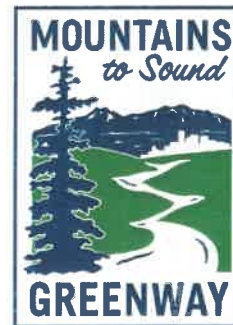


Biodiversity Project Science Journal



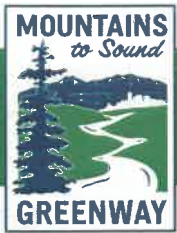
ISSAQUAH
SCHOOLS
FOUNDATION

Name: _____

School: _____

Teacher _____

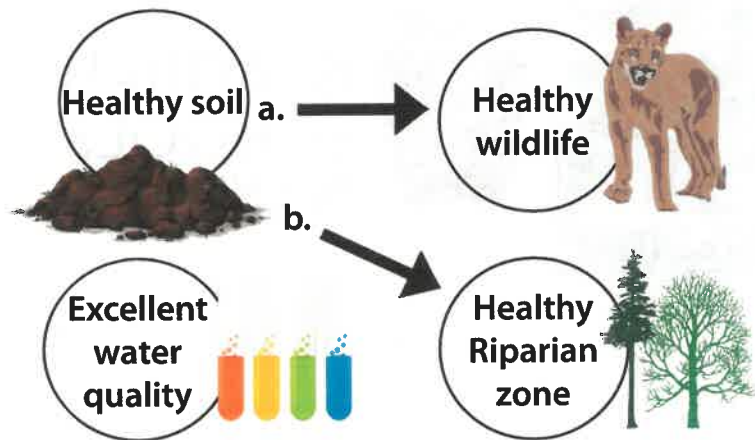
We are studying:



SHOW US WHAT YOU KNOW

1. Biodiversity is the _____.

2. Describe the relationship shown by the arrow between two different parts of the ecosystem below.



a. _____

b. _____

3. TRUE or FALSE (circle one)

The more biodiverse an ecosystem is, the healthier it is.

This is not a test! Just do your best.

4. Salmon are a keystone species in the Pacific Northwest. Describe what that means.

5. Why are native plants important for the biodiversity of the riparian zone?

6. Write 4 words that describe the water quality in a healthy ecosystem.

a. _____ b. _____

c. _____ d. _____

7. Name 3 ways you can improve biodiversity.

1) _____

2) _____

3) _____

BIODIVERSITY BACKGROUND

Biodiversity is the variety of life.

Biodiversity is extremely important for the health and happiness of plants, animals, and humans and it allows an ecosystem to be resilient (to adjust to disturbances like disease, fire, and floods).

Mammals
5,600 species estimated
5,501 (98%) species discovered



Birds
10,500
10,064 (96%)



Reptiles
12,000
9,547 (80%)



Amphibians
15,000
6,771 (45%)



Fish
45,000
32,400 (72%)



Crustaceans
150,000
47,000 (31%)



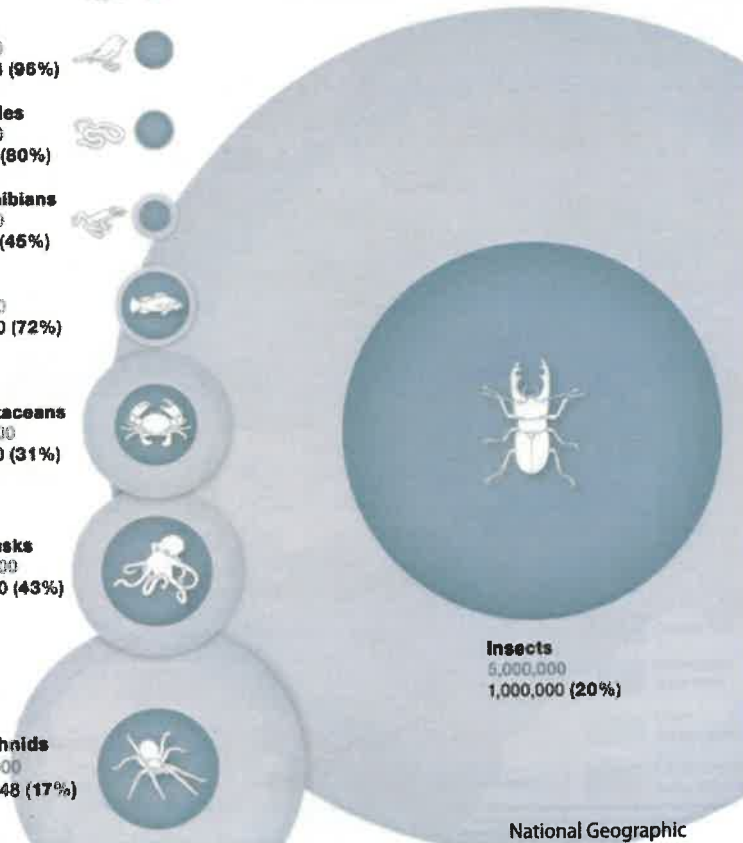
Mollusks
200,000
85,000 (43%)



Arachnids
600,000
102,248 (17%)



This graphic shows how many species scientists have discovered in different groups of animals (in black), and how many species of each animal group scientists estimate there are on earth (in blue).



National Geographic

SOIL Background Information



Excellent soil ⇨ Healthy and diverse plant life!



There are 4 different types of soil:

CLAY (*Can you roll it into a ball?*)

- Teeny tiny particles.
- Water drains too slowly for plant life.
- Contains lots of nutrients.



SILT (*Soft silky dirt*)

- Medium sized particles
(*same width as a strand of your hair*)
- Water drains through slowly.
- Poor amount of nutrients.



SAND (*Think of a sandy beach*)

- Large particles.
- Water drains through too quickly.
- Poor amount of nutrients.



LOAM (*Think of fertilizer*)

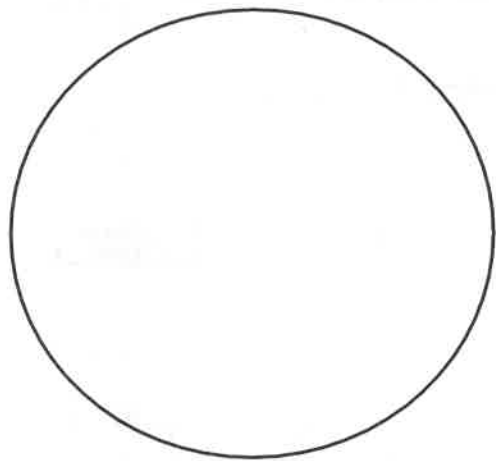
- Mixture of sand, silt, clay, and organic matter (dead plants.)
- Water drains through at a good speed for plant life.
- Contains lots of nutrients.



SOIL

Data Collection

1. Draw your soil

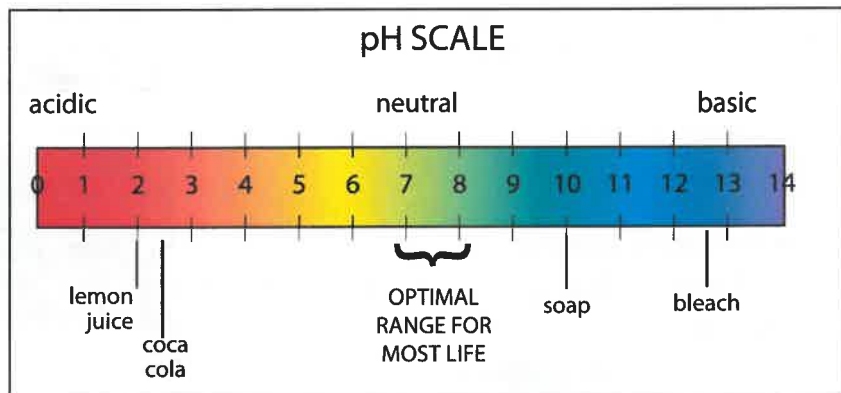


2. Describe your soil



3. What is the pH of your soil? _____

4. Is it acidic, basic, or neutral? _____



SOIL

Critical Thinking Questions

1. When you measure pH, what are you measuring?

2. How does the pH of the soil affect the plant life?

3. In other ecosystems, acidic soil would be poor quality. Why is this not the case in this ecosystem?

4. How does studying soil help us understand the health of the ecosystem?

Conclusion

Based on your data, the health of the soil is (circle one):

Excellent

Medium

Poor



RIPARIAN ZONE

Background Information

A **riparian** (rie-PARE-ee-en) **zone** is the area next to a stream or lake.

Woody debris (duh-BREE) is logs and sticks in the stream.



Native Plants

- Part of the ecosystem for hundreds of years.
- Evolved to live in balance with the plants and animals in its ecosystem.
- Supports biodiversity of an ecosystem.



Black Cottonwood



Snowberry

Non-Native Invasive Plants

- Introduced by humans (accidentally or on purpose) to a new ecosystem.
- Grow quickly and takes resources from native plants, reducing biodiversity in the ecosystem.



Reed Canary Grass



Blackberry

RIPARIAN ZONE

Data Collection



Draw and label the plants you find in your study area.

RIPARIAN ZONE

Data Collection

Species	#	Non-native invasive	Non-native	Native
<i>Ex: Butterfly Bush</i>	1	X		
Totals				

RIPARIAN ZONE

Critical Thinking Questions

1. What is the difference between a native, non-native, and a non-native invasive plant?

Native plants _____

Non-native plants _____

Non-native invasive plants _____

2. How do non-native invasive species affect the biodiversity of the riparian zone?

3. Did you find more native or non-native plants?

Conclusion

Based on your data, the health of the riparian zone is (circle one):

Excellent

Medium

Poor



WILDLIFE

Background Information

We may not see a lot of animals today, but they are here! This ecosystem is home to deer, rabbits, coyotes, garter snakes, salmon, over 100 different birds, and countless bugs.

Keep your eyes and ears open for evidence of animals!

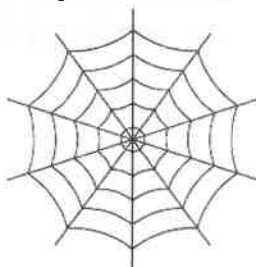


Bird songs

Beaver Evidence



Spider webs



Feathers

Woodpecker holes



Nests



Tracks



WILDLIFE

DATA COLLECTION

1. As you see animals or evidence of animals, mark it off below.

MAMMALS:

- ☐ Douglas' Squirrel
- ☐ Chipmunk
- ☐ Black-Tailed Deer
- ☐ Mouse
- ☐ Black Bear
- ☐ Beaver

BIRDS:

- ☐ Crow
- ☐ Raven
- ☐ Woodpecker
- ☐ American Robin
- ☐ Hummingbird
- ☐ Mallard
- ☐ Pacific Wren
- ☐ Osprey
- ☐ Bald Eagle
- ☐ Great Blue Heron

INVERTEBRATES:

- ☐ Banana Slug
- ☐ Black Slug (invasive!)
- ☐ Brown Slug (invasive!)
- ☐ Snail
- ☐ Earthworm
- ☐ Yellow-Spotted Millipede
- ☐ Fly
- ☐ Ant
- ☐ Beetle
- ☐ Spider

FISH:

- ☐ Salmon
- ☐ Perch



2. All of the animals above depend on salmon! Salmon are a keystone species. What is a keystone species?



WILDLIFE

Background Information

Macro-invertebrates are small animals that are big enough to see without a microscope and that have no backbone.

MACRO-INVERTEBRATE
big no backbone

One way we can determine the health of the stream is by studying what kinds of macro-invertebrates live in the stream. They are called an **indicator species** because their presence shows how healthy the stream is. Some kinds of macro-invertebrates can live in polluted water and some can only live in clean water.

Group 1 macro-invertebrates can only live in very clean water. They cannot live in polluted water.



STONEFLY
(nymph)



CADDISFLY
(larva)



MAYFLY
(nymph)



SNAIL
(right opening)

Group 2 macro-invertebrates can live in wide range of water quality. They can handle some pollution.



SOWBUG



SCUD



CRAYFISH



DOBSONFLY
(larva)



WATER
BOATMEN

Group 3 macro-invertebrates can live in polluted water, but can also be found in clean water.



MIDGE
(larva)



AQUATIC WORMS



SNAIL
(left opening)



WILDLIFE

Data Collection

1. Record how many macro-invertebrates you found:

Group #1 _____ Examples: _____

Group #2 _____ Examples: _____

Group #3 _____ Examples: _____

	#	Multiply
Group 1		x3
Group 2		x2
Group 3		x1
Added up total		

2. Based on your data, the water quality of the stream is (circle one):

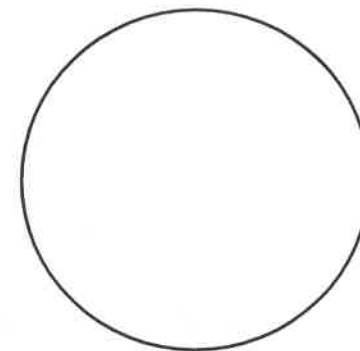
EXCELLENT
(total=22)

MEDIUM
(total=11-21)

POOR
(total<11)

3. Draw one of the macro-invertebrates you saw.

Species:





WILDLIFE

Thinking Questions

1. What is a macro-invertebrate?

2. Why are they called an indicator species? (Hint: Group 1, 2, and 3)

3. How did we use what we know about macro-invertebrates to assess the health of the ecosystem?

3. What does your data indicate about the health of the stream?

Conclusion

Based on what macro-invertebrates found, the health of the stream is (circle one):

Excellent

Medium

Poor

WATER QUALITY

Background Information



Water Temperature - Fish are cold-blooded animals. They are the same temperature as the water they live in, so if the water temperature of their stream gets colder or warmer, so do they. Salmon need cold water because it has lots of oxygen in it.

What is pH? - When we measure pH of a liquid, we are measuring how acidic or basic it is. pH is measured on a scale from 0 to 14, where 0 is the most acidic (like lemon juice) and 14 is the most basic (like bleach). Our blood has a pH of about 7, which is neutral. Salmon need to live in water that is neutral with a pH between 6.5 and 8.5.

What is Dissolved Oxygen (DO)? - We breathe oxygen from the air using our lungs. Salmon breathe oxygen dissolved (DO) in the water using their gills. DO levels in stream water increase where the water bubbles over small rapids called riffles. Colder and fast-moving water has more oxygen in it than warmer water.

What is Phosphate? - Phosphate is a nutrient that all plants and animals need to grow. It is added naturally from decomposing plants and animals. Sometimes, though, too much phosphate enters streams from sewage leaks or from fertilizers running into streams from people's lawns or farms. Too much phosphate in stream water can reduce the amount of dissolved oxygen in the water that is available to salmon.

What is Turbidity? - When we measure the turbidity of water, we are measuring how clear or cloudy it is. The cloudier the water, the more turbid it is. The cloudiness is caused by little particles of soil and plants in the water. The particles makes it harder for fish to breathe (imagine trying to breathe in a sandstorm). Most of the particles settle on the stream bottom and can smother fish eggs and macro-invertebrates (stream bugs). Don't confuse the color of the water with turbidity: water can be a dark color and be clear.



WATER QUALITY Data Collection

Temperature: _____ °C

Dissolved Oxygen (DO): _____ ppm

pH: _____

Turbidity: _____ cm

Phosphate: _____ ppm

	Excellent	Medium	Poor
Temperature	5-12 °C	12-20 °C	Above 20 °C
DO (dissolved oxygen)	More than 9ppm	9-6ppm	Less than 6ppm
pH	6.5-8.5	4.5-6.4 OR 8.5-10	Less than 4.5 or higher than 10
Turbidity	16.25 or more cm	16.25-10.5 cm	10.5 cm or Less
Phosphate	0-2ppm	3-4ppm	More than 4ppm

Conclusion

Based on your data, the water quality of the stream is (circle one):

Excellent

Medium

Poor

WATER QUALITY Thinking Questions



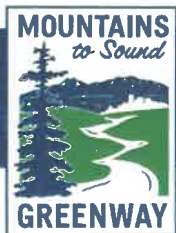
1. What does ppm stand for?

2. Why is cold water better than warm water in a healthy ecosystem?

3. If water looks cloudy/dirty, can you assume it is polluted?

4. Name one way that dissolved oxygen gets into the water.

5. How does healthy water affect the biodiversity of an ecosystem?

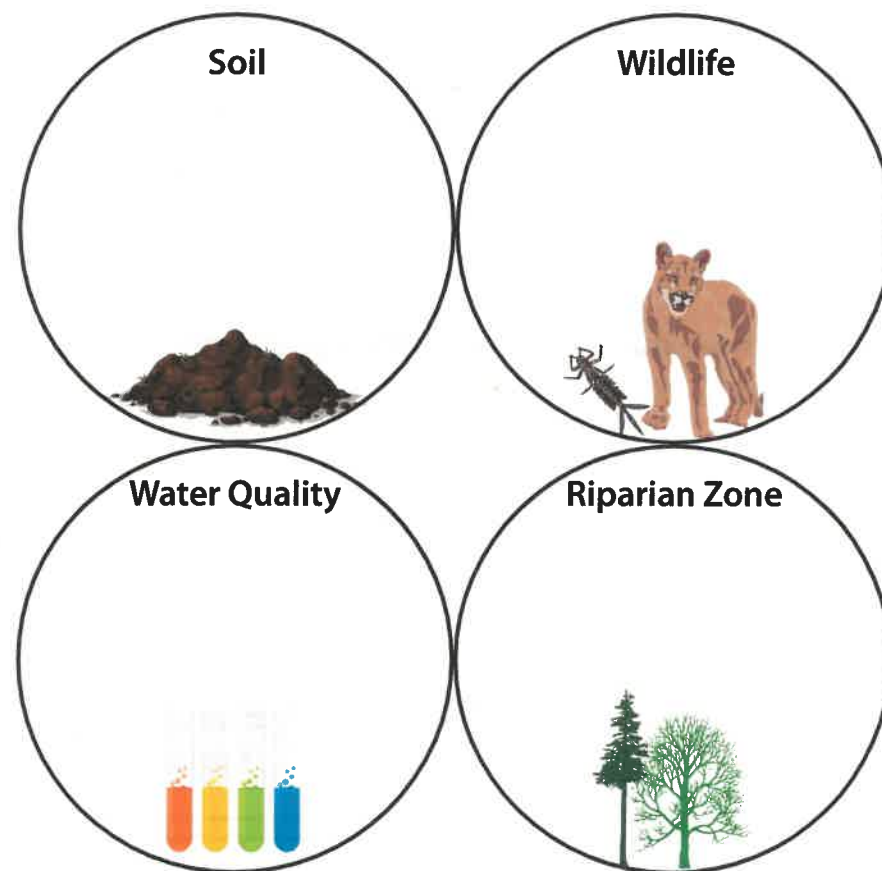


NOTES

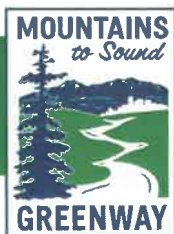


CONCLUSION

The ecosystem I studied:



Do you think this is a healthy ecosystem that supports biodiversity? _____



REFLECTIONS

1. Think back to the field trip. What are some ways humans have negatively and positively impacted this ecosystem?

2. Could these human impacts affect your data collection? How?

3. What could be done to improve the biodiversity of the ecosystem?



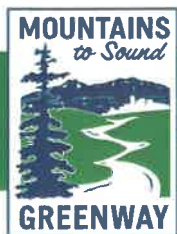
REFLECTIONS

5. What is one thing you did on this field trip that you have not done before?

6. If you could change one thing about this field trip, what would it be and why?

7. What group did you like the best? Why?

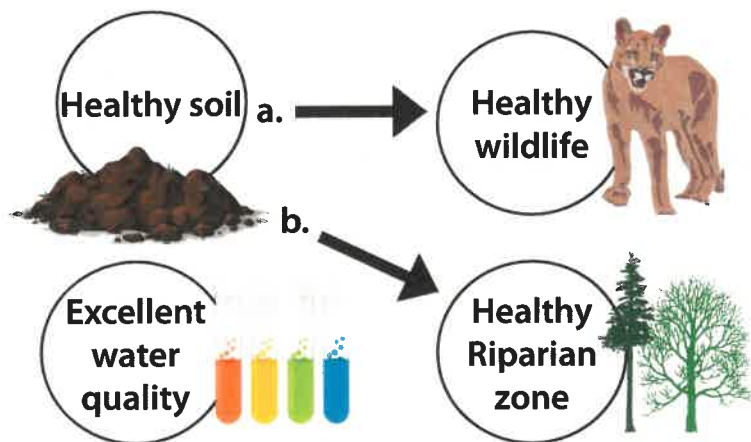
8. What would you like to say to your Greenway Instructor?



SHOW US WHAT YOU KNOW

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a. _____

b. _____

3. TRUE or FALSE (circle one)

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2) _____

3) _____

The Greenway Education Program is supported in part by:



King County

Department of
Natural Resources and Parks
Wastewater Treatment Division



WASHINGTON STATE
Recreation and
Conservation Office



**Grousemont
FOUNDATION**



The Puget Sound Stewardship and Mitigation Fund, a grantmaking fund created by the Puget Soundkeeper Alliance and administered by the Rose Foundation for Communities and the Environment.

Mountains to Sound Greenway Trust

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