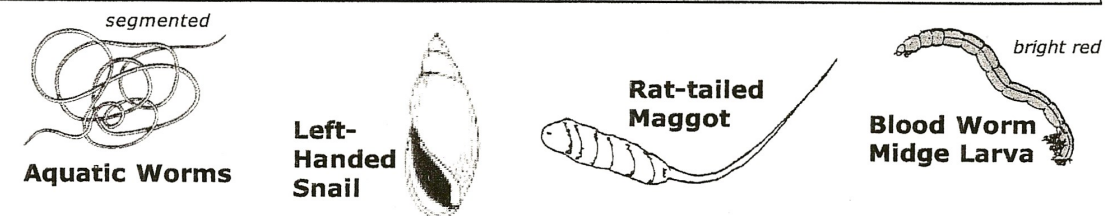
## GROUP 2 – Moderately Intolerant of Pollution



## GROUP 3 – Fairly Tolerant of Pollution



## GROUP 4 – Very Tolerant of Pollution



## Optional Activity

### Stormwater Stewardship Challenge for Day 3

Our system of storm drains was built into our cities to hold rainwater and snow melt that falls onto our cities – this is stormwater. Storm drains help to prevent flooding and damage to our homes and community. However, our cities are covered in solid surfaces that allow for an excess amount of stormwater. This means storm drain systems are now working in a manner for which they were not originally designed – moving stormwater runoff pollution into our waterways.

**Materials:** Computer/phone/tablet, internet connection, any gear needed to conduct drain cleanup (like gloves, trash bags, broom, etc.), writing utensil, colored pencils/markers, paper

To help your community keep storm drains working well, you can volunteer to adopt a storm drain!

You don't need to volunteer officially to do your part though. Anyone can help to keep a drain near them clear of leaves, sticks and other natural materials that could potentially clog a storm drain.

With an adult, find a storm drain near your home and remove any debris from the drain opening.

- **Do not go into the street!**
- **Be careful when walking and always watch out for cars, bikes, and other traffic. Whenever you are outside, it is important to be safe, responsible and respectful.**
- **Use a broom or rake to sweep leaves, sticks, and small rocks away from the top of the storm drain.**
- **Never use your hands to pick up anything!**
- **Never pick up anything sharp or dangerous.**

If you aren't able to make it outside, you can still help! Create a poster reminding people to keep storm drains clear and how to do it safely. Display your poster in a window or take a picture and send to friends and family.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean!

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- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd



# DAY 4

## Puget Sound

Puget Sound is a large body of water in Washington where the freshwater from the mountains connects with the saltwater from the Pacific Ocean. Many cities can be found next to Puget Sound. If you've been to Seattle and you saw the water, you saw Puget Sound! Humans, plants, and animals live in and around Puget Sound. We learned earlier how water is always moving through a watershed — Puget Sound is a watershed where many rivers and streams drain. It is also an **estuary**, which is where freshwater and saltwater mix together. Estuaries are an important ecosystem for many animals, giving them a place to raise their young and find lots of food.



Puget Sound is home to animals that can live in saltwater. Some of these animals travel out to the Pacific Ocean and back to Puget Sound. We learned about salmon on our second day and how they are an important animal that lives in our rivers and streams. Salmon also live in Puget Sound as adults before travelling to the Pacific Ocean.

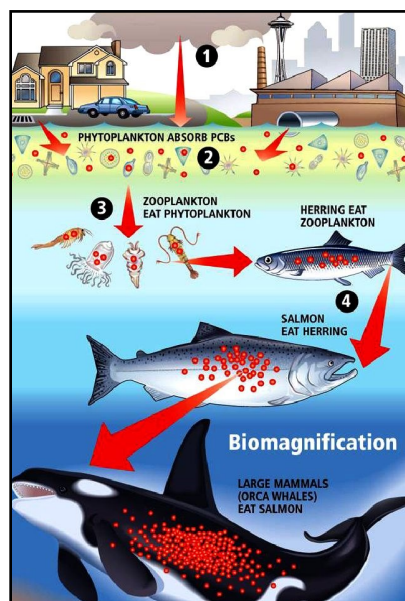


Another animal that lives in Puget Sound is the Orca whale. The pod of Orca whales that live in Puget Sound are called the Southern Resident Killer Whales. Resident Orcas only eat salmon, so it's important that the salmon population is healthy. Because of pollution in Puget Sound, there are not as many salmon for the Orcas to eat. Fewer salmon mean fewer Orcas. We can all work together to help keep the Puget Sound clean, which helps our Orcas and salmon!



Salmon and Orcas are only two of many animals that live in Puget Sound. All living things in Puget Sound need healthy water. Here in Washington, it rains a lot, which means there are lots of opportunities for pollution on the streets and sidewalks to be washed down the storm drains, and into our wetlands, which then lead into the Puget Sound. Because Puget Sound has a lot of cities that surround it, a lot of pollution goes into the water and makes it very unhealthy for all living things in Puget Sound. This pollution can affect every animal in the food chain.

**Biomagnification** occurs when pollution builds up in a food chain over time. Animals at the top of the food chain can accumulate pollution by eating other animals, even if it doesn't eat the pollution on its own. For example, **mercury** is a common pollutant in Puget Sound. It comes from burning coal and improperly disposed household and industrial waste. Mercury is absorbed by **phytoplankton**, which are microscopic plant organisms that live in watery environments. Phytoplankton are eaten by **zooplankton**, which are animal organisms that drift in bodies of water. When a fish eats some mercury-contaminated zooplankton, and then is eaten by a seal, that seal now has mercury inside of it. If an Orca eats several fish that have eaten contaminated zooplankton, the Orca will have a large amount of mercury in it, despite not actually eating any mercury.



<https://sites.sandiego.edu/sdpollutiontrackers/2018/04/05/>

One of the best ways to keep Puget Sound healthy is to make sure we have no pollution going into Puget Sound. Since pollution mostly comes from things that humans use, it is up to us to make sure we don't have pollution on our streets, sidewalks, driveways, and parking lots that might be picked up by stormwater and washed down into a storm drain. It is our responsibility to keep Puget Sound healthy!

**Vocabulary**

**Biomagnification:** When pollution builds up in a food chain over time

**Estuary:** An area where freshwater and saltwater mix together

**Mercury:** A naturally occurring element that can cause pollution in the air and water, usually from burning coal, oil, or wood, or improperly disposing of products that contain mercury like thermostats and lightbulbs

**Phytoplankton:** Small, microscopic plants that drift around in water

**Zooplankton:** Animal organisms that drift in the water, ranging from microscopic to larger animals like jellyfish

# Main Activity

## Who Polluted Puget Sound?

Puget Sound is a watershed home to many people. Sometimes the things we use every day become pollution when they are left behind on our city's streets, sidewalks, driveways, and parking lots. Pollution goes down storm drains with stormwater after it rains. This stormwater drains into Puget Sound making the water unhealthy for animals like salmon and Orca whales.

**Materials:** Writing utensil

**Instructions:**

1. Read the "Who Polluted Puget Sound?" excerpt below.
2. Write your own story using at least 3 of these pollutants:
  - Dog poop
  - Fertilizer
  - Six-pack ring
  - Antifreeze
  - Styrofoam
  - Candy wrapper
  - Gas
  - Car wash soap
  - Balloons
3. After you finish writing your story, answer the question: who polluted Puget Sound?

***"Who Polluted Puget Sound?" Excerpt:***

*It is a cloudy morning at home near Puget Sound. You take your dog on a walk. Your dog poops on the street but you forgot a bag so you leave it there. You and your dog rush back home. You see your neighbor putting fertilizer on their garden. They have used too much and there is extra on their plants. You are almost back home and pass by your school. You notice there is an empty chip bag that was left behind on the field. You finally get home and your adult is washing their car on the driveway. The soap is washing away and into the street. Later you notice your adult's car is gone and on their parking spot is a rainbow oil circle spot. The car must have a leak! It has started to rain. All the different pollution you saw washes away and goes into storm drains that connect to Puget Sound. **Who Polluted Puget Sound?***



# Optional Activity

## Biomagnification











Biomagnification is when a pollutant builds up in a food chain over time. This affects animals at the top of the food chain the most as they eat large amounts of food.

**Materials:** Writing utensil, colored pencils/markers (optional)

Using the chart below, fill in the grids with how much of the pollutant mercury is building up in each level of the food chain. You may want to use different colors to represent each animal. One rectangle is one unit. For example, the phytoplankton absorbs 1 unit of mercury, so you will color in one small box. As you progress through the food chain, you will use multiplication to find the total amount of mercury in each animal:

$$3 \text{ phytoplankton} \times 1 \text{ unit of mercury} = ? \text{ units of mercury in the zooplankton}$$

You would then color in that many boxes next to zooplankton.

	<b>Total Amount of Mercury</b>																								
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## Optional Activity

### Stormwater Stewardship Challenge for Day 4

As we learned today, orca or killer whales that inhabit Puget Sound are called the Southern Resident orca whales. The J, K, and L pods are the three family groups living in Puget Sound. There is a total of 73 whales in all three pods combined. This low population is due, in part, to stormwater runoff pollution in Puget Sound. Our Southern Resident orca whales rely on clean water and an abundance of salmon to survive.

Stormwater contains bacteria, metals from our cars, oils, and other chemicals. All of these pollutants flow into Puget Sound, making our Southern Resident orca whales unhealthy. Help the Southern Resident orca whales by creating a slogan that inspires others to take care of Puget Sound.

**Materials:** Writing utensil, computer/phone/tablet, internet connection

Create a slogan about Puget Sound's Southern Resident orca whales and the stormwater pollution problem. *A slogan is a short phrase or set of words that helps to remember something.* For example, a common slogan you might have seen or heard before about storm drains: "Only Rain Down the Storm Drain" The slogan can reference orcas, stormwater pollution, or a combination of both! Your slogan does not have to rhyme but a slogan should be easy to remember and recall!

Orcas and stormwater slogan:

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There are more resources available online that will help you learn more about our Southern Resident orca whales! **With an adult**, learn more about them at [whaleresearch.com](http://whaleresearch.com).

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn, too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean!

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
- If you live in City of Bothell: Tag @BothellWaUSA and include the hashtag #PugetSoundStartsHere
- If you live in City of Lynnwood: Tag @LynnwoodWA and include the hashtag #Lynnwood
- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

# DAY 5

## Stewardship

A lot has been covered this week on watersheds, rivers, streams, wetlands, and Puget Sound! Many species live within these ecosystems, including humans. It is important to combine everything we learned about these waterways and the impact of stormwater runoff pollution. It's time put our knowledge into action and learn about **stewardship**.

Stewardship means to take care of our natural resources. A steward is someone who is responsible for the care of these natural resources. If you take on the responsibility of keeping our waterways and ecosystems clean – you are a steward.

There are many actions you can take to prevent stormwater runoff pollution from going down storm drains and entering our rivers, streams, wetlands, and Puget Sound. One of the best ways is to be mindful of our daily tasks, materials we use, and habits. Ask yourself the question: "How can I make sure to not leave behind something on our streets, sidewalks, driveways, and parking lots that can become stormwater runoff pollution?"

Clean water is something all living things need to survive. We are responsible stewards of our ecosystems when we work to keep our storm drains, and in turn our waterways, clean of stormwater runoff pollution.

### **Vocabulary**

**Stewardship:** Taking care of something; being a protector

# Main Activity

## Create a Stormwater Pollution Prevention Action Plan

You are capable of implementing change and raising awareness about stormwater runoff pollution! Taking care of the health of our ecosystems is everyone's responsibility. You have learned a lot of information over the week regarding the impact of stormwater runoff when it enters our waterways through storm drains.

**Materials:** Writing utensil

### **Instructions:**

We challenge you to create a *Stormwater Pollution Prevention Action Plan!* This plan should raise awareness about stormwater runoff pollution and why it is damaging to water quality. An action plan helps you to organize your ideas and brainstorm a design that will motivate others to learn. Once you've organized your thoughts into a plan, you can put it into action! Share with your friends, families, and teachers the plan you've designed to engage them into being stewards of our waterways as well!

Follow the guidelines below. Combine your ideas and choices from each section to make a complete plan. At the bottom, write a short summary of additional ideas, notes, and details to help you construct the most effective plan to engage your audience – *people who you want to educate on stormwater pollution prevention!*

### **Stormwater Pollution Prevention Action Plan Guidelines**

#### **Where? *Where do you want to put your plan into action?***

- School
- Home
- Friend's Home
- Social Media (*with the help of an adult*)

#### **Who? *Who can help you put your plan into action?***

- Parent/Caregiver
- Teacher
- Friend
- Other Family Member

*Continued on Next Page*



**What? What topic do you want to focus on and share with others?**

- Specific stormwater pollutants (i.e. bacteria from dog waste, oil leaks, metals from car brakes, excess fertilizer and pesticides used in our gardens, litter)
  - Wildlife (e.g. salmon and orca whales) that are impacted by stormwater runoff pollution
  - Storm drains and how stormwater enters our waterways
  - Something different related to stormwater pollution prevention:
- 

**Second What? What are you going to do? All of the steps below need to be with adult permission.**

- Create posters to put up in allowed areas with adult permission
- Call/Email/Text 10 friends and family to share stormwater pollution prevention methods with adult permission
- Design a presentation to share at an after school club or green team on stormwater pollution prevention when possible
- Start an after school club or green team to brainstorm more stormwater pollution prevention methods!
- Something different: \_\_\_\_\_

**Third What? What supplies do you need for a successful action plan?**

- Art Supplies — List art supplies: \_\_\_\_\_
  - Computer
  - Blank paper
  - Poster(s)
  - Photos — List animals, plants, waterways, maps, or photos you may need:
- 

- Do you need anything else? \_\_\_\_\_

**Why? Why is this topic important to you?**

- You want to protect our wildlife, such as salmon and Orca whales!
- You want to keep our rivers, streams, wetlands, and Puget Sound clean for all!
- You learned something new about stormwater runoff pollution and want to share with others!
- This is something you've been passionate about for a long time and want to continue raising awareness on this issue!
- Another reason: \_\_\_\_\_

**Short Summary of Additional Notes, Details, or Other Helpful Ideas:**

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# Optional Activity

## Volunteer Opportunities

Volunteers dedicate their time to help make a difference to a cause that matters to them. There are many local organizations that are committed to the health of our waterways. Some volunteer opportunities are ongoing and you can volunteer with organizations more than once. Some volunteer opportunities are a one-time event and you can choose a specific date that you are available to help.

**Materials:** Computer/tablet/phone, internet connection

*Find future volunteer opportunities you can participate in!* With an adult, visit the websites of local organizations to research upcoming volunteer opportunities. The local organizations listed on the following page play an active role in maintaining the health of our waterways, raising awareness on stormwater runoff pollution, and providing stewardship methods for stormwater runoff pollution prevention. Check them out!

## **Organizations:**

### **City of Auburn**

- Adopt a Street: <https://www.auburnwa.gov/cms/one.aspx?portalId=11470638&pageId=12523101>

### **City of Bothell**

- Volunteer with Public Works: <http://www.bothellwa.gov/volunteer>

### **City of Lynnwood**

- Environmental Volunteer Opportunities: <https://www.lynnwoodwa.gov/Government/Departments/Public-Works/Environmental-and-Surface-Water-Education-and-Outreach/Environmental-Volunteer-Opportunities>

**Duwamish River Cleanup Coalition** “elevates the voice of those impacted by the Duwamish River pollution and other environmental injustices to advocate for a clean, healthy, and equitable environment for people and wildlife”

- Upcoming Events: <https://www.duwamishcleanup.org/df>

**EarthCorps** “develops leaders to strengthen community and restore the health of our environment.”

- Puget Sound Stewards: <https://www.earthcorps.org/volunteer/puget-sound-stewards/>

**Green River Coalition** - “protecting and enhancing the Green River and our Watershed”

- Upcoming Events: <https://www.greenrivercoalition.org/#upcoming-events>

**King Conservation District** “Our mission is to promote the sustainable use of natural resources through responsible stewardship.”

- Volunteer Opportunities: <https://kingcd.org/get-involved/volunteer>

### **King County**

- The Dirt: calendar of hands-on volunteer opportunities: <https://www.kingcounty.gov/services/environment/stewardship/volunteer.aspx>

**Puget Soundkeeper Alliance** “[Our] mission is to protect and preserve the waters of Puget Sound.”

- Volunteer Opportunities: <https://pugetsoundkeeper.org/volunteer/>

**Puget Sound Starts Here** “raises awareness of how our everyday actions impact waterways in the Puget Sound region and what we can do to prevent pollution.”

- Events Around the Sound: <https://www.pugetsoundstartshere.org/Events.aspx>

**Snohomish Conservation District** “[Our] mission is to work cooperatively with others to promote and encourage conservation and responsible use of natural resources.”

- Volunteer Opportunities: <https://snohomishcd.org/volunteer>

***Do you know of any other organizations that offer local volunteer opportunities?***

## Optional Activity

### Stormwater Stewardship Challenge for Day 5

There are so many ways to protect and care for our water. At the end of every daily lesson, we will be giving a stormwater challenge to help you show off what you've learned.

**Materials:** (Optional) writing utensil, colored pencils/markers, computer/phone/tablet, internet connection

Using what you've learned this week regarding stormwater pollution, it's time to be creative! Create a challenge you can pose to those in your household, to your friends, to your community, or to a broader audience on the internet through social media. Think about each topic the packet covered this week and try to incorporate at least one aspect of it in your challenge.

To share your work, post your challenge to Facebook and/or Instagram (**with an adult**) so other people in your community can learn too! Don't forget to tag @naturevisionorg in your post! Do you live in Auburn, Bothell, Lynnwood, or King County? Use the hashtags and tag the city or county group below. They want to see all the work you are doing to keep our water clean!

- If you live in City of Auburn: Tag @auburnwa and include the hashtag #auburnwa
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- If you live in King County: Tag @KingCountyDNRP and @kingcountywtd

# Answer Key

## Day 3 Optional Activity: Finding Pollution Levels

Stream 1			
Name	Score	# Found	Total Score
Dragonfly Nymph	9	1	9
Cranefly Larva	1	0	0
Leech	1	2	2
Scud	4	2	12
Aquatic Worm	2	3	6
Midge Larva	1	0	0
Caddisfly Larva	10	1	10
Water Penny	6	0	0
Mayfly Nymph	5	2	10
<b>TOTAL:</b>			<b>49</b>

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
61+ No pollution, excellent habitat

The pollution level of this stream is:

**Little Pollution**

Stream 2			
Name	Score	# Found	Total Score
Dragonfly Nymph	9	0	0
Cranefly Larva	1	4	4
Leech	1	1	1
Scud	4	0	0
Aquatic Worm	2	1	2
Midge Larva	1	3	3
Caddisfly Larva	10	0	0
Water Penny	6	0	0
Mayfly Nymph	5	0	0
<b>TOTAL:</b>			<b>10</b>

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
61+ No pollution, excellent habitat

The pollution level of this stream is:

**Very Polluted**

Stream 3			
Name	Score	# Found	Total Score
Dragonfly Nymph	9	0	0
Cranefly Larva	1	1	1
Leech	1	1	1
Scud	4	3	12
Aquatic Worm	2	2	4
Midge Larva	1	2	2
Caddisfly Larva	10	0	0
Water Penny	6	1	6
Mayfly Nymph	5	1	5
<b>TOTAL:</b>			<b>31</b>

Pollution Level
0-10 Very Polluted
11-20 Polluted, poor habitat
21-40 Some pollution, fair habitat
41-60 Little pollution, good habitat
61+ No pollution, excellent habitat

The pollution level of this stream is:

**Some Pollution**

# Answer Key

## Day 4 Optional Activity: Biomagnification

