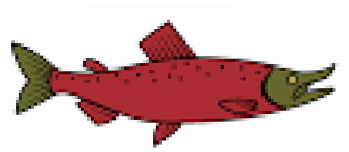


Welcome to Your Greenway Field Trip at Lake Sammamish State Park

Thank you so much for being part of this Greenway field trip! You will play an important role: helping the students stay safe while participating in the field trip activities. If you have any questions, don't hesitate to ask your Greenway Educator.

Greenway Educator Cell Phone Numbers:

Mikaela Ebbeson: 206-678-2244
Lindsay Spangler (Coordinator): 206-373-1613
Becca Kedenburg (Manager): 206-678-3893

What's in This Packet?

- ⭐ Overview of the Day
- ⭐ In Case of Emergency
- ⭐ Chaperone Expectations
- ⭐ Student Expectations
- ⭐ *Forests and Fins* Investigation Stations
- ⭐ Key Terms
- ⭐ Map

SCAN ME
to provide feedback

⭐ Overview of the Day

- Your Greenway Educator will get your group ready for the field trip, including:
    - Introduction to the park and Mountains to Sound Greenway Trust
    - Overview of the day
    - Behavior expectations
    - Use the bathrooms
- Walk to your investigation site, divide students into three investigation groups, start the investigation
- Eat lunch
- Continue investigations
- Whole-class discussion
- Departure

⭐ In Case of Emergency

Greenway Educators carry a first aid kit and are trained in Wilderness First Aid and CPR.

<u>The nearest medical facility:</u>

Swedish Medical Center
751 Northeast Blakely Drive
Issaquah, WA 98029
425-313-4000

⭐ Chaperone Responsibilities

We are so grateful for our adult chaperones! We ask that you:

- Help keep kids **safe** and **engaged**
- Use your cell phone only when necessary
- **Help guide your students** to use their science journals – there are clipboards and pencils in the Greenway backpack
- Encourage students to take turns using materials
- Help get everything back into the Greenway backpack by the end of the day
- **Ask us if you have questions or concerns!**
- **Give us any feedback** on the evaluation form by scanning the QR code.

⭐ Student Expectations

While we're in this outdoor classroom, we expect students to be **respectful** of others and of nature, to be **curious**, and to **try their best**. This means we:

- Listen to the speaker
- Stay with your group
- Use an "indoor voice"
- Stay on the trail
- Walk, don't run
- Be considerate to other hikers – let them pass you on the trail
- Treat living plants with respect – don't tear or pick plants
- Observe wildlife – don't touch animals, including any dogs on the trail

⭐ Forests and Fins Investigation Stations

The students will work in groups to study parts of the salmon stream habitat at several investigation stations. Please help them use the directions in their science journal (referenced in the following pages) to complete their investigations. In the science journal, each investigation has a few pages: Directions, Data Collection, Data Analysis, and Thinking Questions. The Greenway backpacks have everything you need.

Stream Channel: pages 5-6

During an interpretive walk as a whole class with the Greenway Educator, the students will get more of a bird's-eye view of the stream. They will make observations of the stream, including things like its shape, how many logs are in the water, the type of sediment at the bottom, and evidence of erosion. They will use the chart on page 6 to determine the quality of the stream channel.

Circle the choices that best fit your observations:

	HIGH	MEDIUM	LOW
a) Shape			
b) Woody material	10 or more logs	0 - 10 logs	None
c) Pools and riffles	Many pools and riffles	Only a couple of riffles	No riffles or pools
d) Sediment on the stream bottom	Mostly cobble and gravel	Close to equal cobble/gravel/ sand	Mostly sand
e) Erosion (collapsing stream banks)	None	Some	Lots

Based on your data, what is the quality of this stream channel? (*Circle one*):

HIGH **MEDIUM** **LOW**

Work as a group to discuss the Thinking Questions on the next page.

Macroinvertebrates: pages 7-10

At this station, students will measure the health of the stream by collecting and identifying stream bugs (macroinvertebrates). The type and quantity of bugs they find will tell them something about the water quality because some can only live in very clean water while others can handle pollution. *Please remind the students to be gentle with these small creatures!*

1. **Locate materials:**
   - Blue information cards
   - Dip nets
   - Ice tray and container
   - Oxygen pump
   - Petri dishes
   - Spoons
   - Macroinvertebrate identification resources

2. **Materials prep:** Fill the container and ice tray with water from the stream. Try your best not to collect any sediment or leaves in order to keep the water clear. Turn on the oxygen pump and place in the filled container to provide the macroinvertebrates you collect with oxygen while you observe them.

3. **Collect and identify** the macroinvertebrates from the stream (**15 minutes**):
   - Use dip nets or flip over sticks/rocks in the stream. Tips on collection methods can be found on the blue information card.
   - Work as a group to identify the macros by using the identification resources. To get a better look, isolate individuals by using the spoon to transfer it to a petri dish or ice tray.

4. **Record** your data on page 8.

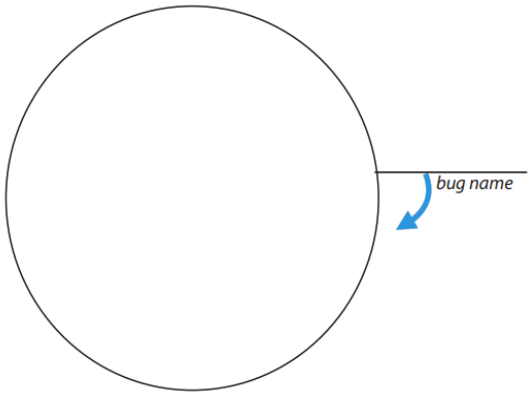
5. **Analyze your data:** Use the table on page 9 to calculate your data, then rate the health of the stream as high, medium, or low.

6. Gently release the macroinvertebrates back into the stream, then work as a group to answer the Thinking Questions on page 10.

Record your data: Check off each species of macroinvertebrates you found.

Group 1 *pollution intolerant*	Group 2 *somewhat pollution tolerant*	Group 3 *pollution tolerant*
☐ Stoneflies	☐ Water Boatmen	☐ Aquatic Worms
☐ Mayflies	☐ Scuds	☐ Midges
☐ Caddisflies	☐ Dragonflies	☐ Left-Opening Snails
☐ Riffle Beetles	☐ Crayfish	☐ _____
☐ _____	☐ _____	

Sketch one of the macroinvertebrates your group collected.



Calculate your data:

	Number of Species	Multiply
Group 1		x3=
Group 2		x2=
Group 3		x1=
	Total=	

Based on your data, what is the quality of this stream? (*Circle one*):

HIGH	**MEDIUM**	**LOW**
(total: 15+)	(total: 6-14)	(total: 0-5)

Gently release the macroinvertebrates back into the stream, then work as a group to answer the Thinking Questions on the next page.

Riparian Zone: pages 11-14

At this station, students will study the plants growing in the riparian zone, which is the area along the stream. Hopefully, they will observe lots of native trees and shrubs. They will use plant identification materials to figure out what is growing in their study area and record that information. *Please remind the students to be gentle around the plants!*

1. **Locate materials:**
   - Green information cards
   - Plant identification resources

2. **Collect and record data** about the plants found in the riparian zone (**15 minutes**):
   - Locate the plants that your Greenway Educator has flagged.
   - Use the plant identification resources to identify each. Do your best!
   - Record information on each plant's name, whether it is native or introduced, and sketch its features, in the boxes on page 12.

3. **Analyze your data**: Complete the chart on page 13, then rate the quality of this riparian zone for salmon habitat as high, medium, or low.

4. Work as a group to answer the Thinking Questions on page 14.

Identify the plants that are flagged throughout the area of study. Below, **record** each plant species name, if it's native or introduced, and sketch its features.

Species: Native / Introduced (*circle one*)	Species: Native / Introduced (*circle one*)
Species: Native / Introduced (*circle one*)	Species: Native / Introduced (*circle one*)
Species: Native / Introduced (*circle one*)	Species: Native / Introduced (*circle one*)

Circle the choices that best fit your observations and data:

	HIGH	MEDIUM	LOW
a) Native species	Lots	A few	None
b) Introduced species	None	A few	Lots
c) Plants hanging over the stream	Yes, on both sides of the stream	Yes, but only on one side	No
d) Plants along the edges of the stream are...	Mostly trees & shrubs	Some trees & some grass	All grass or bare soil

Based on your data, what is the quality of this riparian zone? (***Circle one***):

HIGH **MEDIUM** **LOW**

Work as a group to answer the Thinking Questions on the next page.

Water Quality: pages 15-17

At this station, students will evaluate the water quality by measuring the temperature, dissolved oxygen (how much oxygen is available in the water), turbidity (how clear the water is), phosphate (a nutrient), and the pH (how acidic the water is).

1. Locate materials:
   - Red information and direction cards
   - Testing kits
     - Temperature - thermometer and timer
     - pH - test tube, pH tablets, and timer
     - Dissolved oxygen - test tube, DO tablets, and timer
     - Phosphate - test tube, phosphate tablets, and timer

- Turbidity - turbidity tube Wastewater container

2. **Collect and record data** on the water quality of the stream by measuring the temperature, pH, dissolved oxygen, phosphate, and turbidity (**15 minutes**):
   - Each student or pair of students should select one of the tests to complete.
   - Use the red cards for directions on how to perform each test to collect your data.
   - Record your data on page 16, and share your findings with your group so everyone has all of the information.

3. **Analyze your data**: Complete the chart on page 16, then rate the water quality of this stream as high, medium, or low.

4. Dump the completed tests in the 'Waste Container', then work as a group to answer the Thinking Questions on page 17.

Record your group's data:

- Temperature: _____ °F
- Dissolved Oxygen: _____ ppm
- pH: _____
- Phosphate: _____ ppm
- Turbidity: _____ NTU

Circle the choices that best fit your data:

	HIGH	MEDIUM	LOW
a) Temperature	41-54°F	55-68°F	Above 68°F
b) Dissolved Oxygen	More than 6 ppm	4-6 ppm	Less than 4 ppm
c) pH	6.5-8.5	4.5-6.4 or 8.5-10	Less than 4.5 or higher than 10
d) Phosphate	0-2 ppm	3-4 ppm	Above 4 ppm
e) Turbidity	0-50 NTU	51-100 NTU	Above 100 NTU

ppm= parts per million
NTU = Nephelometric Turbidity Unit

Based on your data, what is the quality of this water? (*Circle one*):

HIGH **MEDIUM** **LOW**

Work as a group to answer the Thinking Questions on the next page.

⭐ Key Terms

Data analysis means thinking about the information you have collected.

Dissolved oxygen (DO) is oxygen that is dissolved into the water. Salmon breathe oxygen using their gills. Colder and fast-moving water has more oxygen in it than warmer, slower water.

Erosion carries sediment from the stream bank into the stream, making the water cloudy and burying salmon nests (redds).

Indicator species, like macroinvertebrates, are species whose presence tells us about the quality of their habitat.

Introduced plants are native in other parts of the world and were brought to this region by people – by accident or on purpose. **Noxious weeds** are a type of introduced plant that significantly impact and degrade native plant and animal habitat. **Weeds of concern** are another type of introduced plants that can also impact and degrade an ecosystem, but less compared with noxious weeds.

Keystone species are species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically. Salmon are a keystone species.

Macroinvertebrates are small animals that are big enough to see without a microscope (*macro* = “big”) and that have no backbone (*invertebrate* = “backbone”). These include snails, insects, worms, crayfish, leeches.

Native plants are plants that have grown in their ecosystem for a long, long time.

pH is the measurement of how acidic or basic a liquid is. pH is measured on a scale of 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.

ppm, or parts per million, is a way to measure how much of a nutrient is present in the water. For example, if we find 10 ppm of phosphate, that means there are 10 drops of phosphate for every million drops of stream water.

Pools are deep places in the stream where water moves slowly. Salmon fry live in the pools after they leave their nest (redd) in the gravel bed.

Riffles are small rapids in the stream where water moves quickly and bubbles over big rocks, logs, and sticks. The fast-moving water adds oxygen to the stream.

Riparian zone: the area next to a stream or lake. A healthy riparian zone is full of different kinds of native plants.

Turbidity is the measurement of how cloudy or clear water 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 make it hard for salmon to breathe (imagine trying to breathe in a sandstorm).

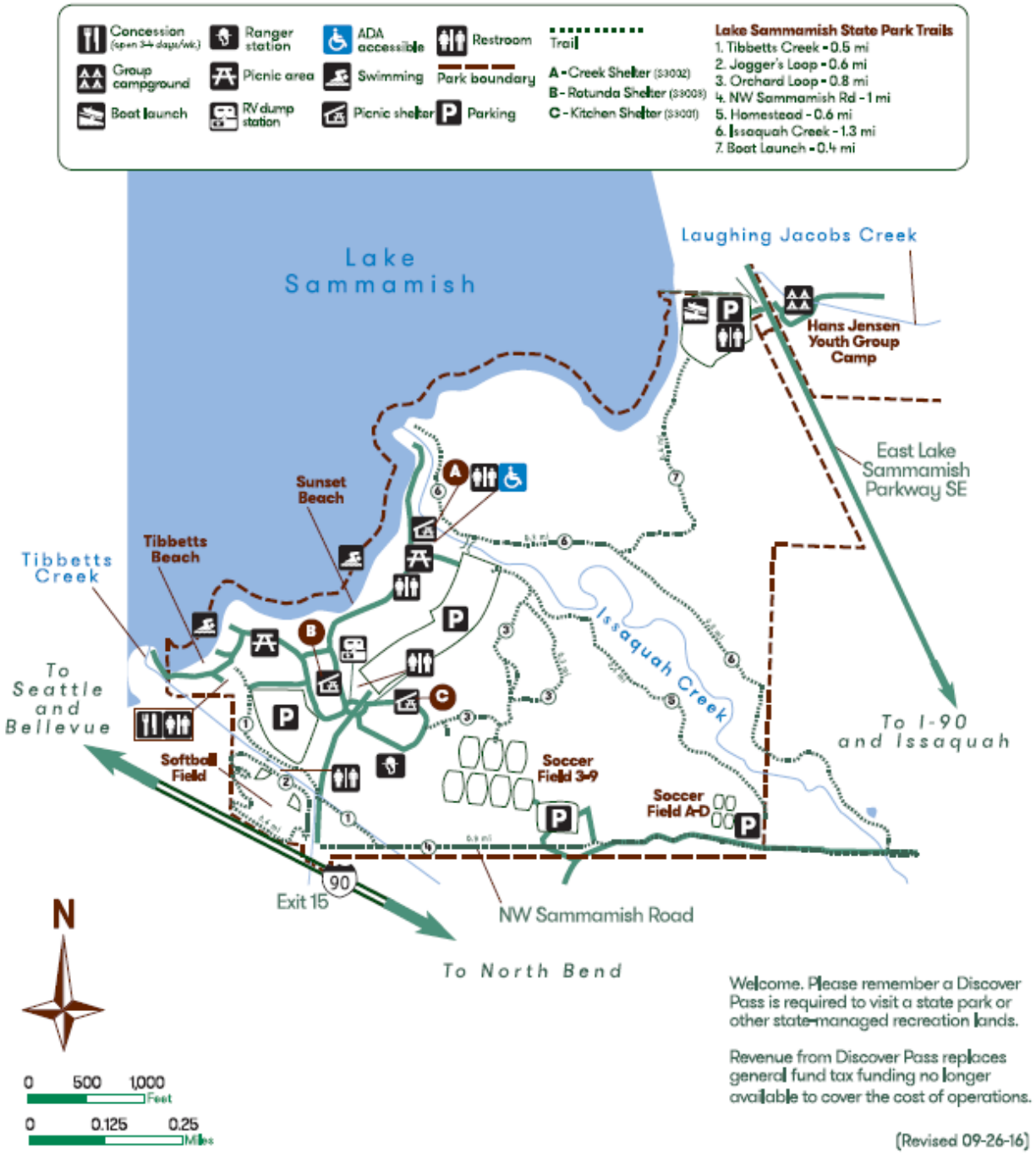
The **velocity** of a stream is how fast the water is moving.

Water temperature is important to measure because fish are ectothermic, meaning they can't regulate their body temperature. Salmon need cold water so that they don't get too hot, and because it has lots of oxygen in it.

Woody material are logs and large sticks that have fallen into the stream. Woody debris provides shade and shelter for young salmon, decomposes, and adds nutrients to the water, and interrupts water flow to form pools and riffles.

⭐ Map

Lake Sammamish State Park



Welcome. Please remember a Discover Pass is required to visit a state park or other state-managed recreation lands.

Revenue from Discover Pass replaces general fund tax funding no longer available to cover the cost of operations.

(Revised 09-26-16)

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