Back cover left blank intentionally

Tessa's Tale

Student:

Teacher:

Tessa's Tale

Principal Author
Chenille Williams

Contributor
Jessica Foster

Illustrator
Samantha Velder

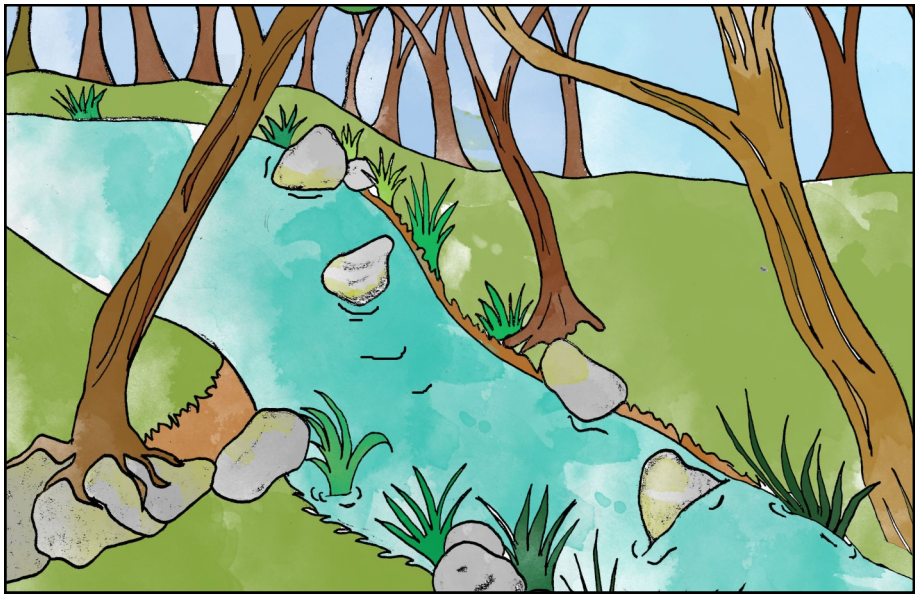
Macroinvertebrate images produced by Georgia Adopt-A-Stream.

Instructions for chemical tests produced by Earth Force for use with the Earth Force low cost monitoring kit. For more information about the testing kit visit the website: www.earthforce.org, or contact Earth Force at 703-519-6877.

Here's a message from Tessa!

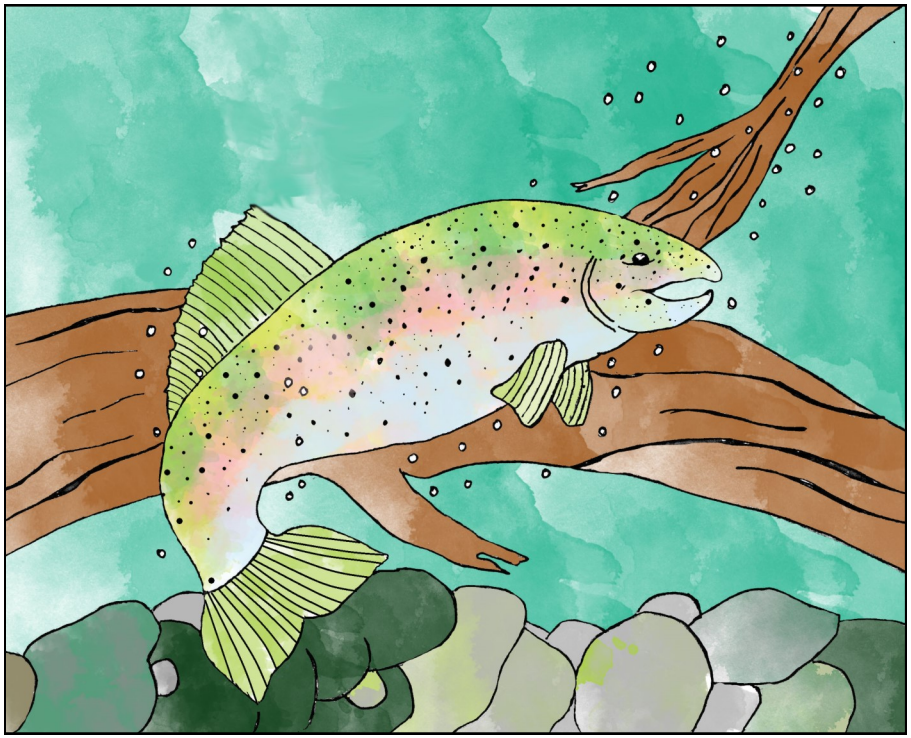
I hope you learned many things about my habitat and about the water at your study site. People can impact the life in the water by polluting and disturbing the land around it. But people can also fix improve water quality and prevent pollution in the future!

Can you name one thing YOU will do to keep water clean?



Meet Tessa, a rainbow trout.

Tessa's stream has plenty of trees along the banks that provide shade and keep the water cool. She finds shelter under fallen logs and food in the fallen leaves and plants.



Rainbow trout live in streams with fast-moving cold water. They are sensitive to pollution and are **bioindicators** that give water scientists and ecologists information about the health of a stream.

Write or draw a way to improve Tessa's habitat and prevent pollution from washing into the stream.

Be creative!

Based on your observations and tests, how did all the changes Dee and Scott made affect Tessa's habitat?

How does the water at your study site compare to the stream where Tessa lives? Is it more or less healthy than the water in Tessa's stream?

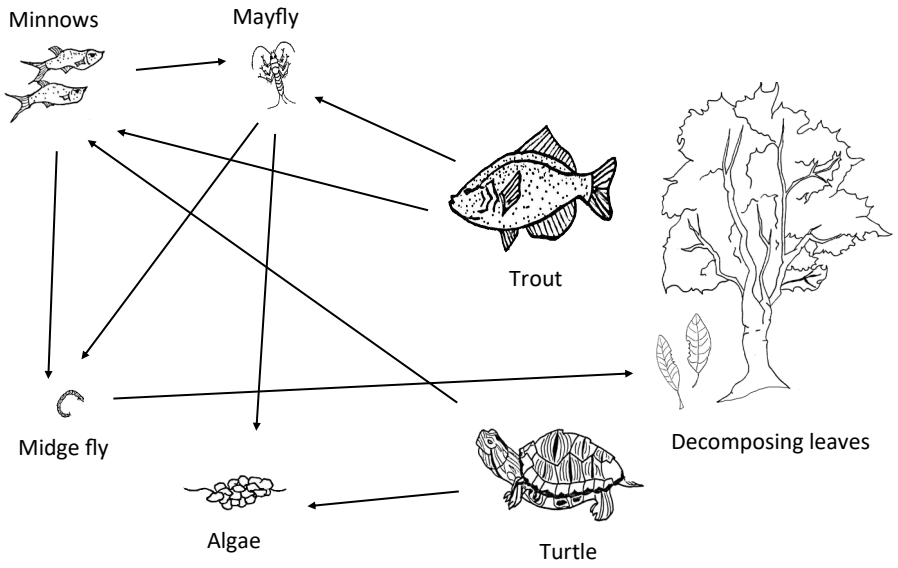
Tessa is a part of the **food web** in her aquatic habitat. Match each organism with its role in the food web.

Producer _____

Primary consumer _____

Secondary consumer _____

Decomposer _____



Which organism is a **carnivore**? _____

Which organism is an **herbivore?** _____

Which organism is an **omnivore**? _____

Scott and Dee own the land where the stream is located. One day they decided the stream looked messy and overgrown, so they dug up the trees and plants along the bank to make it look neat and clean.

How many macroinvertebrates did you find at your study site?

Number of sensitive organisms: _____

Number of semi-sensitive organisms: _____

Number of non-sensitive organisms: _____

Add the three numbers to get a water quality score.

_____ + _____ + _____ = _____

Good >11 Fair 10 - 5 Poor < 5

The stream needs to have a good water quality score in order for Tessa to live in it because it means there is enough food to eat.

Oh no! Dee and Scott removed the plants and logs from Tessa's stream and now her food has nowhere to live! Her food is gone!

Not sensitive to pollution

Midge

Black Fly

Aquatic worm

Leech

Lunged Snail

(opening on the left)

Name 3 types of water pollution:

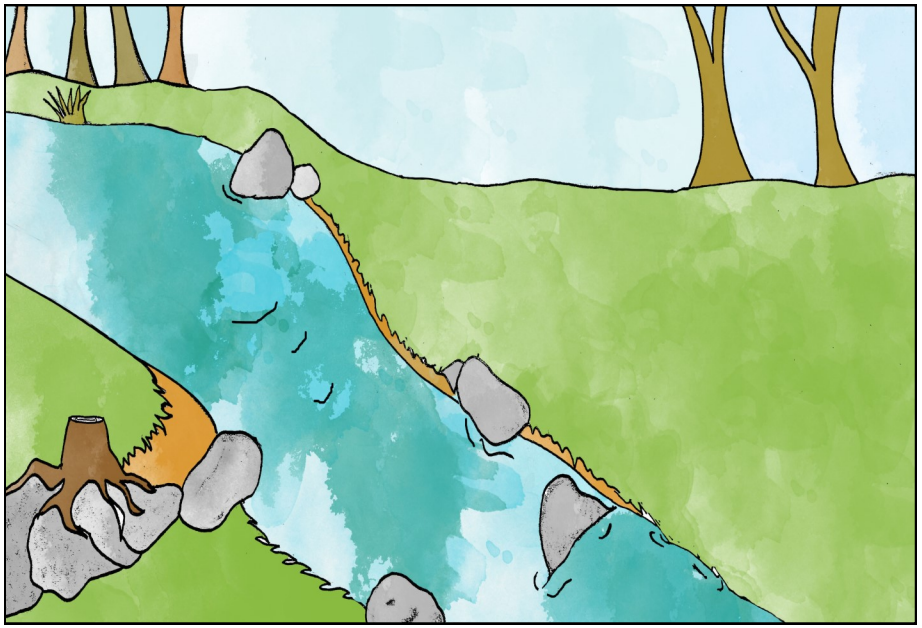
1.

2.

3.

What changes to the stream would harm Tessa's habitat?

The stream has changed! Circle the differences between the two pictures of Tessa's habitat.



Slightly sensitive to pollution

Net-spinning Caddisfly

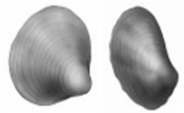
Dobsonfly

Dragonfly

Crayfish

Damselfly

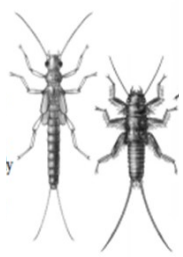
Scud



Clams and Mussels

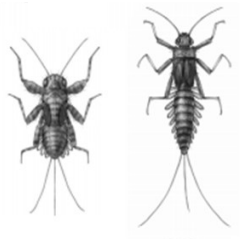
Cranefly

Very sensitive to pollution



Stonefly

Case-making Caddisfly



Mayfly

Water

Riffle

Gilled Snail

(opening on the right)

You are a junior water scientist!

The water body at your field study site has plant and animal life just like in Tessa's habitat. Now that you have looked at different physical characteristics of Tessa's stream, make observations about the pond or creek at your study site.

You will study the biology and chemistry of the pond or creek at your study site. Use the data sheets to collect information about the health of the water and compare it to Tessa's stream.

CHEMICAL DATA

Measuring water chemistry means studying particles of matter in the water. We can't see the particles, but we can see evidence of them with different tests. Each piece of chemical information you measure is called a parameter. The parameters you will measure are temperature, dissolved oxygen, pH, and turbidity.

Temperature — measures how hot or cold the water is

Dissolved oxygen — measures the amount of oxygen in water

pH — measures the water's chemical balance

Turbidity — measures how cloudy the water is

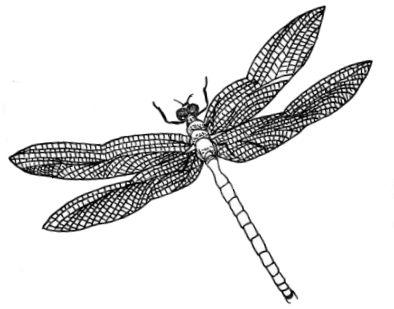
Measure each parameter on the following pages and write data results in the table on page 13.

Instructions for chemical tests are for the Earth Force low cost monitoring kit. Alternate kits can be used to produce results.

Macroinvertebrates live under plants and logs in the water. They break down decomposing leaves and are food for fish. Some even eat other macroinvertebrates!

These macroinvertebrates are larvae and nymphs that live in an aquatic habitat before going through **metamorphosis** to become adults. As adults, they looks like the flying insects we see every day.

Dragonfly nymph



Dragonfly adult

Circle the macroinvertebrates shown on the next three pages that you find in your field studies and count them to calculate a water quality score.

BIOLOGICAL DATA

Many different organisms live in an **aquatic,** or water, environment.

Name 3 organisms that rivers, ponds, lakes and streams.

1.

2.

3.

Aquatic **macroinvertebrates** are one of the many organisms you can find in the water. Some are sensitive to pollution and tell water scientists if a stream is clean.

What does *macro–* mean?

What is an *invertebrate*?

pH

Measures the water's chemical balance

Procedure:

1. Fill the long test tube to the 10 mL line with the water sample

2. Add **one** pH Wide Range TesTab

3. Cap and mix by inverting until the tablet has disintegrated. Bits of material may remain in the sample.

4. Compare the color of the sample to the pH color chart. Record the result as pH.

Dissolved Oxygen

Measures the amount of oxygen in water

Procedure:

1. Submerge the small tube into the water sample. Carefully remove the tube from the water sample, keeping the tube full to the top.

2. Drop two Dissolved Oxygen TesTabs into the tube. Water will overflow when the tablets are added.

3. Screw the cap on the tube. Water will overflow as the cap is tightened. Make sure no air bubbles are present in the sample.

4. Mix by inverting the tube over and over (turning the tube upside side-down and right-side up) until the tablets have disintegrated or dissolved. This will take about 4 minutes.

How has the change in her environment affected Tessa?

Temperature
After Scott and Dee removed the trees, there was no shade over the water and the water got warmer from the sun during the day. Tessa needs to live in clean, cold water.

Dissolved Oxygen
Warmer water contains less dissolved oxygen than cold water, so Tessa has difficulty breathing because there is less oxygen.

Turbidity
When water is more turbid, or cloudy, Tessa has difficulty seeing her prey. The sediment that causes turbidity also clogs Tessa's gills.

How did the health of Tessa's habitat change after the plants were removed?

Would Tessa be able to live at your study site?

Chemistry Results

	Study site data	Before plant removal	After plant removal
Temperature (°C)		6	11
Dissolved oxygen (ppm)		9	7
pH		6	6
Turbidity (JTU)		20	120

Stream Health Rating

Temperature
Good 5 - 8 Fair 9 - 11 Poor >11

Dissolved Oxygen
Good 8 - 10 Fair 5 - 7 Poor 5>

pH
Good 6 - 8 Poor Everything else

Turbidity
Good 0 - 30 Fair 31 - 60 Poor >60

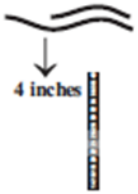
5. Wait 5 more minutes for the color to fully develop.

6. Compare the color of the sample to the Dissolved Oxygen color chart. Record the results as ppm Dissolved Oxygen.

Temperature

Measures how hot or cold the water is

Procedure:



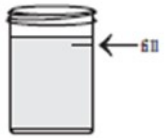
1. Place the thermometer four inches into the container filled with water for one minute.

2. Remove the thermometer from the water, read the temperature, and record it in degrees Celsius.

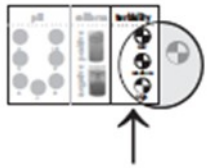
Turbidity

Measures how cloudy the water is

Procedure:



1. Fill the jar to the turbidity fill line located on the outside kit label.



2. Hold the Turbidity Chart on the top edge of the jar. Looking down into the jar, compare the appearance of the secchi disk icon in the jar to chart. Record the result as Turbidity in JTU.