



# FOREST ECOSYSTEMS

---

## FIELD STUDY TRIP

### OUTCOMES:

- 1) Students will understand the elements of a forest ecosystem of Western Washington through direct experience and study.
- 2) Students will understand how elements of this ecosystem are connected.
- 3) Students will understand how energy moves through a forest ecosystem.
- 4) Students will understand that ecosystems undergo both natural and human-caused change and the impact of those changes on the ecosystem and the surrounding environment.
- 5) Students will understand that humans can have either a negative or positive impact on forest ecosystems, in particular on the biodiversity of these ecosystems.

**GRADE LEVEL:** 4th - 7th

**TIME:** 4 hours

**LOCATION:** Tiger Mountain State Forest,  
High Point parking lot, Exit 20 off of I-90

### MATERIALS:

#### Items Provided by Greenway Education Program:

- 4 backpacks that contain:
  - Plant ID books
  - Invasive plant ID sheet
  - Clipboards
  - Pencils
  - Tiger Mountain map
  - Worksheets
  - Jeweler's loupes
  - Animal ID cards
  - Chaperone Sheets (see #7)
  - Guide Sheets for students (see #7)
  - Producer, Consumer, Decomposer card game

### PROCEDURE:

#### **1** WELCOME ON BUS

Meet the group in the parking lot and board the bus. Welcome students, teachers and parents to Tiger Mountain and tell them to bring warm clothes, raingear, drinks and food. Explain that we will be out on the trail for 3.5 to 4 hours and they will need all the items just mentioned. They will eat lunch on the trail. This is the last chance to use the bathrooms until we return to the bus. After gathering their gear and using the bathroom, we will meet in the Interpretive Shelter or at the trailhead. Greenway staff can use track and scat

scarves to teach students while everyone uses the bathroom. Give the Chaperone Guide Sheets out so the chaperones have a few moments to review them. Greenway Education staff should organize backpacks before students arrive so that the Forest Exploration Guide, jeweler loupes and plant ID books are ready for students to use.

## **2 INTRODUCTION IN INTERPRETIVE SHELTER**

Thank the chaperones for coming. Show a map of the Greenway and talk about what a Greenway is and why it is important. Discuss trail etiquette. Ask students if they know some of the “do’s” and “don’ts” of hiking on forest trails. Make sure the following are included: stay on the trail and within sight of your chaperone; respect plants by not stepping on them; respect animals by not disturbing them; respect others by not throwing anything; be safe by not running on trails or by climbing on logs or other structures; respect others and wildlife by not littering or using loud voices.

Announce that today we are studying a forest ecosystem, which is the interaction of living elements with each other and with non-living elements. Ecosystems can be very large or very small and are always changing. Your challenge today is to observe the forest ecosystem, figure out connections between the parts, observe the natural and human-caused changes that impact this ecosystem, and to think about actions you can take to protect ecosystems.

## **3 FOREST WALK (APPROXIMATELY ONE HOUR)**

Students will break into four groups with adult chaperones in each group. Tell them each group will be separated by about 5 minutes on the trail. While they wait to start their hike, they can identify plants in the area, and begin discussing connections between elements of the ecosystem around them and what are producers, consumers, decomposers. Each group will look at the Tiger

Mt. map/sign with Greenway staff before being launched onto the trail and will receive the cell phone number of Greenway staff. They will walk the trail, looking carefully at the forest using the Forest Exploration Guide. Greenway staff will rotate between groups. Encourage the chaperones to help keep the students focused.

When a small group is gathered around the Tiger Mt. map/sign, reiterate the question for the day and tell students that they are going to observe the forest ecosystem. Send them on the appropriate trail making sure that the students, not adults, are using the materials. While on the trail, education staff will highlight photosynthesis, abiotic vs. biotic elements, producers, consumers and decomposers, and natural and human impacts on the forest. The ‘tic-tac-toe’ worksheet can be used if the students would benefit from more structure while walking on the trail.

## **4 LUNCH (APPROXIMATELY ONE-HALF HOUR)**

After lunch gather the class into a large circle and ask them to share one observation about the forest ecosystem they just walked through. Ask how they can connect this observation to something else in the forest ecosystem. Then ask what evidence they saw of change in the forest. What/who caused this change? Does it affect animal populations? How? Is the change something they think should or could be stopped? Why? Greenway educators can choose to play the Producer, Consumer, Decomposer game before beginning the Transect Study. Or if time is short, just play the game and have a discussion afterwards highlighting the concepts listed in the Outcomes section.

## **5 INTRODUCTION TO TRANSECT**

Tell the students that the next step in becoming good observers and scientists is to study this ecosystem in more detail. The forest they are in is 14,000 acres and it is impossible to study all

of it so they are going to gather more information through focusing on one part. Scientists call this approach a transect study. The Greenway educator will place each of the four small groups in a different part of the forest.

Students will draw and label elements from the sky all the way to under the ground. They are to work in pairs taking turns writing and drawing on the sheet attached to the clipboard that each pair will receive. While one student is actively drawing, the other in the pair can ID plants, think about the connections between the elements that are being drawn and decide what they will draw next. Alternatively, Greenway staff can provide enough clipboards so that each student completes a drawing.

Just like in class, students should *first* draw or write 10 elements they observe in the forest. Include parts from underground to above the trees. *Second*, draw 5 elements that are part of this ecosystem but you may not see them today. Abiotic elements receive a \* by the label. *Third*, draw lines between at least five of the elements and write one or two words describing the connection between those elements. Among biotic elements there should be representatives of producers, consumers, and decomposers. Give students 20 minutes to do this portion of the experience.

After 20 minutes of drawing, students should work on the thinking questions. After 10 minutes of working on the thinking questions, chaperones should ask the students to come back together as a group and share their drawings and their answers to the thinking questions and what they observed. Each group should come up with two important connections between elements in the forest ecosystem to share with the entire class. This group discussion should take about 10 minutes of **active sharing** by all group members. The entire transect experience should take about 40-45 minutes.

When all the groups have completed their drawings, thinking questions, and sharing, the entire class should meet together. Each group will

present on the section of forest they studied and depicted, and describe two connections between elements of the ecosystem. Students should then present signs of human/natural changes they have observed and how these changes impact the ecosystem. Students should come up with one way each of them can help preserve ecosystems. Greenway educators can take this opportunity to talk in detail about the 4 R's. (Not littering does not count, push for more). Removing invasives, planting trees, driving less are also good examples.

If time allows, presentations and discussions can include: biotic, abiotic elements, additional connections in the ecosystem, how energy flows through the ecosystem, photosynthesis, producers, consumers and decomposers, additional changes and impacts on the ecosystem, and the definition of an ecosystem. Ask students to describe the ecosystem that they live in day-to-day.

## 6 WRAP-UP

Show a map of Washington State and point out where the students have been studying. Tell them there are many other kinds of ecosystems in the state, and around the world, and we have just explored one tiny bit of a forest ecosystem in the Greenway. Tell them they are welcome to return to this forest ecosystem with their families.

## 7 STUDENT AND CHAPERONE GUIDE SHEET INFORMATION

A guide sheet for the Tradition Lake Trail, Bus Trail and Swamp Trail has been developed for both students and chaperones. In this Activity Guide we have only included the Tradition Lake Trail guides so that teachers can develop an idea of what we focus on during the forest walk. Since the forest is always changing, our guides are always changing. So, the sample included in this Activity Guide might be different from the one actually used during the field trip.





# STUDENT WORKSHEET

## FOREST ECOSYSTEMS FIELD TRIP

Draw your part of the forest ecosystem here. Directions:

- 1) Draw and label 10 parts you see from underground to above the trees. Include 3 abiotic elements and put a \* by them.
- 2) Draw 5 elements you know are part of this ecosystem, but you may not see today.
- 3) Draw and label at least 5 connections. Remember some arrows can go both ways.
- 4) Note on the drawing if the biotic parts are producers (box), consumers (circle) or decomposers (wavy circle.)

Names: \_\_\_\_\_

(over)

© Copyright 2011, Mountains to Sound Greenway Trust



## ANSWER THE THINKING QUESTIONS BELOW

What are the positive and negative ways humans have changed this ecosystem?

What are some natural events that have occurred here that have changed this ecosystem?

What actions can you take to help forest ecosystems?

Decide how your group will share some of what you have learned with the whole class. Think about the biotic and abiotic parts you have labeled, the connections you have identified, how energy flows through this ecosystem, photosynthesis, producers, consumers and decomposers and the impacts that change the ecosystem.

Please return to the lunch spot where we will continue our activities.

# FOREST ECOSYSTEMS WORKSHEET

## TIC-TAC-TOE

Name: \_\_\_\_\_

<b>PRODUCERS</b> Create energy by making food	<b>CONSUMERS</b> Get energy from eating others	<b>DECOMPOSERS</b> Break down organisms into food
<b>NATIVE PLANT</b>	<b>INVASIVE SPECIES</b>	<b>INVASIVE SPECIES</b>



# FOREST ECOSYSTEMS

## TRADITION LAKE TRAIL

### STUDENT GUIDE SHEET

You are about to embark on a walk on the Around the Lake Trail. As you walk through the forest your job will include being a **careful observer** of the forest and a **participant in the discussion** of the questions listed on this sheet. Your adventure starts now!

As you walk to the bridge, be on the lookout for **MOSS**. Answer the questions:

- Is moss a plant or an animal? How can you tell?
- Where do you see it growing?
- What does moss need to grow?
- Is moss a producer?

#### Stop 1 The bridge

- Stand on the bridge. What do you see?
- What benefits do streams play in this forest ecosystem?
- Where does the water come from?
- Notice the sides of the streambed. What caused it to be washed away?
- How can erosion change the health of the ecosystem?

As you walk to you next stop, look for **FALLEN TREES**.

- Do you see anything growing on them? Why are some called “nurse logs?”
- What purpose do they have in the forest ecosystem?
- Should they be removed from the forest? Why or why not?
- Do you see any fungus (mushrooms)? Are they producers, consumers or decomposers? What do they do for the ecosystem?

#### Stop 2 The sign that says, “What’s Tradition Lake up to?”

- Everyone should be absolutely silent for 1 minute. Look around at the forest. What do you see or hear?
- Now talk as a group and try to identify 10 different parts of the ecosystem. Which parts are biotic or abiotic?
- Take 2 parts and describe how they are connected to each other.

As you walk to the next stop, look for evidence of **ANIMALS**.

- What animals might live in this forest? Name 5.
- Do you see any? Do you see evidence of any?

### **Stop 3 The next bench** (on the left side of the trail after the big sweeping U-turn).

- Are animals producers, consumers or decomposers? How do you know?
- Which are predators and which are prey? Can some be both? Name them.
- What do animals need to live?

As you walk to your next stop, look for **FLOWERS AND BERRIES**.

- Do you see any? What colors are they?
- Using your plant ID books, can you identify any of them by name?

### **Stop 4 The balcony** (overlooking Tradition Lake)

- Is there evidence of human impact at the balcony? What do you see?
- What caused the trees to fall down? Was it human or natural caused?

As you walk to your next stop, look for **PLANTS**.

- Are plants producers, consumers or decomposers? How do you know?
- How many different kinds of plants do you see?

### **Stop 5 The intersection of the trails**

Using your plant ID books and your invasives sheets answer the following:

- What are native plants? Identify 2 native tree species and 2 native plant species.
- What are invasive plants? How did they get here? How do they impact the ecosystem? Do you see any?

As you walk to the next stop notice **THE THREE LAYERS OF THE FOREST**.

- #1 Forest Floor – on the ground
- #2 Understory – between the forest floor and the tops of the trees.
- #3 Canopy – the very top of the trees

- How are they connected to each other?

### **Stop 6 The Western red cedar tree with huge hole** in it - go inside!

- What caused this hole? Can you find evidence to support your idea?
- Do you think it was human or natural caused?
- What caused the little holes above the big hole?

**Congratulations! You have completed your ecosystem walk around Tradition Lake. Did you learn anything new? You may now meet your friends at the picnic area beside the lake. Look for large Western red cedar trees and benches to identify this spot. If you get to the Powerline Road you have gone too far!**

# FOREST ECOSYSTEMS

## TRADITION LAKE TRAIL

### CHAPERONE GUIDE SHEET

Walking directions: Follow the Tradition Lake Trail all the way to the cathedral-like area in the forest that has benches and a balcony overlooking the lake. We will all gather here for lunch. If you make a mistake and go on the Bus Trail, turn around and join us at the lunch spot. (Call if you need help!)

Please stop at the following points of interest along the trail with your group. Have the students **observe** the forest and **discuss the questions** listed at each stop. Focus on identifying parts of this forest ecosystem, how they are dependent on one another and what could change the ecosystem. Between stops you will be asked to look for one specific part of the forest.

Begin walking to the bridge while looking for **MOSS**.

- Is moss a plant or an animal? How can you tell?
- Where do you see it growing?
- What does moss need to grow?
- Is moss a producer?

**Chaperone fact sheet:** Moss is a producer because it uses its green leaves to make food through photosynthesis. It usually grows on trees, logs or on rocks. Moss needs water, air (CO<sub>2</sub>), soil and sun. Moss collects and holds water for animals, provides materials for nests and shelter for insects.

## Stop 1 The bridge

- Stand on the bridge. What do you see?
- What benefits do streams play in this forest ecosystem?
- Where does the water come from?
- Notice the sides of the streambed. What caused it to be washed away?
- How can erosion change the health of the ecosystem?

**Chaperone fact sheet:** Streams provide water for animals and plants which is essential for life. The water comes from a spring on Tiger Mountain and from snow and rain. The streambed has been eroded by flooding when warming temperatures melt the snow and by heavy rains. Erosion can cause fish to die if too many small particles of soil accumulate in the stream. This can clog the fish's gills and can suffocate their eggs. People can cause erosion by removing plants and trees from the forest. This can lead to flooding and fish dying.

As you walk to you next stop, look for **FALLEN TREES**.

- Do you see anything growing on them? Why are some called “nurse logs?”
- What purpose do they have in the forest ecosystem?
- Should they be removed from the forest? Why or why not?
- Do you see any fungus (mushrooms)? Are they producers, consumers or decomposers? What do they do for the ecosystem?

**Chaperone fact sheet: Fallen logs or “nurse” logs usually have moss, plants, small trees and fungus growing on them. Although they are dead, they provide water and nutrients for plants and animals. They “nurse” the living organisms. They are a vital part of the forest and should not be removed from the forest. Foresters used to take them out to reduce fuel for forest fires, but soon found that the impact to the ecosystem was harmful. Fungi are decomposers and feed on dead or decaying matter. This puts nutrients back in the soil.**

**Stop 2 The sign** that says, “What’s Tradition Lake up to?”

- Everyone should be absolutely silent for 1 minute. Look around at the forest. What do you see or hear?
- Now talk as a group and try to identify 10 different parts of the ecosystem. Which parts are biotic or abiotic?
- Take 2 parts and describe how they are connected to each other.

**Chaperone fact sheet: Biotic parts are the living parts of the forest (plants, animals, fungi) and abiotic are the non-living parts (sun, air, water, soil, wind, temperature). Dead things (logs, stumps, fallen leaves, etc,) are also biotic because they once were alive. An example of a dependent relationship between two parts would be squirrels need the seeds from trees for food.**

As you walk to the next stop, look for evidence of **ANIMALS**.

- What animals might live in this forest? Name 5.
- Do you see any? Do you see evidence of any?

**Chaperone fact sheet: Animals in this forest could be black bears, cougars, deer, coyotes, raccoons, squirrels, rabbits, mice, birds, insects, snakes or frogs. Evidence of animals can be tracks, scat, hair, scratching on trees, plant or animal remains left behind.**

### **Stop 3 The next bench** (on the left side of the trail after the big sweeping U-turn).

- Are animals producers, consumers or decomposers? How do you know?
- Which are predators and which are prey? Can some be both? Name them.
- What do animals need to live?

**Chaperone fact sheet: Animals are consumers since they can't make their own food. They either eat plants or each other for energy. Cougars, coyotes, bears, insects, birds and snakes are predators. Deer, rabbits, squirrels, mice, birds, insects are prey. Raccoons and snakes can be both predator and prey. Animals also need water, shelter, space and air (oxygen) to survive. They depend on plants either by eating them or by eating animals that eat plants.**

As you walk to your next stop, look for **FLOWERS AND BERRIES**.

- Do you see any? What colors are they?
- Using your plant ID books, can you identify any of them by name?

**Chaperone fact sheet: They may see Salal flowers (white) or berries (dark blue); Oregon grape flowers (yellow) or berries (dark blue); Salmon berry flowers (pink) or berries (orange).**

### **Stop 4 The balcony** (overlooking Tradition Lake)

- Is there evidence of human impact at the balcony? What do you see?
- What caused the trees to fall down? Was it human or natural caused?

**Chaperone fact sheet: Logs cut after they fall across the trail, powerlines across the lake, the balcony, the trail and the benches are all examples of human impact in the forest. Trees fall due to windstorms (natural events) and disease (natural). Forests are always changing.**

As you walk to your next stop, look for **PLANTS**.

- Are plants producers, consumers or decomposers? How do you know?
- How many different kinds of plants do you see?

**Chaperone fact sheet: Plants are producers because they use sunlight, water, air (CO<sub>2</sub>) and nutrients to make their own food. Students may see 5 different species of trees, 5 or more different species of bushes, 10 or more different species of plants on the forest floor.**

## Stop 5 The intersection of the trails

Using your plant ID books and your invasive plant ID sheets answer the following:

- What are native plants? Identify 2 native tree species and 2 native plant species.
- What are invasive plants? How did they get here? How do they impact the ecosystem? Do you see any?

**Chaperone fact sheet:** Native plants have lived in the Pacific Northwest for more than 100 years. All the plants (except Foxglove) in the Plant ID books are native. Invasive plants have come here from other places. They can be brought here on purpose or by accident in animal feed, on shoes or tires or by other animals or wind. They change the ecosystem by taking over the habitat of the native plants and using the water, sun and nutrients that they need to grow.

As you walk to the next stop notice **THE THREE LAYERS OF THE FOREST.**

- #1 Forest Floor – on the ground
- #2 Understory – between the forest floor and the tops of the trees
- #3 Canopy – the very top of the trees

- How are they connected to each other?

**Chaperone fact sheet:** The canopy, the understory and forest floor are connected because the leaves in the canopy capture sunlight and change it into food (sugars) that feed the tree all way down through the understory to the roots. The roots hold the soil together so that plants on the forest floor can grow. Roots also absorb water and nutrients from the soil. The canopy provides shade for the understory and forest floor plants.

## Stop 6 The Western red cedar tree with huge hole in it - go inside!

- What caused this hole? Can you find evidence to support your idea?
- Do you think it was human or natural caused?
- What caused the little holes above the big hole?

**Chaperone fact sheet:** This hole was probably caused by trunk rot and then set on fire by humans. There are dusty areas of the tree that have rotted away and the dark charcoal-like interior was caused by fire. It does not look like a lightning strike (it hits the top of the tree) and there hasn't been a forest fire at Tiger Mountain for over 100 years. The little holes are caused by a sapsucker woodpecker that drills holes and sucks the sap.

Meet the rest of the class in the picnic area beside the lake. Look for large Western red cedar trees and benches to identify this spot. If you get to the Powerline Road you have gone too far!