Appendix B
Teacher Field Notebook

Formatted to be printed double sided, collated, and stapled into individual booklets.

National Wildlife Refuge System
You Are Here
Columbia River Gorge Overlook
14
N
Steigerwald Lake
Steigerwald Lake Overlook
Steigerwald Lake
Steigerwald Lake
National Wildlife Refuge
Scaup Pond
Purple Martin site
Plot line survey site
Gibbons Creek Wildlife Art Trail
Gibbons Creek
Redtail Lake
Redtail Lake Overlook
Fish Ladder
Columbia River Overlook
Steamboat Landing
Captain William Clark Park
Columbia River
Reed Island State Park
STEIGERWALD LAKE
NATIONAL WILDLIFE REFUGE
Gibbons Creek Wildlife Art Trail
Year-round Trail
5% grade or less
Seasonal Trail
Closed Oct 1-Apr 30 to protect wildlife
5% grade or less
Columbia River Dike Trail
Service road — uneven loose gravel surface.
Bikes, horseback riding, jogging and dogs on leash allowed.
Refuge Boundary

Plot Line Survey- Plant Survival Count (all year)

Time to complete the entire activity: 30 minutes (10 for instruction and demonstration, 15 minutes to do plant survey, 5 to wrap up)

Introduction:

The students' goal is to survey and record the survival rate of native trees and shrubs that 5th and 6th grade students from Camas and Washougal planted along Gibbons Creek.

Enter data collected into this database: http://www.estuarypartnership.org/steigerwald-data

Instructions:

Right after crossing the bridge over the creek, you can demonstrate the plot line survey activity to the students. Assign students into teams of 5, and assign each team with numbers of steps (30, 60, 90, 120, and 150) (FYI-we will use steps so it can be a random sample). Send the 150 group first. Have students use observation skills as they do the activity.

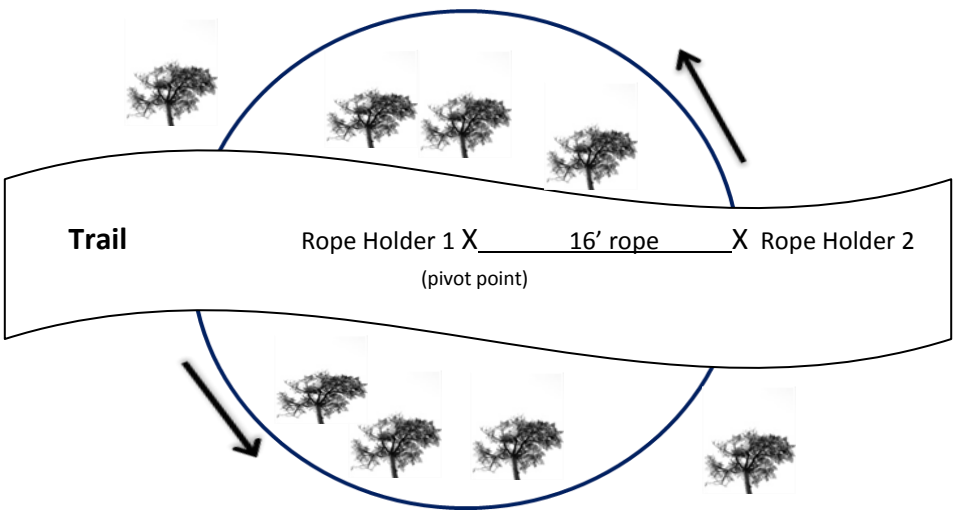
Student Roles: All students walk the designated steps first. Then they begin activity.

Rope Holders (2 students): Using the 16 foot pre-measured rope, student 1 stands in the center of the trail holding one end and student 2, holding the other end, walks down the path until the rope is taut. The one in the center of the trail pivots around (like the center of a clock) as the other student moves in a complete circle with the rope as the plant counters survey all plants in tubes within the area inside the roped area.

Plant counters (2 students): Look at the plants (in plastic tubes within your plot) and check the status (alive or dead) of each plant. If a plant has green leaves on it, it is ALIVE. If a plant does not have green leaves, scratch the stem with your fingernail to see if it is brown (DEAD) or green (ALIVE).

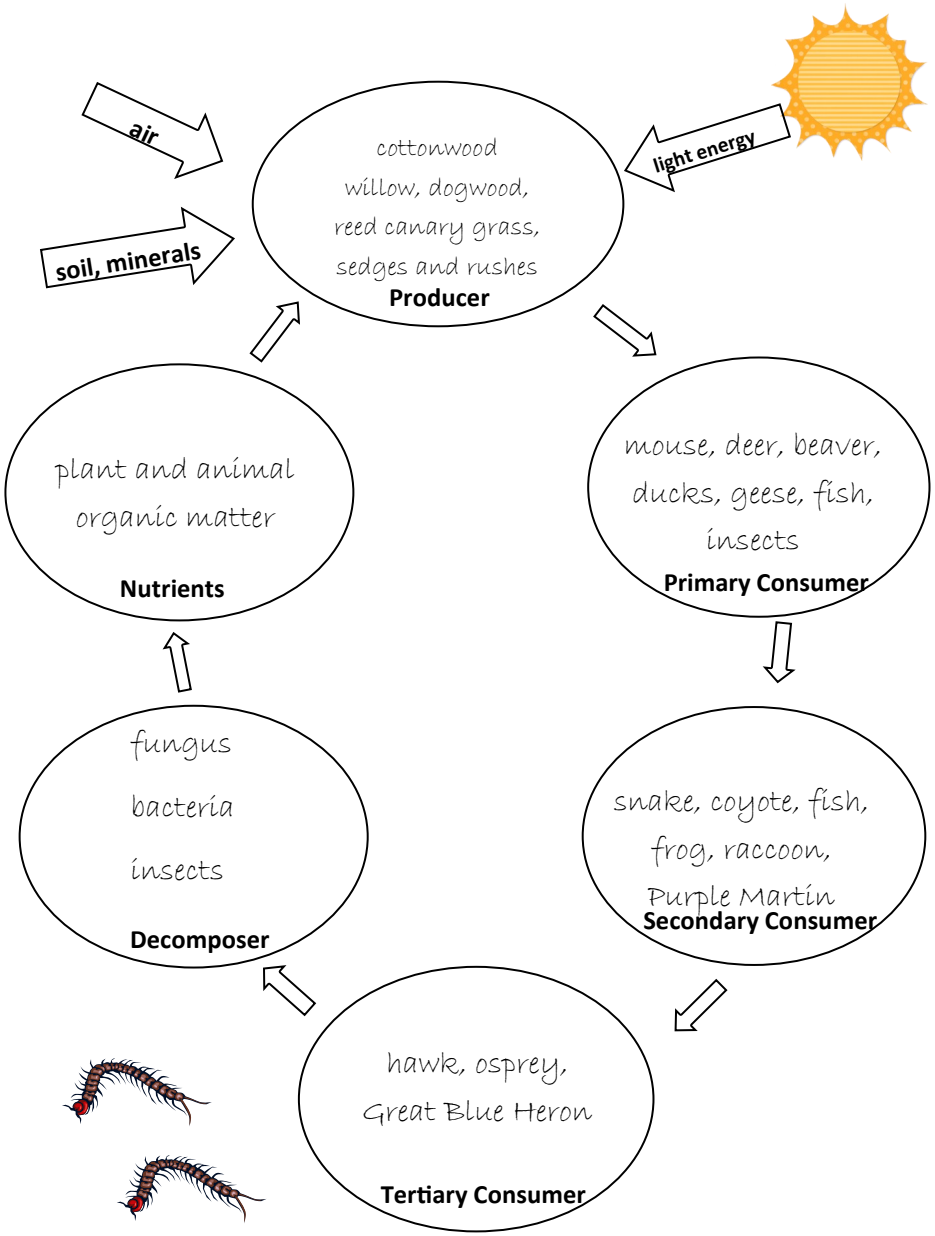
Data Recorder (1 student): On the plot survey worksheet, student records how many plants are alive and dead. Share data with team at the end. The team can create a method to share information from the plant counters to the data collector.

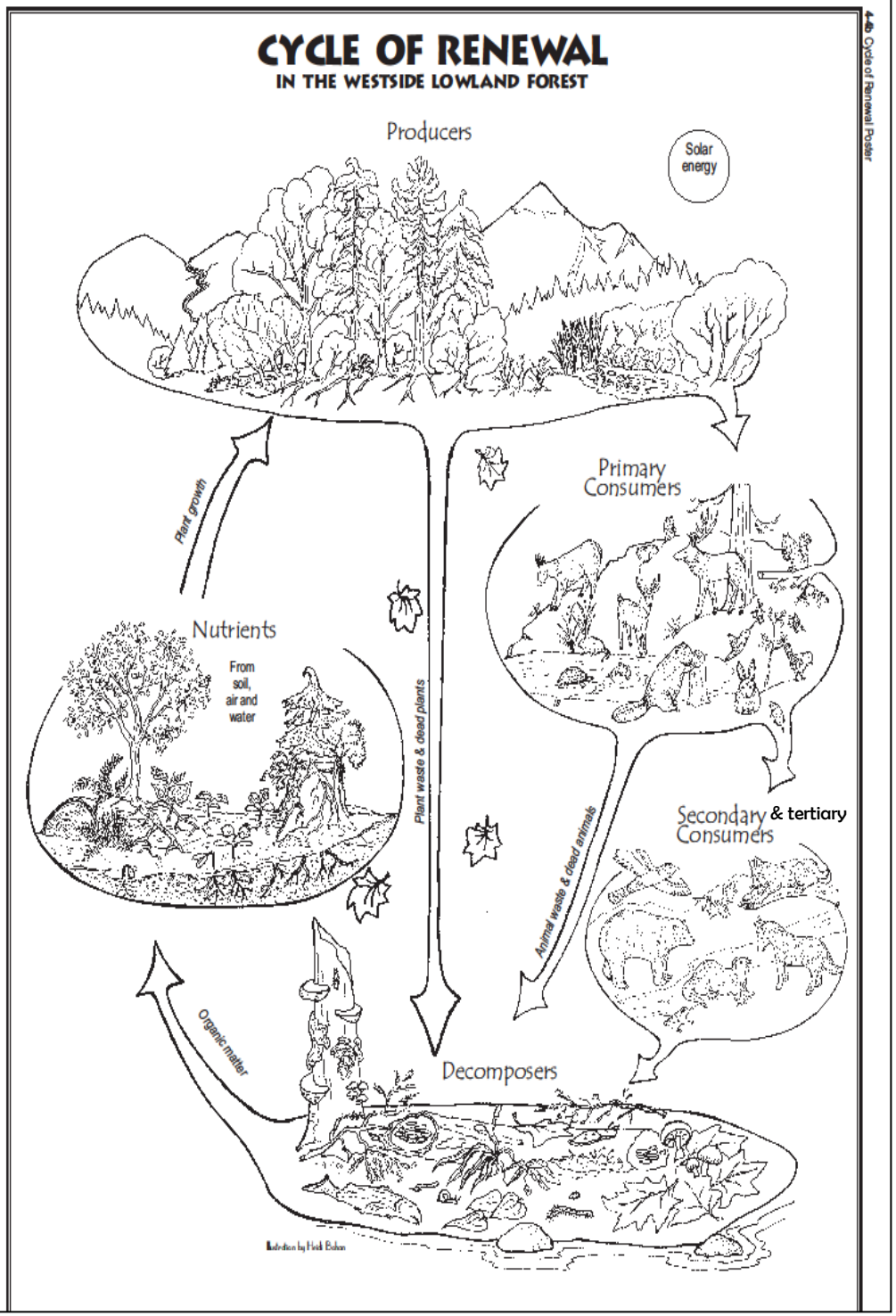
Example Diagram:



Food Chain and Energy Flow

Directions: Create a food web found at Steigerwald in the ovals below. *Example animals may fall in multiple categories.*





Plot Line Survey- Plant Survival Count

What is the survival rate for new plants at Steigerwald?

Background

5th & 6th grade students from Camas, Washougal & Battleground planted native trees and shrubs to help the habitat for wildlife. How many plants have survived?

Student Roles: (write the name of your team members below)

Rope holders (2) _____ _____

Plant counters (2) _____ _____

Data Collector (1) _____

Number of Paces (steps): (circle one) 30 60 90 120 150

Record your data here:

 # Of ALIVE plants Tally _____ **Total** _____

# of DEAD plants Tally _____ **Total** _____

Total plants _____

Discuss these questions in your group.

Write 2 reasons why you think the plants survived?

plants are closer to water, tubes protected them from competition, more shade/sun, planting skills/luck, not bothered by animals, soil type

Write 2 reasons why you think the plants died?

competition from invasive plants, beaver or other animal damage, human disturbance, not enough water or sun, planted incorrectly, wind damage, knocked over tube/plant

Follow-Up Math Questions:

What fraction of the total number of plants are ALIVE? _____

Change fraction to percentage. (alive/total x 100= **___%)** _____

What fraction of the total number of plants are DEAD? _____

Convert fraction to a percentage (dead/total x 100= **___%)** _____

Calculate the area of the plot (the radius = 16 feet) Area=πr^2 _____

April-September Purple Martin Field Investigation

Time to complete the entire activity: 20 minutes (10 for instruction, demonstration and practice using binoculars, 5 minutes to do bird survey, 5 minutes to wrap up)

Introduction: Purple Martins nest in holes in cottonwood snags (standing dead trees). Purple Martins feed primarily on flying insects and make frequent trips to their nests bringing food and nesting supplies. These birds are listed as a species of concern and have found refuge at Steigerwald.

Instructions:
After you walk through the first stand of tall trees (cottonwoods) and begin to round the corner, you will see many cottonwood snags. Here you can introduce and demonstrate the activity. Assign students into teams of 3, and assign each team an area along the trail to observe one snag (standing dead tree) for 5 minutes. 2 or 3 groups may observe the same snag. Once each group settles in their designated place and locates a snag, they can begin the survey activity. Call out the start time and the end time for all groups.
*European starlings and swallows may be using these snags as well. Look closely to make sure they are Purple Martins (photos below).

Directions:

Identify and draw one plant.

Come up with your own name of this plant using its characteristics.

_____

Describe why you chose that name.

_____

_____

Who lives at Steigerwald? The Plants!

Directions:

Use your field guide to identify and list plants along the trail.

Trees

cottonwood

willow

Red Alder

Oregon White Oak

Oregon Ash

Shrubs

Clustered Wild Rose

dogwood

ninebark

Douglas Spirea

twinberry

Grasses/Plants

cattail

sedges and rushes

reed canarygrass***

nettle

horsetail

Non-native Invasive

reed canarygrass

Himalayan Blackberry

teasel

tansy ragwort

Canada Thistle

***This non-native and invasive grass is the dominate species in the wetland areas of the refuge. It was planted on the refuge long ago when it was a dairy farm. Our efforts to replant trees and shrubs will hopefully shade out the reed canary grass thus providing a better habitat for the animals in the future.

Are there Purple Martins nesting in the Cottonwood snags?

Introduction: Purple Martins nest in holes in cottonwood snags (standing dead trees). Purple Martins feed primarily on flying insects and make frequent trips to their nests bringing food and nesting supplies. These birds are listed as a species of concern and have found refuge at Steigerwald.

Directions: 1. Find a snag and draw a diagram including any holes you see being used by birds.

2. For 5 minutes, watch the cottonwood snag and count how many trips a purple martin makes in or out of the holes in the snag. Flying in = 1 trip,

and flying out = 1 trip.

Date _____

Start time _____

End time _____

# of trips

_____

# of holes used?

_____

Other birds you see?

_____

_____

Draw your snag and mark the holes that are used by birds.

Post Field Trip

How could we improve Steigerwald as a habitat for wildlife?

Research: What are the most critical needs of wildlife?

Food, water, shelter, nesting areas

Research: What are the most critical threats to wildlife at Steigerwald?

Non-native species and human threats

The Science: How does Steigerwald meet those needs?

Plants, wetlands, snags

The Science: How do these threats affect wildlife?

Wrong kind of food and overcrowding

Current ideas improving the Steigerwald ecosystem:

Remove invasive species

Plant native species

New ideas :

Create snags for Purple Martin nesting

Allow seasonal flooding (alter the dike)

Scientific Reasoning for these ideas.

Invasive plants compete with natives for space

Native plants provide food for native animals

Purple Martins nest in snags

Seasonal flooding brings in new nutrients for plants to grow.

Who lives at Steigerwald? The Animals!

Directions:

Observe and list actual animal sightings or animal signs (evidence) below. *Example animals may fall in multiple categories.*

Primary Consumers

(eat plants)

Mouse
Fish
Deer
Insects
Beaver
Ducks
Geese

Secondary Consumers

(eat primary)

Coyote
Fish
Snake
Raccoon
Purple Martin
Mergansers

Tertiary Consumers

(eat primary and secondary)

Hawk
Osprey
Great Blue Heron
Great Horned Owl

Decomposer

(Fungi, bacteria, insects)

1. Mushroom
2. Beetle
3. Worm

Why study Steigerwald Lake National Wildlife Refuge?

The Steigerwald Lake Refuge is important in part because it is the crossroads of two important flyways for migratory birds, north to south and east to west. On their yearly migrations, migratory birds depend on safe places along the route to be able to rest and feed before continuing their long journey. In today's world not many of these valuable resting places are available because humans have filled in many of the areas along waterways.

You are the scientist!

No one is collecting and recording long term data at Steigerwald. You are the scientist, your data will be passed on to students and volunteers year after year. To detect risks to this valuable eco-system it is important that the data you collect is accurate, thoughtful and carefully recorded so that next year's scientists can continue this valuable work.

Vocabulary and core concepts

Ecosystems are defined as all of the plant and animal populations and nonliving resources in a given area. The relationships between organisms within an ecosystem make it possible to predict the consequences of change and provide insights into the sustainable use of natural resources.

Food Webs: A network of food chains or feeding relationships where energy and nutrients are passed on from one species to another. Changes in ecosystems affect the populations that can be supported in a food web.

Structures and Behaviors: Plants and animals have different structures that meet their needs and behaviors that respond to the environment.

Heredity and Adaptation: Ecosystems change. Plants and animals that can adapt to these changes will survive and reproduce in higher numbers.

Washington State Science Standards Connections

The Big Idea: 4-5 LS2A Ecosystems are defined as all of the plant and animal populations and nonliving resources in a given area. The relationships between organisms within an ecosystem make it possible to predict the consequences of change and provide insights into the sustainable use of natural resources.

Core Concepts: LS2C Food Webs: Changes in ecosystems affect the populations that can be supported in a food web.

LS1C Structures and Behaviors: Plants and animals have different structures that meet their needs and respond to the environment.

LS3C Heredity and Adaptation: Ecosystems change. Organisms that can adapt to these changes will survive and reproduce in higher numbers.

SYSC Studying Complex Systems: Analyze a system in terms of subsystems functions as well as inputs and outputs..

INQB Planning Investigations: Plan different kinds of investigations, including field studies, systematic observations, models, and controlled experiments.

APPC Solving Problems at Steigerwald: Work with other team members to apply the full process of technological design and relevant science concepts to solving a problem.

Post Field Trip

Energy Inputs

Sunlight

How do the inputs change over the year?

Seasonal growth
Rainfall
Migratory animals
Amount of sunlight

Matter Inputs

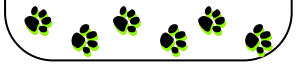
Air, water, river, rocks and soil

Living Subsystems

Plants

Animals

Fungi/bacteria



Steigerwald Ecosystem

What can the whole system do?

Support wildlife populations

Non-Living Subsystems

Sunlight

Air

Water

Energy Outputs

Food energy

Matter Outputs

Plant and animal matter

Nutrients in soil

Reflection Activity Options:

A.) Describe your experience at Steigerwald as if you were talking to a friend or family member.

Examples: What did you do, see, smell, feel, experience?

B.) Before I went on the field trip, I thought this about the environment…….

After the field trip, I now know this …….

I was surprised by this……

Post Field Trip: Teacher led discussion

The Steigerwald System

What are the inputs and outputs of matter and energy at Steigerwald?

Investigating Parts of the System

Who Lives at Steigerwald?

Waterfowl Populations

How is Steigerwald providing the needed food and rest that migratory birds depend on?

Ideas for improving Steigerwald

What can be done to make Steigerwald an even better environment for native wildlife?

Steigerwald Lake National Wildlife Refuge

Teacher's Field Notebook