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# 905434

Report on Metropolitan Greenspaces Education Grant
"Me and My Salmon"

Organization: Lenox Elementary School, Hillsboro Unified School District 1J
Project Contact Person: Maureen Barnhart, elementary teacher
Chief Executive Officer: Susan Sullivan, principal
On Site Project Manager: Maureen Barnhart

Objectives:
"Students will understand that decisions made locally often have implications which are geographically distant or have effects over time."

Life cycle study: Accomplished using reference materials and student observation of steelhead trout eggs hatched in classroom aquarium.

Geographic Range: Introduced using USFW maps of salmon runs in the Pacific Northwest (from Bonneville Dam center); to be continued in discussion of marine migration/interrelationships between people and cultures re: salmon as a resource.

Variety of habitat: Introduced in comparing Vernonia site and Bonneville Dam and hatchery; to be continued in study of marine migration.

Characteristics of aquatic and marine habitats: health and physical properties of stream introduced using ODFW Stream Scene curriculum. To be continued through Outdoor School session at Camp Westwind, near Lincoln City; and using Elementary Science Series curricula to study saline solutions and other physics of the ocean, interactions of substances in the ocean (turbidity, oil spills--Project Aquatic Wild, ODFW). Reinforcement of predator-prey relationships in rivers, introduction of predator-prey relationships in the marine habitat.

Effects of human activities at various points of the habitats: Observed at Vernonia site (some changes had been made, by the camp management, in the creek as a result of the floods in Vernonia (to prevent a change in the creek channel, though students were assured by camp management and Outdoor School staff that the salmon run was protected by the change.)

The whole picture: At this point the students understand the relationship of human activities in their neighborhood to the watersheds of the

northwest corner of Oregon. They have discussed the effects of logging along the riparian zone, and the natural and human caused changes to a watershed that may affect the physical properties of the fish habitat. They have read newspaper articles and discussed the conflict between indigenous people of the northwest and the problems of shrinking habitat. They have yet to consider the marine stage of the fish's cycle and the political interactions of the international community over gill net fishing, protection of the species, the reliance on the ocean of countries with few land resources, etc.

Partners: The teachers named in the application participated to varying degrees, but 6 of the 7 participated in all events, and 2 additional classes participated in some events. This represented grades 1 through 6, and opens the possibility of continued participation as students move through the grades. Three of the teachers participated in a one day class on salmon and salmon habitat.

There was no participation with the US Forest Service.

The Oregon Geographic Alliance: while a grant was not funded through the National Geographic Society, the curriculum was monitored and adjusted according to the experiences of Jere Fitterman (Gregory Heights School, Portland) and Maureen Barnhart.

The Capstone Program, Portland State University: Dr. Teresa Bulman and nine students, as well as two graduate students, instructed students on the tools and practices to measure and map a waterway. The "Tapwater Tour" program was donated to the school as a part of this program.

The Washington County ESD/Outdoor Education Program suggested that the outdoor school experience include very specific curriculum including fish morphology and life cycle. The outdoor school staff wrote and presented a one day field experience for eight classes at the Vernonia/Rock Creek camp at which salmon were observed.

Lenox School is committed to sending students to Outdoor School in the Fall of 1998, and the ESD has placed the school at the Camp Westwind site at the coast, where the students may consider the marine habitat of the salmon and the effects of human patterns on the health of this environment.

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Americorps volunteer Rebecca Levin spent several weeks working with students at school, preparing them to understand effects of various substances on waterways and in watersheds.

An additional partner was found in the Oregon Council of Teachers of English, who funded purchase of literature books dealing with natural history and naturalists. Also, Intel Corporation donated some money for field equipment.

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"Me and My Salmon"--a curriculum inviting students to understand the biology and ecology of riparian areas, observe the impact of human activity on environment and organisms, and consider the similarities between their own lives and habitat and those of another organism.

The curriculum from September, 1996, through June, 1998:

Annual observation of spawning salmon: students visit a safe observation point to observe spawning adults. An ideal location gives many observation points and is close enough to the water level to observe the redds.

September, 1996: sixth grade students at Outdoor School (Camp Cedar Ridge, Rock Creek, Vernonia) observed a large run of summer coho salmon. The site owner (Larry Steele) and outdoor school staff allowed younger student to observe the run on a date the following week, working around the outdoor school schedule. This observation piqued student interest in the organism, its environment (why aren't they found in our Rock Creek in Hillsboro?), and its life cycle.

An important piece of the curriculum is the return to this site every Fall, to observe the change in population size, to recognize the cycle of adults returning, to reinforce that the adult fish are not the same adults from the previous year (observation of dead/dying fish) and to reinforce the fact that the eggs laid will result in adults returning three years from now.

Research: Reinforce the student understanding of the salmon cycle. Locate the waterways of the Pacific Northwest, observing the location of hatcheries and/or dams along the waterways. The observation and research are presented in a "probe"--an illustrated presentation identifying the salmon cycle, fish morphology, and survival numbers (number of eggs, fingerlings, adults).

Students returned to the site in September of 1997, both at an outdoor school session and a one-day session for younger students. The Outdoor School staff presented a well-planned a program of observation of the salmon, discussion of salmon morphology, and a visual poster giving an

explanation of the numbers of eggs compared to the number of returning adults. This was presented along with discussion of what potential dangers to the organisms exist at various points of its life and migration. The staff used a variety of activities, including games from Project Wild.

A look at the physics of water and other substances. Students understand that substances which enter the waterways will affect the waterways in different ways. Students experiment with methods of removing impurities from the water. Using the TOPS curriculum Solutions, students observe that substances may be classified as solutes, dissolving in the water and leaving the water transparent (though not necessarily colorless, e.g. powdered fruit drink); as a coarse suspension, which settle to the bottom, leaving the top clarified; or as a colloidal suspension (e.g. powdered milk), dispensing thoroughout and rendering the water opaque. Students experiment with filters, gravity, coagulating small particles to filter them out (alum coagulates clay particles, vinegar coagulates milk); using the water cycle to evaporate and condense water molecules, leaving the contaminants behind.

Make a model river to investigate erosion, dam construction, effects of pollution in a watershed. Using the curriculum Rivercutters, students create a landscape using diatomaceous earth. As an adaptation of the curriculum, students placed rocks in a container of water and froze it, creating a glacier. Students placed the "glacier" on the landscape and observed glacier erosion. Next a source of water is placed to drip, and eventually erode a river. One observation is the continual process of erosion, and the constant changes in a river. A transparent plastic dam is placed on the river, and students observe that silt eventually builds up behind a dam. Finally, students are asked to place a cotton-tipped swab, dipped in food coloring, someplace in the watershed. Eventually the food coloring will appear in the river, reinforcing the concept that the watershed is the water and the land that drains into the waterway.

Science Education for Public Understanding of Policy: Solutions and Pollution. Students explore what the measurement "parts

per million" means--it seems a small unit but means that a substance is still in the water. Students experiment with acids and bases, and the math needed to neutralize an acidic or basic solution to bring it to neutral. They discuss how pollution might be "cleaned up", especially when dilution is not an option.

Observation of fish (GEMS: Fish Behavior). Students observe the behavior of different species of fish: bottom feeders, such as catfish; schooling fish, such as zebra danio; and fish which move through all levels of the aquarium, usually alone, such as guppies. (As it happens, the guppies also exhibit some mating behavior.) This activity develops patient observation and note taking skills. Students must show how their observations led to a hypothesis about fish behavior, and then plan an experiment to test that hypothesis. For instance, one student's hypothesis was that a mirrored image along one side of the aquarium might cause the schooling fish to linger around that image. Class discussion hypothesized how migratory fish might react to a change in the environment.

Studying a local "wetlands"--a study of the swale area on the Lenox grounds. Students were assisted by students from the Portland State "Capstone" program in learning how to use tools (compasses, tape measures, protractors) to map the high points of the banks of the swale, including the varying widths of the swale. The map is now set up to continue the study next Fall: we will map vegetation, monitor the pH, dissolved oxygen, andaquatic organism populations. With the Capstone program the students were introduced to the concept of microclimates, and will apply that concept to the map of the swale.

Sharing information as a naturalist: Scientific observation shared as literature is modeled in a selection of fiction and non-fiction literature. Students read selected pieces, discuss the audience addressed in the literature, and evaluate the information presented. They then wrote a 16 page book for primary students, explaining what the student author had learned through observation and research about an aspect of an ecosystem which includes a body of water.

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Applications of "Me and My Salmon" to *National Council of Teachers of Mathematics Standards:*

Standard 1: Mathematics as Problem Solving

Data collected re: fish habitat may be compared to determine causes of declining or increasing fish populations.

Standard 2: Mathematics as Communication

Data on fish habitat (pH, temperature, dissolved oxygen) is the common language of the biologists sharing information on fish populations.

Standard 7: Computation and Estimation

Computation of stream flow, temperature changes, dissolved oxygen changes.

Estimation of populations.

Standard 8: Patterns and Functions

Predictions about populations for the future. Patterns of temperature, etc. in various ecosystems (riparian, wetlands, ocean currents). Using fish counts to estimate fish populations. Ratio of fish growth and human growth.

Standard 10: Statistics

Statistics on changing populations, comparison of spp... survival

Standard 11: Probability

Probability of survival.

Standard 12: Geometry

Adaptations of fish to their environments.

Standard 13: Measurement

Temperature, weight, length, age, stream flow, dissolved oxygen, pH, distance of migration, river length, area of a watershed, volume of water flow.

Applications of "Me and My Salmon" to *Oregon Dept. of Education Science Common Curriculum Goals:*

Unifying concepts and processes:

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- Apply foundation concepts of change, cycle, cause and effect, energy and matter, evolution, perception and fundamental entities.

  Salmon cycle, water cycle, erosion, energy from hydroelectric sources, effect on populations of human activities, adaptations of aquatic organisms.

- Apply explanatory concepts of model, system, theory, probability, and replication.

  Use of model to study erosion and "birth" of a river, observation and experimentation re: fish behavior and adaptation (aquaria).

- Apply relationship concepts of population, equilibrium, force, interaction, field, structure and function, time and space, and order.

  Adaptation of salmon to maintain spp. (quantity of eggs laid vs. numbers of returning adults, cause and effect of substances deposited in the water (solution, colloidal dispersion, coarse suspension), change over time (or not) in aquaria/local swale pH, temperature, dissolved oxygen.

- Use basic scientific process skills to observe, measure, use numbers, classify, question, infer, hypothesize and communicate.

  Scientific method used in all activities.

- Understand structure and properties of matter.
- Understand chemical and physical changes.
- Understand the characteristics, structure and functions of organisms.
- Understand the transmission of traits in living things.
- Understand the relationships among living things and between living things and their environments.
- Understand the properties and limited availability of the materials which make up the Earth.
- Understand that science is a human endeavor practiced by individuals from many different cultures.
- Understand that scientific knowledge distinguishes itself through the use of empirical standards, logical arguments and skepticism.
- Describe the role of science and technology in local, national, and global issues.

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- Describe how the daily choices of individuals, taken together, affect global resources cycles, ecosystems and natural resource supplies.
- Identify scientific questions and form hypotheses that are based on observations and can be tested through scientific investigations.
- Design and conduct scientific investigations using knowledge of unifying concepts and processes, appropriate tools and techniques.
- Use analysis and interpretation to formulate explanations and draw reasonable conclusions based on the results of an investigation.
- Communicate investigations, explanations, and conclusions.

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Resources:


Anderson, Margaret J. and Marie Le Galtinkeis. Children of Summer: Henri Fabre's Insects. New York: Farrar, Straus and Giroux. 1997

Chancer, Joni and Gina Rester-Zodrow. Moon Journals: Writing, Art, and Inquiry Through Focused Nature Study. Portsmouth, NH: Heinemann. 1997

Cherry, Lynne. A River Ran Wild. San Diego: Harcourt, Brace, and Co. 1997

Cherry, Lynne. Flute's Journey: the Life of a Wood Thrush. San Diego: Harcourt, Brace, and Co. 1997

Cone, Molly and Sidnee Wheelwright. Come Back, Salmon. San Francisco: Sierra Club Books for Children. 1991

Grover, Wayne. Dolphin Treasure. Beech Tree Chapter Books. 1997

Guiberson, Brenda Z. Salmon Story. New York: H. Holt. 1993

Haig-Brown, Roderick L. Return to the River--A Story of the Chinook Run. New York: W. Morrow and Co. 1945

Hall, Elizabeth and Scott O'Dell. Venus Among the Fishes. New York: Yearling Books. 1996

Oregon Dept. of Fish and Wildlife. Stream Scene. Information and Education, ODFW, Portland, Oregon. 1987.

Ruis, Maria and J. M. Parramon: Habitats

Simon, Seymour and Elsa Warnick. Ride the Wind: Airborne Journeys of Animals and Plants. San Diego: Harcourt Brace and Company. 1997

Steelquist, Robert. Adopt -A-Stream Foundation Field Guide to the Pacific Salmon. Seattle: Sasquatch Books. 1992


Re: "Me and My Salmon"
Barnhart/Lenox Elementary School
Project No. 905434

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# Me and My Salmon: a curriculum of Life Cycles, Morphology, Migration and Habitat

Sept., 1996: Students observe a large salmon run in Rock Creek in the Nehalem watershed. Outdoor School staff presented curriculum related to the salmon spawning, and to salmon morphology. The concept of watershed is presented, including the fact that the Rock Creek located by the students' homes is a different creek in a different watershed. Students in younger grades are given a half day presentation and opportunity to observe the salmon at the same site, Camp Cedar Ridge, in Vernonia.

Winter, 1996-7: An Americorps volunteer with the Northwest Regional ESD helps on a twice weekly schedule. Students explore the interaction of substances and classify those substances as solution, coarse suspension, or colloidal dispersion in water. They consider natural and human causes of introduction of substances into waterways, and study the possible spread of a substance throughout a watershed. They observe that the health of the entire watershed affects the organisms in the waterways, or even the ocean.

Spring, 1997: Students compare their research on river habitat for salmon with easily observed habitat at the zoo. They visit the Bonneville Dam and Fish Hatchery, where they consider the effects of the dam itself and debate the decision to begin human control of the salmon reproduction.

Fall, 1997: Students return to the Vernonia site, and consider the length of the summer coho cycle: they understand that the fish they observed one year ago have migrated to a marine environment IF THEY SURVIVED (the perils of the fish at various stages have been discussed). Again the Outdoor School staff and Larry Steele, owner of the camp, accommodate younger students (this time for a whole day) on a visit to the site. Activities reviewing the fish adaptations to a riparian environment, including more about the ecosystem surrounding the creek.

Winter, 1997-8: Students study erosion and the "parts of" a watershed using a model. At the same time they observe the growth and behavior of rainbow trout, received from the ODFW and raised in the classroom.

Spring, 1998: Students work with Capstone Program (Portland State University) studying a swale on the Lenox school grounds. They are taught to map the area using compasses, and create a map on which they are recording information gathered: observations of abiotic and biotic components. (Some maps indicate that we are possibly the headwaters of

## Me and My Salmon: a curriculum of Life Cycles, Morphology, Migration and Habitat

Dawson Creek!) A small group has contacted SOLV in an effort to maintain this section of the watershed.

Additionally, a grant from the Oregon Council of Teachers of English has given us fiction and non-fiction written by naturalists. Our goal is to write some fiction/non-fiction to share with younger students, taking into account the need to understand one's subject from a scientific method.

Next Fall: Outdoor School will be held at Camp Westwind in Lincoln City. Students will focus on the journey of the salmon through the marine environment, as well as consider marine and estuarine health and its relation to the watersheds.

Also next Fall: we believe we have students from the PCNW Graphics Arts program to help us get our web site going.

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LESSON PLAN #905434

# SALMON / FISH ECOLOGY

## CEDAR RIDGE
## FALL 1996
## COLDEN BAXTER *"BOMBADIL"*

INTRODUCTION: Introduction will include a review of the three components of an ecosystem (biota, abiota and interactions) and a discussion of the sptial and temporal scales of the ecosystem that includes Pacific salmon. A historical perspective of the salmon populations of the northwest and their declines will be shared. A quick summary of the three stations at this field study will be given.

### ACTIVITY

TITLE: "CHINOOK SALMON WATCH"
Ecology Concept: **Ecosystem: Habaitat, niche, interactions, organisms.**
**Benchmark:** Describe how adaptations help an organism survive in its environment. Describe the characteristics of a specific organism.
**Objective: TSWBAT:** Observe and discuss Chinook salmon; their life cycle, habitat, behavior, adaptations and niche.
**Procedure:** This activity will begin with a discussion of scientific observation and how to record these observations. In a safe and organized manner, students will wade in and hike along Rock Creek looking for summer Chinook salmon. Currently, there are many salmon spawning in the reach of Rock Creek that flows through camp. Through the next two or three weeks, students may be able to observe salmon, and perhaps even observe them spawning. When (or if) salmon are sighted, students will sketch the habitat where the salmon was observed. They will watch closely the behavior of the salmon, including any interactions amongst individual salmon and sketch in (with stick figures and arrows) their positions and movements. The counselor will then lead them through a discussion of the summer Chinook salmon life cycle, some physical and behavioral adaptations of salmon, and the niche of Chinook salmon. Finally, they will add their sighting(s) to the salmon observation map at the main shelter.
**Product:** A sketch map of a salmon in its habitat and the salmon life cycle.

## ACTIVITY

TITLE: "FISH CATCH" (back-up activity if there are no salmon)
Ecology Concept:. Ecosystem: Habaitat, niche, interactions, organisms
BENCHMARK: Describe how adaptations help an organism survive its environment. Describe the characteristics of a specific organism.
Objective: TSWBAT: Observe and discuss the species of fish present in Rock Creek; their life cycle, habitat, behavior, adaptations and niche.
Procedure: In a safe and organized manner, students will wade in and hike along Rock Creek looking and seining for fish. They will observe them up close, measure, sketch and identify them. Students will also discuss physical and behavioral adaptations of the fish, their life cycles, and their niche in the stream ecosystem.
Product: A labeled drawing of a fish.

## ACTIVITY

TITLE: "MEASURING SALMON HABITAT"
Ecology Concept: Matter cycle: water cycle,, Ecosystems: interactions.
BENCHMARK: Measuring, recording, and explaining the significance of the properties of an object or event. Describe components of the water and rock cycles. Demonstrate the ability of matter to change by heating and cooling. Describe characteristics of a specific habitat.
Objective: TSWBAT: Recognize and understand abiotic aspects of the stream that are important factors influencing salmon habitat. Understand the scientific method.
Procedure: The students will split into two equal sized groups. Applying the scientific method, one group will measure temperature, dissolved oxygen concentration, and turbidity of the stream. The other group will measure the size and orientation of woody debris as well as the stream velocity, width and depth. Each group will then share their data with the other and will discuss the importance of the factors they measured to salmon. They will also make conclusions and draw new hypothesis from their measurements.
Product: Each student will return to their classroom with a nearly-completed physical habitat data sheet. It will be their take home exercise to calculate the stream flow from the velocity, width and depth data they collected, as well as the volume of the woody debris from the dimensions they measured.

## ACTIVITY

TITLE: "SALMON CARCASS / SCALE STUDY"
Ecology Concept: **Organisms: energy flows, matter cycles, interactions, ecosystem.**
BENCHMARK: Describe characteristics of a specific organism. Describe how adaptations help an organism survive in its environment. Diagram and explain a cycle. Recognize and diagram the parts of a system and identify interactions among those parts.
**Objective: TSWBAT:** Observe the anatomy of a salmon, determine the salmon's age, and describe the process of decomposition and the role of the salmon's carcass in the nutrient cycle.
**Procedure:** Students will split into two groups. One group will analyze a salmon carcass and discuss the process of decomposition and the nutrient cycle. In particular, the unique role of salmon in connecting the cycles of marine, freshwater and terrestrial systems will be examined. The other group will be examining this salmon's scales under a dissecting microscope in an attempt to determine its age and annual pattern of growth. They will tie their observations into what they know about the Chinook salmon life cycle. The two groups will switch or simply share their observations, depending on time constraints.
**Product:** Students will tape a salmon scale into their field notebook and record their observations and conclusions..

## ACTIVITY

TITLE: "SALMON CYCLE GAME" (BACK UP ACTIVITY IF THERE ARE NO SALMON CARCASSES)
Ecology Concept: **Organisms: interactions, ecosystem.**
BENCHMARK: Describe cause and effect relationships. Describe characteristics of a specific organism and apply knowledge of the effects of environmental change on populations. Recognize and diagram the pats of a system and identify interactions among those parts.
**Objective: TSWBAT:** Understand the salmon life cycle and salmon migration. Describe the limiting factors (including human impacts) affecting Pacific salmon as they complete their life cycle. Recognize the huge spatial scale of the salmon's ecosystem, and the myriad of interactions (including those with humans) they experience.

**Procedure:** Each group of students with a counselor receive a bag of "goldfish" crackers that represent a population of salmon. The group will make their way around a circular trail with many stops and small obstacles that correspond to various life stages, obstacles, hazards or interactions that many Pacific salmon populations experience. Each stop is marked by a picture on a stake. At stops that may result in mortality within the population (e.g. at a commercial fishing operation) students will roll a di to determine how many fish are lost. At some of these stops there will be cards to draw that will determine the number of times the di must be rolled before moving on (e.g. at the egg stage, students may draw a card indicating increased fine sediments--roll di three times to represent loss due to entombment). At each stop, students will discuss where the population is located (ocean, estuary, mainstem river, tributaries), how much time has gone by since their being deposited as eggs, and the particular interactions the salmon are taking part in (particularly with humans).
**Product:** Digested goldfish crackers.

**WRAP-UP:** Students' experiences will be shared, concepts of the activities quizzed and reviewed. Human values and perceptions of salmon as well as their interactions and connections with salmon will be discussed. If salmon were not the focus of the field study (as when salmon are not present), a similar discussion will take place with an emphasis on non-salmonid species.

LESSON PLAN SEQUENCE

INTRODUCTION

SPLIT INTO THREE GROUPS

ROTATE BETWEEN SALMON WATCH, SALMON CARCASS AND MEASURING SALMON HABITAT

WRAP UP

# LESSON PLAN

## FLOOD PLAIN

## CEDAR RIDGE CAMP
## FALL 1996
## CARRIE VINCENT a..k.a. *"SOLANA"*

INTRODUCTION: Meet with class and ask them to envision that our path to the main shelter was, less than a year ago, flooded. Intro at shelter involves interactive questions, possibly including: What is a flood plain? What are some specific examples of biotic and abiotic interactions on a flood plan? What are factors that can cause or prevent flooding?.

### ACTIVITY

TITLE: SUCCESSION ON THE FLOOD PLAIN
Ecology Concept: **Ecosystems: succession, habitat, biodiversity**
BENCHMARK: Describe cause and effect relationships.
Objective: TSWBAT: To identify signs of succession on a flood plain.
**Procedure:** Students will examine an area of the forest with a large amount of flood deposits, paying particular attention to different types of soils, different types of woody debris and looking for all stages of the succession cycle..
**Product**: Drawing of succession cycle in FSJ.

### ACTIVITY

TITLE: PHOTOSYNTHESIS
Ecology Concept: **Energy Flow: energy transfer, matter cycle**
BENCHMARK: diagram and explain a cycle.
Objective: TSWBAT: Identify key elements of photosynthesis and their relevance.
**Procedure:** Students will study leaves with a hand lens. Instructor will then ask a series of questions about the sex elements of photosynthesis. They will prepare and act out a skit to illustrate (instructor narrates).
**Product**: Photosynthesis beads.

## ACTIVITY

TITLE: **SEEDS, SPORES AND DISPERSAL ON THE FLOOD PLAIN**
Ecology Concept: **Interactions: adaptations**
**BENCHMARK:** Identify the factors that influence or change the balance of populations in their environment.
**Objective: TSWBAT:** Identify different seeds, how they disperse and adapt.
**Procedure:** Talk to students about how seeds disperse. Walk around site and look for seeds that may have arrived directly due to flooding, as well as other methods. Use sock or clothing to collect seeds on ground. Come back together, look at seed with hand lens or "magnification boxes". Discuss and label..
**Product:** One species of seeds and mechanisms written in FSJ.

## ACTIVITY

TITLE: **THE SLUG STAMPEDE**
Ecology Concept: **Ecosystems, niches and adaptations of organisms**
**BENCHMARK:** Describe characteristics of specific habitats and organisms that live there.
**Objective: TSWBAT:** Define and describe habitat, niche and adaptations of slugs. Also, to overcome revulsion of misunderstood animal.
**Procedure:** Talk to students about slugs' niche, habitat and adaptations. Draw picture of anatomy of slug. Ask students to follow slime trail to examine slugs. As a group, inspect the slug trap. One "volunteer" slug will be placed in petri dish to examine underside and travel mechanism of slug..
**Product:** Drawing of slug in FSJ.

**WRAP-UP:** Review concepts through "quizzing" of each of the stations. Explore specifically human impact on flood plains, i.e., changing vegetation, damning, etc.

## LESSON PLAN SEQUENCE

| | | |
|---|---|---|
| **Introduction** | **Entire Class** | **20 Mins.** |
| **Photosynthesis** | **1/4 Class** | **25 Mins.** |
| **Succession on the Flood Plain** | **1/4 Class** | **25 Mins.** |
| **Seeds, Spores & Dispersal** | **1/4 Class** | **25 Mins.** |
| **The Slug Stampede** | **1/4 Class** | **25 Mins.** |
| **Conclusion** | **Entire Class** | **20 Mins.** |
| **Travel Time** | **Entire Class** | **10 Mins.** |

# LESSON PLAN

## STREAM

## CEDAR RIDGE
## FALL 1996
## JIM NUSSER a.k.a. "BURROW"

INTRODUCTION: Meet class and walk to field study area. Set down expectations and discuss the community of organisms in the stream and the idea of the stream as an ecosystem. Introduction will also include a demonstration of the scarcity of freshwater available to humankind.

### ACTIVITY

TITLE: "BEAVER ECOLOGY"
Ecology Concept: **Organisms; adaptations interactions; organism/environment**
BENCHMARK: Describe how adaptations help an organism survive in its environment. Describe characteristics of specific habitats and organisms that live there.
**Objective: TSWBAT**: Recognize the physical and behavioral adaptations of the beaver.
**Procedure:** As a group the students will identify what animal has managed to change the surrounding environment so drastically (by looking at all of the signs of beaver activity). During the activity, the students will discuss what a beaver is, where they live, what they eat and how they survive. The physical adaptations of a beaver will be demonstrated through the "Beaver Dress-Up Activity". Students will discuss the ways a beaver's activity influences the aquatic and forest habitat that surrounds them.
**Product:** Drawing of a beaver in its habitat. A list of three adaptations in the field study journal.

## ACTIVITY

TITLE: "CRITTER CATCH"
Ecology Concept: **Organisms: adaptations; environment dependence.**
**BENCHMARK:** Classify and order a given group of objects. Identify the factors that influence or change the balance of populations in their environment. Describe how adaptations help an organism survive in its environment. Describe characteristics of specific habitats and organisms that live there.
**Objective: TSWBAT:** Identify stream animals, their adaptations, habitats and niches.
**Procedure:** Under close supervision and only after having a clear understanding of the safety rules, the students will wade into the stream and capture stream organisms. They will observe the organisms using hand lenses and identify the creatures using identification cards and posters. There will be a group discussion of the species students found and the functional feeding groups that the insects belong to.
**Product:** Students will produce a drawing of their favorite stream organism and list in their field study journal all of the organisms they observed.

## ACTIVITY

TITLE: "STREAM MORPHOLOGY"
Ecology Concept: **Ecosystem**
**BENCHMARK:** Make predictions based on cause and effect relationship involving two or more factors. Describe how the earth's surface changes over time.
**Objective: TSWBAT:** Identify major stream characteristics, describe effects of riparian vegetation on physical stream processes, and understand the difference between point and non-point source pollution..
**Procedure:** Learn major stream characteristics such as eddies, cutbanks, depositional areas, pools, banks and riffles. This will be done through observation, discussion, posters and hiking along the riverbank with the instructor. Do a stream table experiment, presenting both vegetated and non-vegetated scenarios. Point out major stream characteristics including the increased erosion due to loss of the riparian vegetation on the site. Use a fluorescent dye to illustrate the effects of pollution on the stream in the "mock river" experiment.
**Product:** A drawing of the river with labels of various physical parts.

## ACTIVITY

TITLE: "THE INTERCONNECTING WEB"
Ecology Concept: **Ecosystem: biodiversity, habitat, community**
BENCHMARK: Recognize and identify the parts of a system and identify interactions among the parts. Order a group of objects.
Objective: TSWBAT: Understand and explain how a variety of biotic and abiotic factors in a stream interrelate.
Procedure: With the students in a circle, have each student wear a name tag with a single abiotic or biotic stream component written on the tab. Each student passes a ball of yarn to another student and mentions a relationship between the two components. Discuss the effects of a change in one component of the stream on all of the other components..
Product: Create/draw a web in the FSJ of a stream ecosystem..

WRAP-UP: Concepts of the activities will be quizzed and discussed. Human interaction with the stream ecosystem and responsible conservation practices will also be discussed.

## LESSON PLAN SEQUENCE

| | | |
|---|---|---|
| **Introduction** | (Entire Class) | **10-15 Mins.** |
| **Activities - Station Model** | (3 separate groups) | **2 Hours** |
| **Wrap-up Review** | (Entire Class) | **15-20 Mins.** |

lsplcrs(s96)

Swale study
Lenox grounds
April, 1998

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Vernonia Site

905434
Vernonia Site

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Salmm Viewing
Vernonia

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Salmon Viewing
Vernonia

905434
Vernonia Site
and activities

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Vernonia site and activities

905434
Vernonia Site


Dorsal Fin
Eyes
Nostrils
Anterior Fin
Pectoral Fin
Lateral Line
Gills
Mouth
Ventral
Anal Fin

905434
Vernonia Site