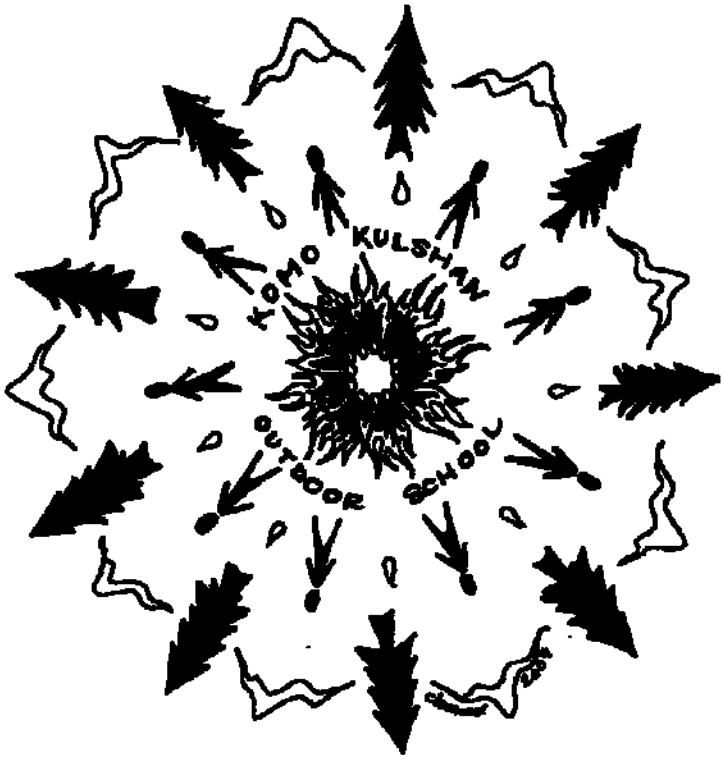
Komo Kulshan Outdoor School
Teachers' Guide



CARE-KKOS: P.O. Box 842, Concrete, WA. 98237

KKOS is a project of C.A.R.E. (Community Arts, Recreation, and Education Coalition), which is a member of S.E.E. (Social and Environmental Entrepreneurs), a tax-deductible, non-profit org., 501.c.3.

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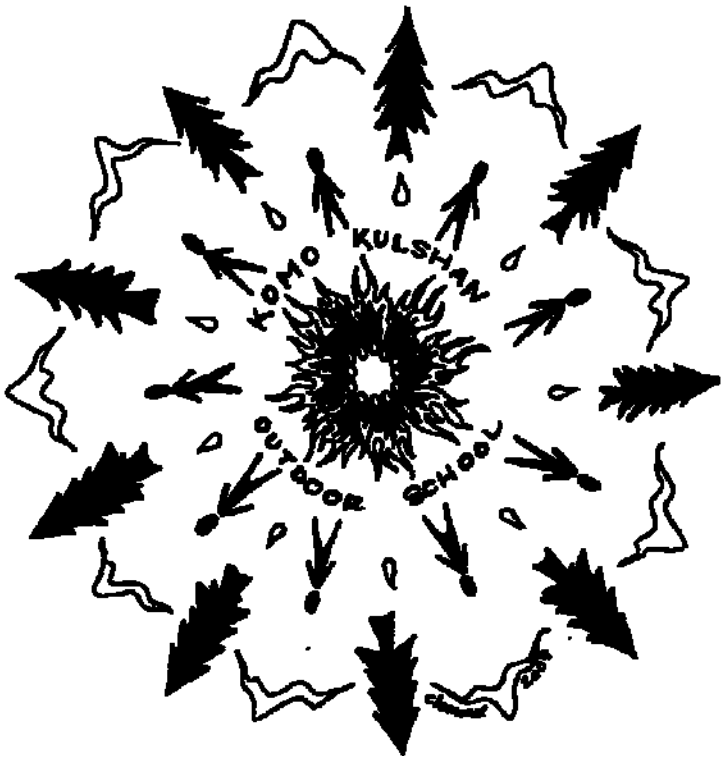


Komo Kulshan Outdoor School – An Introduction

Thank you for your interest in KKOS!

The success of this educational project is due to the innovation, creativity, talents, and dedication of a number of organizations, agencies, and individuals. Sponsored by a local non-profit, C.A.R.E. (Community Arts, Recreation, & Education Coalition), and supported by Puget Sound Energy, (PSE), University of Washington's MESA program, Puget Sound area schools, and local businesses and community members, the Baker River watershed has become a model for experiential education offering **affordable** programs to ***previously underserved schools*** in the region. In addition, KKOS now designs custom programs for middle school and high school students, who have previously attended at the elementary level.

Serving upper elementary students, their teachers, and high school leaders from communities in and around Puget Sound, the program includes extensive teacher training, selection and training of high school student leaders, the 3-day/2-night field session, and pre-and post-classroom lessons.

Base-camped at PSE's Baker Lake Lodge, participants spend most daylight hours outdoors in "nature's classroom." **The watershed-based curriculum revolves around multi-disciplinary field studies and includes: geography (landforms and map reading), chemistry (water quality testing), biology (marcoinvertebrates and fisheries), botany (native plants), forest ecology, social studies, (local native cultural history), physical education (hiking and recreation time), reading/writing/drawing (journaling), and energy generation and conservation (hydroelectric tour and lessons).** Late afternoons and early mornings find students helping to cook, serve, and clean up community meals. Evenings are enjoyed around the campfire where music, story-telling, and original dramatic productions entertain and educate until bedtime.

This **holistic** approach to education not only gives students real-life perspective to their studies, but also encourages caring and empathy for the environment and for each other. **Our hope is that those participating will integrate their KKOS studies with learning throughout their lives, becoming responsible and caring stewards of the places they call home.**

<u>Current Participants:</u>
Concrete School District: Elementary & Middle Schools
Sedro-Woolley School District: Evergreen, Central, Mary Purcell, Big Lake, Lyman, Samish & Clear Lake Elementary Schools
Mount Baker School District: Acme & Mt. Baker Academy, His Place Home school Association
Sedro Woolley Homeschool Partnership
Anacortes Home Education Partnership
Skagit River Schoolhouse

KKOS – Goals, Audience, Objectives and Activities

The Goal

The goal of Komo Kulshan Outdoor School is to provide an intimate, high quality, affordable, residential, outdoor education experience in the Baker River watershed for public/private school students, and to facilitate the integration of sustainable, place-based education into the classroom.

Audience

- **Upper elementary school students** living in or attending schools in Skagit and Whatcom counties, as well as the greater Puget Sound area.
- **Teachers** of the elementary students as primary instructors, both in the classroom and in the field.
- **High school students** (nominated by their school councilors and/or classroom teachers) as mentors and Clan Leaders for younger students.
- **Professional specialists** (PSE fisheries biologists, cultural historians, environmental educators, retirees, etc.) as possible, additional instructors on site, or in the classroom, to enhance the experience through teacher training, program preparation, student participation, and/or learning extensions.

Objectives and Activities

- Provide a comprehensive, affordable, high quality program for underserved schools and populations within the Skagit/Whatcom and greater Puget Sound areas.
- Connect students with their watershed, local ecosystems, and sustainable energy systems and energy efficiency/conservation through a field-based educational experience.
- Help students develop an understanding of the natural components of these systems and interactions, including human interactions.
- Foster an appreciation for the values of energy and resource conservation.
- Encourage students to develop and use skills of cooperation and consensus-building.
- Provide training opportunities for selected high school students in a leadership capacity within the program.
- Provide a framework for teachers to implement, document, and share activities focusing on the Baker River/Skagit River watershed and the greater natural and cultural community through experiential education.
- Meet (or exceed) Washington State environmental educational mandates by providing this education content and experience. Materials are also in alignment with Washington State EALRS (Essential Academic Learning Requirements) and the GLEs (Grade Level Expectations) as provided by OSPI.
- Compliment and enhance *Puget Sound Energy's* various outreach efforts, educating students and families in the PSE service area.
- Develop and carry out fall and spring outdoor education programs for area youth in partnership with Puget Sound area schools during each academic year.

Jobs and Responsibilities

KKOS/PSE Staff

- Develop, design, and test all lessons and curricula
- Create visual aids, purchase food, teaching tools and supplies
- Train classroom teachers and high school leaders
- Organize classes, schedules, logistics and facilities
- Provide Welcome and Orientation when class arrives
- Teach selected field lessons and be available to assist classroom teachers in the field
- Emergency/first aid support and radio monitoring
- On-going observation/evaluation
- Lead kitchen/meal program
- Lead campfire program
- Lead closing circle
- Classroom visits (pre and post)
- Write end-of-season report
- Explores funding opportunities and seeks grants

Classroom Teacher

- Attend annual KKOS Teacher Training session
- nominate appropriate high school student candidates
- Prepare students with required pre-trip lessons
- Select parent chaperones and conduct an optional parent info meeting prior to KKOS
- Complete pre-trip checklist (permission, substitute, order bus, prep students, etc.)
- Ride with class in bus to KKOS
- Lead/teach students in selected field lessons
- Provide direction and discipline throughout the program
- Support student success in all aspects of the program
- Complete post-trip lessons and/or extensions in the classroom
- Complete and return evaluation forms

High School Leaders:

- Complete and return HSL application form
- Attend annual High School Leadership training
- Will be assigned to a clan and will work with those students the entire time
- Ride in bus with class to KKOS
- Assist teachers in instructional areas
- Assist students with their journal entries
- Support and supervise students in field lessons and in lodge lessons (i.e., meals)
- Carry KKOS radio for emergency use in the field
- Help students check out (and in) equipment, books, etc.
- Monitor students in their rooms at night (HSL sleep in lodge)
- Complete and return evaluation forms

Adult Chaperones

- Will be assigned to a clan (Osprey or Trout)
- Will bring (at least one) personal vehicle to KKOS (in case of emergency), arriving at the same time as the school bus
- Support teachers and HS leaders when they are teaching; supervise/discipline students
- Supervise students during break times: 7-8 am, 4-5 pm, 7-8 pm. (HS leaders will be working on meals, campfire, etc.) Games, balls, books, etc available at lodge
- Note: Student shower times are 7-8 am and 7-8 pm ONLY, due to availability or adult supervision
- Participate in all lessons and activities – be a great role model for your child!

Komo Kulshan Outdoor School – Program Overview

Pre-trip Classroom Lessons

- KKOS Adapted UW MESA Lessons
    - "World's Water Supply" (math, geography, social studies.)
    - "Watersheds" (science/systems, geometry/visualization, art)
- Schedule pre-trip class visit by KKOS staff 2 weeks before your field session dates. KKOS staff will present a slide show "sneak peak" of what students can expect at KKOS, go over student packing list, answer questions, administer and collect student pre-trip surveys, and hand out student journals.
- KKOS journaling sessions (2-3 class sessions). Complete all GREEN pages before attending KKOS field session.
- Meet with High School Leaders (HSLs) if possible. Have HSLs visit your classroom and assist students with the green pages of their journals.

KKOS Field Session

Day One

- Bus ride to Baker Lake Lodge. Complete "magic bus ride" scavenger hunt page in journal en route. (Eat lunch before arrival, at school or en route.)
- **12:30** – Arrive at Baker Lake Lodge. Unload bus. Welcome and Orientation.
- **1**:**30 –** Water Cycle Relay.
- **2**:**30 –** Walk to Upper Baker Dam for hydropower tour.
- **3**:**30 –** Return to lodge for hydropower model lesson.
- **3**:**45 –** Snack and unpack.
- **4**:**00 –** Recreation time (supervised by parent chaperones).
- **5:00** - Trout A and HSL meet at *round table* to help prepare dinner.
  All else meet in quiet room for reflection time led by teacher.
- **6:00 –** Dinner and announcements
- **7:00 –** Trout A cleans up. Student shower option, prepare for campfire.
- **8:00 –** Meet in quiet room for evening story and bead ceremony.
- **8:15** – Head outside for campfire program.
- **9:15 –** Return to lodge and prepare for bed.
- **9:30 –** Lights out.

Day Two

- **7:00** – Trout B and HSL meet at round table to help prepare breakfast.
  Parent Chaperones supervise students who are up early in the quiet room.
- **8:00 –** Breakfast and Announcements.
- **9:00 –** Trout B clean up meal and everyone prepare for field day.
- **9:30 –** Meet in quiet room for morning story and bead ceremony.
- **10:00 –** Head outside for "spawn till you die" salmon life cycle activity.
- **11:00 –** Walk to boat launch shelter.

- **11:15 –** Lunch.
- **11:45 – "**Divide and Conquer."
    - Osprey Clan hikes up to Glover Mountain for forest ecology lesson.
    - Trout Clan stays at boat launch shelter for water quality lesson
- **1:45 –** Clans switch locations and activities. Water quality lesson may finish early and begin hike up to Glover Mountain.
- **3:45 -** Clans meet at boat launch shelter and then return to lodge together.
- **4:00 –** Snack. Recreation time supervised by Adult Chaperones.
- **5:00 –** Osprey A and HSL meet to help prepare dinner.
  All else meet for reflection time with Teacher in quiet room.
- **6:00 –** Dinner time and announcements.
- **7:00 –** Osprey A cleans up. Den inspection. Student shower option. Practice campfire performances and have them approved by a "skit director," (HSL or chaperone).
- **8:00 –** Meet in quiet room for evening story and bead ceremony.
- **8:15 –** Head outside for campfire program.
- **9:15 –** Return to lodge and prepare for bed.
- **9:30 –** Lights out.

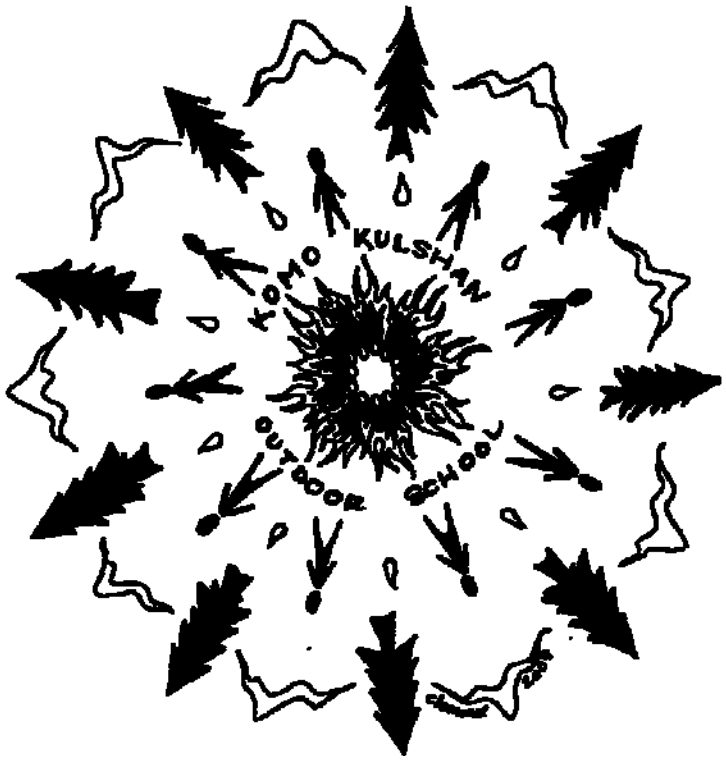
Day Three

- **7:00** – Osprey B and HSL help prepare breakfast.
  Parent Chaperones supervise packing and cleaning rooms
- **8:00 –** Breakfast and announcements
- **9:00 -** Osprey B cleans up.
  All else meet in quiet room for quiet activities led by teacher. (Journal pages – Flora and Fauna Checklist, Campfire Memories.)
- **9:30 –** Morning story and final bead ceremony.
- **10:00 –** Head outside for natural resource lessons
    - Cedar Tree of Life
    - What "wood" we do without it.
- **11:00 -** Clans switch lessons.
- **12:00 –** Closing Circle.
- **12:15 –** Picnic lunch or lunch packed to go depending on bus arrival time.
- **12:30 – 1:00 –** Bus arrives. Load gear. Happy trails.

Post-Trip Classroom Lessons

- Schedule a KKOS staff visit to classroom 1-2 weeks after your field session. KKOS staff will lead "Shaping the Skagit" lesson in blue pages of Journal. They will also administer and collect student post-trip surveys, and collect teacher evaluation.
- Complete remaining blue pages in journal.
- Complete PSE's "Exploring Your Environment" workbook lessons, focusing on low cost/no cost energy conservation measures for students, and families. (You will be given a classroom set at the end of your KKOS field session.)
- Family Activity – "Home Water use/Energy Audit Survey.

Part Two - Curriculum



Pre-Trip Lesson
KKOS adapted – UW MESA, "World's Water Supply"

Led by teacher in classroom

Summery:

Students will brainstorm why the earth might be called the "water planet," recalling all the different kinds of water they know about, such as salt water, lakes and rivers. By tossing an inflatable globe among them students will discover the distribution of land and water on earth. Then students will investigate where the fresh water is located and calculate the percentages of this "rare" type of water.

Objectives:

1. Students learn where all the water on earth is located and how much of it is fresh water.
2. Through a hands-on demonstration students will start to visualize how much water can be found in different sources.
3. Students will practice calculating percentages.
4. Students will have hands-on practice visualizing and calculating volume, (if optional student worksheets are used.)

Materials:

- Inflatable Globe (or standard classroom spin globe)
- Post-it notes
- Several cubic centimeters, three meter sticks and Student worksheet 1.1, 1.2, 1.3 *(optional)*
- Six jars; same size, labeled for categories of water
- Seven smaller jars, all same size labeled for categories of fresh water.
- Food coloring
- Several eye droppers
- Several tablespoons
- Several cups
- Student worksheet 1.7
- Student worksheet 1.8

Please find Student Worksheets in Appendix B.

Background:

We call the earth the "water planet". Approximately 71% of the earth is composed of water, a total of nearly 136,000,000 cubic kilometers of water. Most of this water however is not fresh. Most is salt water found in the oceans and saline lakes; 97% of water or 1,320,000,000 cubic kilometers is salt water.

Amount of Water on Earth by Scientific Category*

Source	Total amount of Water in cubic Kilometers	Amount of water In the classroom Scale**
Oceans and saline lakes	1,320,000,000	4 cups
Glaciers and Icecaps	29,200,000	1.5 tablespoons
Groundwater	8,340,000	0.5 tablespoons
Fresh water lakes	126,000	3 drops
Soil Moisture and Water Vapor	80,000	2 drops
Total Water	**1,360,000,000**	**4 cups, 2 tablespoons, 5 drops**

*The hydrologic Cycle, US Geological Survey, 1984.
**The classroom scale is 1 cup = 330,000,000 cubic kilometers

Fresh Water on Earth by Scientific Category

Source	Total water in Cubic kilometers	Amount of water In the classroom scale
Glaciers and Ice Caps	29,200,000	3.5 tablespoons
Ground Water	8,340,000	1 tablespoon
Fresh Water Lakes	125,000	100 drops
Soil Moisture	67,000	54 drops
Water Vapor	13,000	10 drops
Rivers	1,300	1 drop
Total Fresh Water	**37,700,000**	**5.5 tablespoons, 165 drops**

Procedure:

Preparation before activity

Prepare one jar with the measured amount of water that will be represented on Earth (4 cups, 2 Tbsp, 5 drops). Add food coloring so when divided, smaller amounts will still be visible. Prepare five empty jars with labels; Oceans, Glaciers and Ice Caps, Ground water, Atmospheric Vapor, and Fresh Water. **See below in: *How Much Water is on Earth?***

Also prepare the jars for the Fresh Water activity. You will need 7 total jars. Prepare one jar with measured amount of total fresh water (4.5 tablespoons, 165 drops). Add food coloring. Prepare 6 empty jars with labels; Glaciers and Ice Caps, Ground Water, Fresh Water Lakes, Soil Moisture, Water Vapor, and Rivers.

(Keep in mind that 300-400 drops of water equals a tablespoon so you can average by allowing 1 Tbsp = 350 drops of water.)

Activities:

Inflatable Globe

With an inflatable globe, elicit from students what they think it is and what distinguishing features they see. Throw the ball to a student and have them hold their hands still after they have caught it. What is their right index finger touching, land or water? Continue to toss the ball around the class and record if the student's right index finger is on land or water. Chart this information. Ask the students what they notice. Any patterns? Encourage them to try to figure

out the ratio of land to water or to estimate the percentage of each. *(NOTE- if using a solid, spinning globe, then have student close eyes and point finger as you spin it)* Remember that approximately 71% of the Earth is composed of water. If the charted numbers are not clearly illustrating this, consider that there may be rivers, lakes, or other water sources on land that are not visible on the globe.

Water Planet
Organize students into pairs and have them brainstorm why they think the Earth is called the "water planet." Ask them to write out on the post-it notes where they would find water (ie. ocean, lakes, rivers, etc.), one place per post-it. As pairs share their ideas, group similar post-its together on the board. Have them guess where most of the water is and think about areas that have not yet been considered.

(Optional: If you want to integrate math into the lesson, then follow MESA 1.1-1.3. The objective of these worksheets is to be able to visualize a cubic kilometer because this is how the water on Earth is measured. Student sheets 1.1 and 1.2 are recommended to give students a basic understanding of volume. Student sheet 1.3 is investigating the volume of a cubic kilometer and includes more advanced math.)

How Much Water is on Earth?
Reveal the categories that water is divided into. Show the empty labeled jars. Explain categories if necessary and facilitate discussion. Show students the jar with the total amount of water on Earth. Explain that this is a small scale of how much water is present on earth. We will need to do some math to figure out how the water is divided. We will be using drops as our basic unit of measurement, but we will also be using tablespoons and cups. So we need to find out how many drops are in a tablespoon and how many tablespoons are in a cup. In their pairs, ask students to estimate how many drops are in a tablespoon. After they have shared their estimates, explain that they will determine exactly how many there are.

Eye Dropper Practice
Hand out an eye dropper and tablespoon to each pair. In their pairs, have them practice with one scientist carefully squeezing one drop at a time while the other assists in counting while holding the tablespoon. After practicing, have each person in the pair take a turn at being the dropper and recording final results. Each pair should have two numbers to report. Have students share their results and do a class average of all scores. (If you have more time for this activity you can have each pair do several different trials to get a more accurate estimate.) Repeat process with tablespoons to cups.

Earth Water
The scale being used is 1 cup of water = 330,000,000 cubic kilometers. Now we will determine the percent of each type of water present on earth. The full jar represents all the water on earth. Choose volunteers from the class to assist in filling each of the five empty jars with the correct amount of water. After this demonstration, use MESA sheet 1.7 to determine decimal and percent equivalents for these five categories.

Fresh Water
Repeat process for fresh water using student sheet 1.8.

Pre-Trip Lesson
KKOS adapted – UW MESA, "Watersheds" activity

Led by Teacher in classroom.

Summery:

Students explore the geographical features that make up a watershed. They build a two-dimensional paper model of a watershed and experiment with the flow of water in their watershed. If enough time is available you can also make paper-mache watershed models.

Objectives:

1. Students learn that a watershed is an area of land that drains or sheds water from the highest to the lowest point.
2. Students learn of the many specific characteristics that make up a watershed.
3. Students learn that water flowing over the land picks up pollutants and spreads it through the watershed.
4. Students learn that building houses and roads has an impact on the watershed.

Materials:

- Watershed Characteristic Vocab Words on index cards
- Materials to look up definitions of Vocab Words, (Dictionaries, geography books, etc.)
- Half sheets of paper
- Permanent green markers (enough for each group of students.)
- Water soluble blue, red, brown and black markers (enough for each group of students.)
- Spray bottle with water.
- Tape
- Worksheets – "Water Around Us," and "Rain and Watersheds"

Please find student worksheets in appendix B.

Background:

A watershed includes the entire area of land that drains into a body of water such as a stream, river, lake, or ocean. In areas where there are mountains, crests (the mountain ridge), will divide one watershed from another. If the area is flatter, then small subtle rises can separate different watersheds. On the western side of Washington State the rivers in the Cascade Mountains flow into Puget Sound. On the eastern side, the rivers flow into the great Columbia River Basin.

Procedure:

Activity

Have students work in groups on KKOS Student Worksheet 3.1 "Water Around Us." Discuss their answers with entire group. Have them share their answers to number 6 and tell them that the real name for their system is watershed. A watershed is an area of land that sheds

or drains water from the highest point (head waters) to the lowest point (valleys etc.) Have them label their drawings "watershed."

Hand out watershed characteristic vocab words on index cards, one or two to each group. Working in groups, have students look up definition of each vocab word. Have groups share with entire class their definitions.

Drainage Basin		
Crest	Valley	River Channel
Mountain Lake	Streams	Ocean
Tributary	Divide	
Flood plain	Range	
Slope	Head waters	

After students understand definitions have them draw a second picture of their system labeling the parts with the correct vocab words.

Reinforce the definition of a watershed – "an area of land that drains or sheds water from the highest to lowest point," and tell them that a watershed includes all these different characteristics.

Next make a three dimensional model of a watershed.

- Hand out two half sheets of paper to each student.
- Have students crumble one sheet into a ball. Unfold sheet carefully to create ridges and valleys. Tape each of the four corners to second half sheet of paper. Have students write their name with pencil on a corner of bottom sheet.
- Lead students through coloring their watersheds.
    - Ridges are outlined with blue pen. The blue represent frozen water, ice and snow, on mountains. Be sure that students understand to only use the blue pen on the ridgelines.
    - Use green permanent marker to draw dots throughout entire watershed representing trees.
    - Have students pick one area (watershed) where they will build their house. Draw house in brown marker
    - Explain that in order to build a house people and materials need to be transported. Have students draw one road in black through one watershed, not crossing any mountain ridges.
    - Explain that people have lawns around their houses, what do you need to keep lawns green and manicured? Pesticides, herbicides, fertilizers. Have students draw red dots around house to represent these chemical pollutants.
- When students are ready, go around with the spray bottle and give each watershed model a few sprays to make the markers start to run.

Have students work on KKOS Student Worksheet 3.2 "Rain and Watersheds."
Have students put all their watershed models on a table where they can dry and be viewed.
Have students compare their watershed models with other group's watershed models.

Water Cycle Relay – Day One

Time: 1:30-2:30 pm. Led by KKOS staff, Classroom teacher, HSLs, and adult chaperones assisting.

Summery:

Students will act out the water cycle through a relay race in which they move water to the Baker River Watershed to ensure the survival of all living things in the watershed.

Objectives:

1. Students will learn that all living things need water to survive.
2. Students will learn that we cannot make "new" water.
3. Students will learn the major parts of the water cycle (evaporation, condensation, precipitation, saturation) through acting them out and participating in the water cycle relay.

Supplies:

- Four buckets. Two filled with water and marked "Worlds Water Supply," and two empty and marked "Baker River Watershed, Survival Level."
- Two ladles.
- Clan flags

Procedure:

Introduce Cycles:

- Gather students in a circle. Ask students what is special about a circle. (*Everyone can see everyone else. It has no beginning and no end.)*
- Compare circle to cycle.
- Ask students for example of cycles. (*Life cycles, bicycles, recycles, water cycles.)*

The Importance of the Water Cycle:

- Ask students why water is important. *It is important because all living things need it to survive and also because we can not make more water*.
- All the water we have is all the water we've ever had, and it's all the water we ever will have. So the water you are drinking today could be the same water that the dinosaurs drank, and peed out. How is this possible? *The Water Cycle*. As water moves through its cycle it gets filtered and cleaned.

Review the Water Cycle/ Water Cycle Dance:

- Ask students to help you out reviewing the water cycle by acting out each part.
- To represent evaporation have students crouch down, then stand up and raise hands into the air.
- To represent condensation pretend to fluff clouds in the sky.
- To represent precipitation lower hands back down to ground.

- To represent saturation use hands to mime water soaking into the ground.
- Can you do it all together faster?

Water Cycle Relay

- Have each clan line up behind a bucket filled with water, labeled "the Worlds Water Supply." Across the field place two empty buckets labeled "Baker River Watershed, Survival line."
- High School Leaders will be stationed by the "Baker River Watershed" buckets to act as judges and to present the clan flags to the winners of the relay race.
- Explain the relay to students: The Baker River Watershed needs a certain amount of precipitation each year for there to be enough water for all the creatures to survive. You are going to become the water cycle, and help the water get to the Baker River Watershed.
- The first person in the line picks up a "ladle shaped cloud" from the Worlds Water Supply. This represents evaporation. They will carry their "cloud" to the Baker River Watershed, which represent condensation. They will then pour their "cloud" into the watershed bucket, which represent precipitation. Next they will run back, which represent saturation, and pass the ladle off to the next person.
- All clan members should support their team mate by shouting out the water cycle stages as their team mate acts them out.
- Keep playing until both teams fill up the Baker River Watershed to the survival line.
- The person carrying the last lucky cloud that fills the bucket to the survival line will become the first person to carry their clan's flag. Flag bearers are junior leaders. They walk behind the High School Leader and lead the clan to the next activity. We'll rotate so many different people will get a chance to become a flag bearer throughout the next three days.

Hydro Power Tour – Day One

Time: 2:30 – 3:30, including time it takes to walk to the dam and back. Led by KKOS instructor, classroom teacher, High School Leaders, and adult chaperones assisting.

Summery:

Students will have the opportunity to see the Upper Baker Dam, where some of their electricity is generated.

Objectives:

1. Give students an introduction to how the Fish Taxis works and the opportunity to see part of the Fish Taxi system.
2. Give students an introduction into how electricity is generated and how it travels to their houses. Students will learn that it is a system with many parts including the dam, the turbine, the generator, transmission lines and substations.
3. Students will learn that when they use a lot of electricity in their homes more water needs to be run through dam which has a direct impact on Baker Lake and the Baker River Watershed.

Supplies:

- Hard Hats, (safety protocol)
- PSE Hydropower board (optional)

Procedure:

1st stop – The Turbine

Ask Students what they are looking at. *Usually at least one student can identify it as a turbine.* When on top of the dam you can't see the working turbines because they are underneath the dam in the powerhouse.

A turbine is just one part of a system that generates electricity and moves it from **"Mountain Height to Electric Light."** (*When you say "Mountain Height" hold one hand up really high above your head and when you say "electric light" hold you other hand down low and pretend to flick a switch on and off a few times. Have students do this with you.)* When we get on top of the dam we will point out and discuss some other parts of the system, but in just a moment we are going to see where some of our electricity is generated. **Hydropower** is just one of the ways that we generate electricity. What is hydropower? It is electricity generated with the force of moving water.

Ask the students what are some good safety rules to follow when on top of the dam, (*i.e. no pushing, nothing goes over the side of the dam, walk in single file, wear hard hats, and so on.)*

2nd Stop – Near Speed Limit Sign, looking down at the side of the Dam.

Ask students how high they think the dam is. It is 330 feet tall. Ask students how deep Baker Lake is behind the dam. It fluctuates, but it is at least as deep as the dam is tall.

Ask students what they think this place looked like before the dam was built. *It was a river rushing through a narrow gorge. There was a small lake up farther, but no huge reservoir.*

Tell students that building the dam had a big affect on the Baker River Watershed. It helped the people living in this area and farther down valley by generating electricity, but it hurt the salmon population. Ask students if they think salmon can jump over the dam. No of course not. Because PSE had a negative impact on the salmon by building the dam, they have the responsibility to help the salmon and lessen that negative impact.

Tell students that in science, sometimes your first idea, or your first **hypothesis**, isn't always the best one, but you need to test it out to know if it will work or not. Ask the students if they have a guess what PSE's first idea of how to help the salmon was? Point out the pipe running down along the side of the dam. Ask students to imagine they are a little salmon about the size of their pointer fingers and they want to travel downstream towards the ocean. Would it be fun to go down that tube? It might seem fun to them, but the baby salmon got pretty beat up going down it, and a lot didn't make it. So PSE's first hypothesis didn't workout so well. Tell students that in a moment you will show them another idea PSE had to get salmon around the dam, which works much better.

3rd stop – On top of the Dam

Orientate students to where they are. Point out Mt. Baker, or where they would see Mt. Baker if it wasn't cloudy. Point out Baker Lake, and let them know that the river on the other side of the dam flows into Lake Shannon, which is formed by the lower baker dam. All the land they see around them is all part of the **Baker River Watershed**. All the rain and snow that falls on the land all runs down into Baker Lake and river.

Tell the students that now you are going to explain how PSE gets salmon around the dam, since the waterslide didn't work too well. Point out the **Floating Surface Collector**. Tell students that it is called a Floating Surface Collector (FSC) or a Gulper. (*Have students make a gulping sound.*) In the FSC are pumps that create a current. Fish swim into the current and get funneled into a smaller and smaller space until they are at last in a small tank called a **hopper**. (*Have students hop up and down.)* Point out cranes at other end of the dam. The cranes lift the hopper up and the fish get put into another tank on a truck which drives them around the dam. Tell students they will learn more about this tonight at campfire and tomorrow when they visit the fisheries.

Tell students that you are now going to explain the parts of the system that generates electricity and moves it from "Mountain height to electric light." (*Have them do the hand motions again. If you brought the "answer key" board it helps to point at the pictures as you talk.)*

It starts with the **water cycle, precipitation** fills up the lake. Water flows under the dam, turns the **turbine,** which turns a **generator.** (*Point out the **powerhouse** where the turbines and generators are.)* The generator produces electricity. Make sure the students know that it isn't

the water itself that turns into electricity, the water is the force used to turn the generator. (*If students are older you can mention potential and kinetic energy.)*

The electricity moves through large power lines, **or transmission lines.** (Point *out power lines coming from the powerhouse*.) The electricity that is first produced at the dam is very strong. (*Have students hold out arms like weight lifters.)* Ask students what would happen if the strong current was wired directly into their houses? Stuff would blow up when they turned it on. So before the current goes to the houses it gets stepped down at **substations**. Point out the **transmission station** on the other side of the dam and ask students if they have ever seen things like that around their neighborhoods. Tell them that a substation looks like that, but that is a transmission station. The current is not being stepped down there, it is actually being stepped up. When you have to send electricity a really long way you want to send it as a strong current because you loose a little bit along the way. This is called line loss.

This dam can generate about 100,000 kilowatts, which is enough to power 60,000 fully electric homes, (electric heat, electric water heaters, electric appliances, so on), which is about twice the size of Bellingham. (There are 29,000 some housing units in Bellingham.) But not all the electricity produced at this dam goes to Bellingham. Some goes to Sedro-Woolley, to Concrete, to Lyman, all over. That is how electricity gets from "Mountain height to electric light."

Ask the students if they think the lake is high or low. How can they tell? Ask the students if the lake level always stays the same. Ask the student what happens in the wintertime when people are cranking up their electric heaters, and it gets dark really early so people are turning on lots of lights. We have to run more water through the turbine to turn it faster to generate more electricity, which mean the lake level goes down, which can have an impact on salmon and other wildlife. (For example, if a salmon laid its eggs near the edge of the lake and the level goes down, it could leave those eggs high and dry.) **So where ever the students live, when they use a lot of electricity, they have a direct impact on the Baker lake and the Baker River Watershed.**

Hydropower Model – Day One

Time: 3:30 – 3:45 Led by KKOS Instructor and/or classroom teacher. High School Leaders, adult chaperones assisting.

Summery:

Students will observe a demonstration of how different types of light bulbs use more or less electricity and thus are more or less efficient. Students will discuss ways they conserve electricity, through new technology and also through making personal behavioral choices.

Objectives:

1. Students will learn that compact florescent light bulbs are more efficient than florescent light bulbs, and that LED lights are more efficient than florescent light bulbs.
2. Students will observe that there is a finite amount of electricity going through a circuit at any one time and if the load on the circuit is too great not all appliances will work.
3. Students will draw connections between the above concept and the idea that as our population grows and people use more electricity there won't be enough power on the grid for everyone. We must either build more power plants, which have drawbacks, or learn to use less electricity.
4. Students will discuss ways that they can conserve electricity.

Supplies:

- Student Journals
- PSE Hydropower model

Procedure:

Explain the Hydropower model

When I turn the model on water will come out of this spigot and turn this wheel. What does the spinning wheel represent? *The Turbine*. The turbine is hooked up to a little generator which produces a small amount of electricity. There are three different kinds of light bulbs that we are going to test to see how much electricity they use.

Make a Hypothesis

Have students identify the different kinds of light bulbs. Ask students if they have a hypothesis or guess what kind of light bulb will be the most efficient.

Test hypothesis with hydropower model

Ask for a student volunteer to help read the amp meter when the model is turned on. Turn on each different kind of light bulb and read the amp meter. Have students record results in their journals. Turn on all the light bulbs at once and see what happens.

Ask students which light bulbs are most efficient. LED's are the most efficient, followed by CFLs, followed by incandescent light bulbs. Ask students what happened when all the light bulbs were turned on at once. There wasn't enough electricity to run all the light bulbs and so

some dimmed. Asked students if they have ever noticed at home when many appliances are running at the same time, the lights might flicker, or a fuse might blow.

Conclusion – Discussion about energy conservation

There is only so much electricity that can be generated at any one time by our power plants. Next ask students to consider what happens as more and more people move to Western Washington and use more and more electricity. Facilitate a short discussion with students about energy use and conservation. Will there be enough electricity to go around? What can we do to find a solution to this problem? Can we build more power plants? We can, but it is expensive and there are impacts on our environment, as you saw with the Dam. What is something we can do instead? Conserve electricity? Ask students for examples of how they can conserve more electricity. Buying CFLs is one option, but make sure you emphasize options that do not include buying new things, such as turning lights off and unplugging appliances.

Reflection – Day One

Time: 5- 6 pm. Led by classroom teacher, non-cooking high school leader assisting.

Summery:

Students will review major new concepts learned during the day, and will have the opportunity to share observations and ask questions that may have arisen during the day. Students will complete reflection pages in their journals which include a hydropower activity, a watershed/salmon scavenger hunt, and an open ended page for reflection.

Goals:

1. Students will review how hydroelectricity is generated and transported to their homes.
2. Through a scavenger hunt students will become familiar with features of the Baker River Watershed and will be introduced to the five species of Pacific Salmon.
3. Students will have the opportunity to ask and also share their observations.
4. Teachers will have the opportunity to discuss new concepts with the students and connect them to prior classroom lessons.
5. Teachers may have the opportunity to demonstrate the hydropower model if there was not enough time before snack.

Materials:

- Journals and writing implements
- PSE hydropower boards
- Baker River Watershed topo map
- Salmon posters
- Hand Crank generator model

Procedure:

Remember – Reflection time is not student free time.

Hydropower boards

- Use journal page – Upper Baker Dam tour and Hydro Power Lesson.
- Remind students that they have had the opportunity to see how electricity is generated and transported from "Mountain Height to Electric Light." There are many parts of the system of generating hydropower. Can the students name some of the parts? (*Turbine, Dam, Powerhouse, Power lines, transmission stations and substations).*
- To review how hydropower is generated challenge the students to put the parts of the system in the correct order.
- Ask for seven volunteers to each hold up one of the seven boards. Ask the class to put the posters in order with the student volunteers moving the boards as the class directs.
- Complete questions 1-3 in Journals.

Scavenger Hunt
Using the Baker River Watershed topo map and salmon posters, have students complete page the scavenger hunt page in their journal. Students can work on their own or in pairs. After having some time to complete the page, have students share their answers with each other

Open Ended Reflection, (optional, as time allows).

- Ask students to remember the activities/lessons they did during the day. (Water Cycle Relay/Hydropower tour/Hydropower model lesson.)
- Ask each student to come up with a question about something they saw or learned about today. Was there something the observed that they want to learn more about? Encourage them to be curious.
- You don't necessarily have to answer their questions but discuss what they could do to find the answers themselves. (Research in a library, interview an expert, conduct an experiment?)
- This is also a good time to discuss how what they are learning at KKOS is related to what they have already learned in the classroom.

Generator Model (optional, as time allows)

- Ask for a "strong" volunteer. Have that student turn the hand generator while you tell a short story about a typical day in the life of person using electricity. It will get harder to turn as more and more appliances get turned on. Encourage that student to keep cranking even as it gets harder. The river never gets to rest.
- A student comes home from school and it's a hot day so they turn on the fan. As night falls it begins to get dark so that student needs to turn on a light. That student decides to turn on some music so they turn on the stereo (represented by the bell). It has cooled down now so we can turn off the fan. It's getting close to bed time so let's turn of the music. Now it's bed time so let's turn the light off.
- Ask the student volunteer and class what happened as you turned on and off appliances. The light bulb should have dimmed when everything else was plugged in and the crank got harder to turn.
- This activity demonstrates just how hard the water in the Baker River has to work to provide everyone with power. It also reinforces the concept that only so much electricity can be produced by a power plant, as was introduced by the Hydropower model lesson.
- Possible discussion points include:
    - What will happen if people need/demand more power than we can currently be generated?
    - What are ways we conserve energy?
    - Do any students live without electricity?
    - What kinds of everyday activities do they enjoy? Do these activities require electricity?

Please keep students engaged until the dinner bell rings. When bell rings have students put journals away in their rooms and then have a seat at the long tables for dinner announcements.

Make-A-Meal – Day One & Two

Time – 7-8 am and 5-6 pm. Led by KKOS site manager, HSL assisting.

Summery:

Students will help prepare a meal, present the meal to the rest of their class, and clean up afterwards.

Objectives:

1. Students will take ownership in preparing a meal for the community
2. Students will practice cooperation, an important skill when living in a community
3. Students will learn about and practice the important life skill of meal preparation
4. Students will learn and practice important kitchen safety rules including washing hands and using knives and utensils properly

Materials:

- Journals and writing implements
- Wookies
- Close toed shoes
- Meal job cards
- Small white board and marker
- Meal songbook
- Kitchen equipment

Procedure:

- Welcome group and play the favorite food name game.
- Introduce the Kitchen Cycle and explain that they are going to help make the meal, present it, and clean up afterwards.
- Ask them to look at their journals and read the first sentence. Discuss what "cooperative living skill" means.
- Explain each job (menu-maker, supper chopper, recycle master, table sanitizer, bread and beverage).
- Have students select job cards. Give students a small amount of time to trade jobs if they would like.
- Lead students into Kitchen, introduce them to the cook, demonstrate proper hand washing, have each student wash their hands.
- Supervise dinning room jobs while HSL and cook supervise kitchen jobs.
- After students are finished with their jobs practice meal presentation.
- Ring the dinner bell, invite the rest of the class in to have a seat, and present the meal with a songs and/or jokes.
- Excuse rows to WALK and WASH by asking them questions about concepts learned during the day.

Campfire Program – Nights One and Two

Time: 8:00 – 9:15 Led by KKOS Staff, classroom teacher, HSLs, and adult chaperones assisting.

Summery:

The first night staff, HSLs and at least one parent chaperone or the classroom teacher will model putting on a puppet show. The show will educate students about the impact the dams had on the salmon, and the solutions PSE put in place. The second night students will have the opportunity to put on their own skits or puppet shows. They may choose to use the provided scripts, or create their own original piece about something they have learned.

Goals:

1. Entertainment and education (edumatainment!)
2. Students will have the opportunity to express themselves creatively
3. Students will have the opportunity to work together to create a piece to present to the rest of the class
4. Foster a supportive sense of community, in which students feel comfortable getting up in front of each other and sharing their talents, (acting, singing, musical instruments, poetry, set and costume design, telling jokes, etc.)

Materials:

- Puppet Stage
- Puppets, costumes, scripts
- Campfire tub (Songbooks, storybooks, kazoo's, matches and newspaper for fire starting)
- Kindling and wood for fire
- Lanterns
- Two folding chairs
- Snack
- Hand sanitizer
- Napkins

Students will need:

- Flashlights
- Warm clothes

Procedure:

- While the cooking group is cleaning up after dinner and students are preparing for campfire the *non-cooking* HSL leader and KKOS instructor will set up. Carry out the campfire tub, stage, lanterns, chairs, and lay the fire.
- After dinner students will meet in the quiet room for an evening story and bead ceremony.

- If students are performing an original play they must have them screened and checked off by an adult "director." Anything performed on the KKOS stage must be:
    - Educational
    - Appropriate
    - Fun!
- KKOS instructor will leave a little before students to light the fire.
- Everyone else will walk out to campfire together by way of the west patio and trail.
- Campfire consists of an official welcome song, then the "program" (Night 1 – staff puppet show, Night 2 – student performances) snack, one or two rousing interactive songs and/or HSL performances, one or two quieter songs, and closes with a "goodnight talk."
- Adult chaperones will help students to be respectful audience members during staff performance.
- HSLs will get snack from the kitchen at the appropriate time and serve it to students.
- The "goodnight talk" includes reminding students to be respectful of lights out and quiet time, and going over expectations for the morning.
- Students will be excused from the campfire room by room and will walk back to lodge with an adult chaperone/HSL/teacher.
- Students will head back to the lodge between 9:00 and 9:15. Light's out is at 9:30.

Spawn 'Till You Die – Day Two

Time: 10:00 – 11:00 am. Lead by KKOS staff, classroom teacher, HSLs, and parent chaperones assisting.

Summery:

Students will go through an obstacle course that simulates the salmon life cycle and the many challenges, both natural and man-made, that salmon face.

Objectives:

1. Students will learn the salmon life cycle through acting it out.
2. Students will realize that very few adult salmon return to spawn even in the best of conditions.
3. In the game students will experience some of the ways humans can impact salmon survival, both negatively and positively.

Materials:

Spawn till you die tub:

- Flagging tape to mark obstacle course boundaries
- Jump rope
- Predator puppets
- Danger cones
- Salmon Cemetery sign
- Tokens to represent food
- Plastic bag to represent oil spill

- White board and markers
- Laminated life sized pictures of salmon
- Culvert

Procedure:

Intro

- Gather students outside at the campfire circle.
- Briefly review the salmon life cycle using white board and markers.
- Show students the life sized pictures of salmon, (review "the hand of salmon," trick for remembering the five species of pacific salmon.)
- Ask students how the salmon get so big. *They eat a lot as adults*. Where do salmon find all this food? *In the biggest grocery store on earth, the ocean.*
- Tell students that now they are going to become salmon and discover what it is like to make a journey from their stream, all the way out to the ocean, and back.
- Vote on which species of salmon students want to be and read the back of the salmon picture to discover how many years that species spends in the ocean.

Explain Obstacle Course:

- Lead students over to obstacle course. Have them line up so they can see you demonstrate how to go through the obstacle course.
- Begin as eggs – students act out hatching from an egg, absorbing a yoke sack, and growing a mouth.

- Swim downstream and jump over a riffle or rapid, (two adults needed for jump rope). If a student touches the riffle they go to the salmon cemetery.
- Continue swimming downstream past predators, (adults needed to act out predators – trout, bear, eagle). If a student is tagged by a predator they go to the salmon cemetery.
- If a student steps outside the stream, (flagging tape), in an effort to avoid a predator then they go to the salmon cemetery.
- When students reach the estuary they become smolts and do a smoltification dance to get ready for the salt water.
- In the ocean students must collect tokens equal to the number of years their species spends in the ocean, while avoiding ocean predators, (adults needed to be fisherman and orca.)
- Once enough tokens are collected students swim back up stream, avoiding predators.
- During the time they spent in the ocean, the population of the Skagit valley has grown and a dam was built to provide more electricity. Students must make it through the turbine, (jump rope.)

Round One Discussion

- After the end of round 1 gather up survivors and swim over to the salmon cemetery. Look at the ratio of survival to mortality.
- Ask dead salmon how they died, (predator, turbine, riffle?)
- Ask students if they think the game was fair.
- Tell students that sometimes humans make it even more difficult for salmon to survive. Add more challenges for the second round – oil spill, culvert, toxic food. (**To avoid crashes remind students to go through culvert one at a time and to look and make sure no one is coming from the opposite direction.)**

Round Two Discussion

- At the end of round 2 discuss the different survival rate, (did more or less salmon survive to spawn? Sometimes on round 2 no salmon survive. Compare this to the year 1985 when very few adult salmon returned to the Baker River.) What made it harder to survive?
- Discuss ways that humans can make it easier for salmon to survive. (Fish taxi, fishing limits, clean up oil spills/prevent oil spills in the first place, use less electricity so more dams are unnecessary or dams can be decommissioned, remove culverts.)

Round Three Discussion

- Run through the course a third time with advantages given to salmon. Remove culvert and oil spill. Impose a limit on the fisherman. Have returning salmon line up behind a "Taxi Driver" and get driven around the Dam.
- Discuss the survival rate of the third round. Ask students if there are things they think they can do in their own lives to help protect the salmon.

Forest Ecology – Day two

Time: 12:00-1:45 and 2:00 to 3:45. Led by classroom teacher or KKOS instructor, HSLs and adult chaperones assisting.

Summery:

Students will hike up Glover Mountain (0.5 miles) and around a loop trail at the top (0.25 miles). Students will learn about native plants and features of the forest by using their senses, their powers of observation, and also by teaching their peers.

Activities

(Hike up hill to Overlook ~20 min.)

1. Introduction – Watershed View observations – from overlook (~10 minutes)

OR (if no view due to weather that day…)

1 Build a Tree activity (~10 minutes)
2. Each-One-Teach-One, on the loop trail(~40 minutes)
3. Silent, Solo Hike, on the loop trail (~10 Minutes)

(Hike back down hill to Boat Launch Shelter ~15 min.)

Objectives:

1. Students will recognize that the land and the forest are part of the Baker River Watershed.
2. Students will get the opportunity to teach each other and feel empowered about their own learning.
3. Students will learn to identify some examples of native plants.
4. Students will use their senses to experience the forest and get some quiet time to enjoy their surroundings.

Materials:

Watershed View and Model

- White Plastic Bag
- Spray Bottle filled with water

Build a Tree

- Whiteboard and dry erase marker
- Wookies

Each One Teach One

- Each One Teach One cards
- Field guides
- Hand lenses

Silent Solo Hike

- Silent Solo Hike Cards

Procedure:

Introduction – Watershed View and Model

After hiking up hill take a quick water/rest/porta-potty break, then gather at outlook.

- **Ask students to look across at the view.** What do they see? All that land is part of the Baker River Watershed. If the rain falls on the side of the mountains that we can see, where does it end up? *The Baker River or Baker Lake.* If it falls on the side we can't see, where does it end up? *In another watershed because it is draining away from the Baker Lake).*

- **Make a model**. Ask students to each bring you one rock. Pile rocks in front of you and drape with a plastic bag. The plastic bag represents the land. Spray plastic bag with water from the spray bottle and watch where the water drains.
- Discuss with students what landforms/bodies of water they see. How many watersheds do they see?
- **What is the definition of a watershed?** *An area of land that drains water from the highest to the lowest place*.
- Ask students to take a few minutes to sketch the Baker River Watershed in their journals.
- **Look back out at the real watershed. Are trees part of the watershed**? What would happen if all the trees were removed? *No homes for animals, less oxygen/air quality issues, more erosion.*
- The tree roots hold the soil in place, so if there were no trees, than when it rained the water would pick up all the loose dirt and wash it into the Baker Lake. Would all that dirt in the water be good for salmon? *(If students have already been to water quality, they should be able to tell you about turbidity. If they have not been to water quality yet, tell them they will learn more about this when they go to water quality.)* **Do we need a healthy forest for the watershed to be healthy?**
- Since trees are an important part of the watershed we are going to spend a little more time studying them and forest ecology.

ALTERNATE Lesson, if the weather prevents observation:
Build a Tree (Be sure to include ALL in the clan – students, adult chaperones, and high school leader must all participate)

Tell students that they are going to learn about the parts of the tree by building their very own tree. As you go through this activity, have students look at their "wookies" to see the parts of the tree. Also write the names of the parts on the whiteboard. Ask for volunteers to be each part of the tree and have them do a motion/sound to represent their part. Heartwood can make a heartbeat sound, xylem can raise their hands and say "Xi-high," phloem can lower their hands and say "flow down," cambium can stretch and say "bigger, bigger," and bark can bark like a guard dog.

- **Heartwood.** The heartwood is the center of the tree and should be visible as a darker or lighter dot on student wookies. It is the oldest part of the tree. It is dead, but it provides support for the rest of the tree.
- **Xylem.** The xylem transports <u>water</u> that the roots suck up from the ground, all the way up the trunk, all the way to the leaves. All living things need water to survive, including trees.
- **Phloem**. The leaves are using the water that the xylem transports, and sunlight to make food in the form of the <u>sugars</u>. It is the phloem's job to transport that sugar down the branches and the trunk to all the parts of the tree so it can be nourished and grow.
- **Cambium.** The cambium, fed by the water and sugar, grows a new layer of xylem and phloem each year. It is a hard to see brown line just inside the bark. Sometimes it is called the inner bark.
- **Bark.** It is the bark's job to protect the tree, not unlike our skin.

Have all parts of the tree do their motion at the same time. Next have students trace their wookies in their journals and draw and label the parts of the tree.

Each-One-Teach-One

Now it is time for the students to become the teachers! Use rocks, sticks, leaves, on the ground to model how this works. The teacher will take the first person, (or first pair – with larger groups, you can do it as Each-Two-teach-Two) a short way up the trail and stop at an interesting plant or feature. The teacher will teach the first student, have them "rehearse", and instruct Student #1 to STAY THERE. Then walk a little farther along the trail, to Station #2. Teacher will radio High School Leader to send the second student. The second student will stop at the first Station, learn from student #1, and then will continue on to learn from the teacher at Station #2. The second student becomes the expert, or teacher, for Station #2, and so on. Repeat process until the entire group is spread out along the trail, each with a teaching station. At this point the High School Leader (who is ALWAYS the last one left at the end) will walk up to Station #1 and be taught by that student. Afterwards, they will walk <u>together</u> to Station #2. Then HSL, students from Station #1 and #2 will walk <u>together</u> to station #3. Repeat process until the entire group ends up <u>together</u> at the other end of the trail. (NOTE: Adult chaperones should either be paired with a student, sent out in between students to also have a station to teach, or just be "spotters" – depending on student needs, time available.) High School Leader will <u>always</u> be the last one in line and is responsible for gathering everyone back together.

While students are waiting for their turn to teach, have them sit, observe, and draw a plant in their journal. You can pass out hand lenses to help them observe their plants, just *be sure to collect the hand lenses at the end of the lesson.* If it is too wet or cold to do journal work, have High School Leader lead a group game under the canopy, preferably one that involves movement to keep them warm, (i.e. "screaming toes" or "quinoa".)

There are cards in the lesson tub with suggestions for stations. There are also field guides in the lesson tub. At each station, point out to students what they will be learning about and ask them if they have any prior knowledge, (i.e. have you ever seen this plant before? Do you know what kind of tree this is? Can you notice anything special about this stump?). Give each student a couple of facts to share with their "students." Have the student practice teaching you before you leave them. If a student is feeling particularly uncomfortable with teaching, leave a card with them to help them remember what they are teaching about, but encourage students to use their own words and not just read from the card. They may also sketch and/or right notes about their station in their journals.

Transition - The Big Q:

At the end of Each-One-Teach-One, gather everyone up and discuss -

- "Does anyone remember the big question?" *Is this watershed healthy?*
- "Remember that the forest is part of the watershed. Based on our observations and what we have just learned, is this forest healthy?"
- "Scientists spend their lives studying all the interconnection of the forest, so we would need more time to do more surveys to be able to say for sure. But we have observed

that there are many different kinds of plants, providing food and homes for many different kinds of critters. So based on our observations here today, the forest appears healthy."

Silent Solo Hike

Tell students that for the last part of the hike, they are going to get a chance to spend a little "alone time" in the forest. This is something that not all people get to experience. Explain to students how this will work.

You will walk down the trail, placing cards that have suggestions for students of things to notice or think about as they are hiking. Once you are out of sight, the High School Leader will send the first student, reminding them to be SILENT and to WALK – NO running! Once the first student is out of sight, the High School Leader will send the next student, and so on until the last student leaves. The High School Leader will always be the last person in line and can communicate any problems to you via radio. *They will also pick up the cards on their way out.* You will take the adult chaperone(s) with you and leave them in strategic locations, (steep, rocky, or challenging parts of the trail) for student supervision.

After the silent hike, congratulate them, briefly revisit the experience, take a quick bathroom break if necessary and hike down to swap lessons with the other clan. (Or if this is your second lesson, meet at the Shelter to walk back to the lodge.)

Water Quality – Day Two

Time: 12:00-1:45 and 2:00 to 3:45. Led by classroom teacher or KKOS instructor. HSLs and adult chaperones assisting.

Activities

1. Water Quality intro – 10 minutes
2. Observations – 15 minutes
3. Water Quality testing stations – 35 minutes
4. Water Quality conclusion – 10 minutes
5. Water Quality skit – 30 minutes

Part 1 – Water Quality Testing

Summary: Students investigate whether or not Baker Lake is a healthy habitat for sockeye salmon by testing for pH, D.O., and turbidity.

Objectives:

1. Students learn that pH, D.O, and turbidity are important factors that affect water quality and the survival of salmon.
2. Students learn that pH is the amount of hydrogen dissolved in water and affects how acidic or basic the water is, and that salmon need a p.H. close to neutral in order to survive.
3. Students will learn that salmon need oxygen dissolved in their water to breath at a level of at least six parts per million.
4. Students learn that turbidity is how cloudy the water is and is caused by sediment or algae suspended in the water, and that salmon need low turbidity in order to survive.
5. Students will have a hands-on experience conducting scientific investigations.

Materials

Water Quality Tub

- pH poster
- pH station card
- pH test kit
- Turbidity station card
- Turbidity test kit
- D.O poster
- D.O station card
- D.O test kit
- White board and markers
- Rubber boots
- Bell for station rotation
- Water sample jars
- Thermometer

Background:

What is pH?

PH is a measurement of how many hydrogen ions are dissolved in the water. This affects how acidic or basic is the water. A substance with a low pH is very acidic while a substance with a high pH is very basic. A logarithmic scale from 0 to 14 is used to measure pH, battery acid

being close to zero, and household lye being close to 14. Seven is considered to be neutral and the pH of pure distilled water. Because the scale is logarithmic an increase of one pH unit equals a ten-fold increase in hydrogen concentration. You can point out to students that battery acid has a pH of zero and lemon juice has a pH of two, and although that is only a difference of two units, it is really quite a big difference in the level of acidity.

Salmon and pH
Salmon need a pH close to neutral in order to survive. But they can survive in a range from around 6 – 8 pH.

What causes lake water to be more or less acidic?
Natural Causes: The soil and rock types around the lake. Much of the water entering a lake first travels underground.
Human Causes: Acid rain caused by sulfur and nitrogen gas from burning fossil fuels such as coal in power plants or gasoline in vehicles. Other pollution.

What is turbidity?
Turbidity is how hazy or cloudy the water is. If there is a lot of dirt or sediment floating in the water, or an algae bloom, it will have high turbidity. Salmon need low turbidity for a number of reasons. High turbidity makes it difficult for fish to breathe and also to see to find food. Young salmon living in turbid waters tend to not grow as big and are more likely to die younger. Turbidity can also block sunlight and inhibit photosynthesis. This disrupts the food chain. If there are fewer plants, there will be less aquatic insects, which equals less food for young salmon.

What causes high turbidity?
High turbidity is caused by erosion of dirt from the surrounding land. Flooding and storm events can cause increased erosion. Humans can increase erosion when they cut down trees because the trees' roots stabilize the soil. Construction projects can also contribute to erosion. Algae blooms can also cause high turbidity. An unnaturally high level of nutrients such as phosphorus or nitrogen, (found in laundry detergents and fertilizers) can cause algae blooms.

How do we measure turbidity?
One way to measure turbidity is using a secchi disk. A disk with black and white markings is lowered into the water until the black markings can no longer be distinguished from the white. Then the depth of the secchi disk is measured. The clearer the water the deeper the marking will be able to be seen. Thus the deeper the secchi depth the less turbid the water.

Another unit of measurement for turbidity is the JTU or Jackson turbidity unit. This is the inverse measurement of the amount of water needed to completely obscure light from a candle flame. The more cloudy or turbid the water, the less water needed to obscure the light, the higher the JTUs.

Salmon and dissolved oxygen
To breathe, salmon pass water over their gills and extract dissolved oxygen from the water. Dissolved oxygen is usually measured in part per million, (ppm). One way to explain ppm to

students is to ask them to imagine one million balloons. All of them are white except for one which is red. This would equal 1ppm red balloon to white balloons. Salmon need at least 6 ppm D.O. to survive.

What effects how much D.O. is in the water?
D.O is affected by mixing due to wind and rapids, temperature, and living organisms. Cold water is able to hold more dissolved oxygen. If a lot of algae and aquatic plants are photosynthesizing there will be more oxygen. If there are a lot of organisms decomposing, there will be less oxygen. Thus in lakes, the level of D.O. usually increases in the spring and summer when there is bloom in algae and plant life, and then decreases in the winter when plants and algae die off or go dormant.

Procedure:

Introduction to water quality

- Begin the lesson by relating water quality to the "Big Question – Is our Watershed Healthy."
- Read paragraph on journal page "water quality introduction" with students and briefly answer and discuss questions.

Observation

- Tell students that one of the most important scientific skills is one that they already possess – observation.
- Fill out journal page "water quality data," with students. Have students do 1-4 while beneath the shelter.
- Take students down to the lakes edge and have them fill out 5 – 9.
- While at the lake's edge have a high school leader fill four tubs with water samples. One tub needs to be filled to the very top for the D.O. test. (If it is not up to the very top this will affect the D.O. test.) The HSL will also fill one tub for testing pH and two tubs for testing turbidity. The HSL will need to put on rubber boots and wade out into the water a little bit. They should fill one turbidity tub with relatively undisturbed water, and they should try to kick up sediment to fill the second turbidity tub. Parent Chaperones and or students can help carry water samples back to the picnic shelter.
- Gather students up around the water sample and have a volunteer and/or the high school leader measure the water temp for number 8. Take an Air temp reading with the provided thermometer for number 9.
- Return to the picnic shelter.
- Based on their initial observations, have students make a hypothesis about whether or not the lake is a healthy habitat for salmon. *Example: I think it is a healthy habitat because the water is clear and sockeye salmon need clear water*.

Testing

- Tell students that they are now going to test for some water quality indicators that they couldn't measure with their eyes alone. They are going to be using some scientific equipment.
- Students will split up into three groups to rotate through three stations to test for turbidity, D.O, and pH.

- Briefly define turbidity, D.O, and pH, and let students know that there will be more information at each station and instructions to follow.
- The High School Leader will supervise the D.O. station. Teacher and chaperones will supervise the pH and turbidity stations.
- Each station should take about 10 minutes for students to conduct investigation and answer questions in their journal.
- **To test for pH** fill vials up to 5 ml and add one drop of indicator solution. Compare color of sample to pH cards.
- **To test for D.O.** fill vials up to very top, (air bubbles will change results.) Drop in two tables, being careful not to touch tablets because oil from skin will affect the results. Shake vials until the tablets are completely dissolved, (5-10 minutes). *HSL is responsible for assisting students with this procedure.*
- **To test for turbidity** fill white canisters with sample water up to the fill line. Look down at the secchi disk sticker on the bottom of the canister and compare it's clarity to the turbidly card.

Conclusion

- Gather students up and have them share results and answers to questions.
- In their journals have students write a final conclusion about whether or not the lake is a healthy habitat for salmon based on the results from all their tests.
- As time allows conduct a further discussion. Possible discussion points include:
    - What other variable might we need to test for to determine if this is a healthy habitat for salmon? (Is there food present for salmon? Pollution?)
    - Do the variables we tested for change with season, time of day, and so on?
    - Why might different groups have gotten slightly different results?
    - Why do scientists conduct the same experiments over and over again?

Water Quality Part Two: Water Level Skit

High and Dry or Wet and All Set?

Summary: Students will act out what happens to salmon eggs when the water level of Baker Lake changes due to the operation of the dam.

Objectives:

1. Students learn that how much electricity we use affects the water level of Baker Lake.
2. Students learn that extreme water level fluctuations are harmful to salmon eggs.
3. Students learn that many other species are connected to salmon, so if salmon are impacted, the whole watershed is impacted.

Materials:

In Water Quality Tub

- Rope
- Redd Cards
- Character Cards
- Lake level graph

Procedure:

Introduction

- Ask students to look at the lake and the water level. Is the water level always the same? Why or why not?
- Show students the graph showing changes in the water level. Why does the lake level change? When people are demanding more electricity, we have to run more water through the turbine.
- Why does the lake level go down so much in the winter? People are using more electricity to heat and light their homes because the sun is setting earlier.

Setting up the skit

- Tell students that we are going to explore how changing water level affects the sockeye salmon.
- Pass out watershed character cards to students (and parent chaperones and HSLs).
- Lay rope on the ground in a circle. Inside the circle is "on stage", outside the circle is "off stage."
- Place redd cards around the inside of the circle. Baby salmon position themselves at redd cards to begin.
- Tell students you will be narrating the skit. You will read a sentence or two and then pause to allow the characters to act out the action.
- As a group have students brainstorm/practice how they might act out their characters. For example ask the student playing trout how they might act out trout. Encourage them to make fish faces, swimming motions, and so on. Ask them how they might act out catching a baby salmon. Encourage them to gently tag the character playing baby salmon and mime eating them. And so on through each character.

The Skit

- Narrate act one, pausing to let students play out the action.
- Have students give themselves a round of applause. Tell them that in act two the dam has been built.
- Move rope back so the redds are outside of the lake, (high and dry).
- Narrate act two, pausing to allow them to act out the action.

Conclusion

- To end on a positive note ask students what they can do to conserve electricity so that the lake level does not drop too low. For each suggestion given move the rope back up over a redd card to demonstrate the lake level rising.
- Tell students that one way PSE helps out the salmon is by managing a spawning beach. Some returning sockeye are taken to the spawning beach in the PSE fishery facility. There they spawn, and the eggs are kept and incubated. You can think of the spawning beach as a savings account in a bank. If something happens to the redds in Baker Lake, then we still have the eggs from the spawning beach to supply the next generation of the salmon.

Reflection – Day Two

Time: 5- 6 pm. Led by classroom teacher, non-cooking High School Leader assisting.

Summery:

Students will have the opportunity to share observations and ask questions that may have arisen during the day. Students will complete reflection pages in their journals, including "write a cinquain poem" and an open ended reflection page.

Objectives:

1. Students will write a cinquain poem about something they observed during the field day.
2. Students will have the opportunity to ask questions that may have arisen during the day and also share their observations.
3. Teachers will have the opportunity to discuss new concepts with the students and connect them to prior classroom learnings.

Materials:

- Journals and writing implements
- White board and markers

Procedure:

Remember – Reflection time is not student free time.

Write a Cinquain

- Follow the formula in the journal and write a cinqauin together as a class on the white board.
- Encourage students to remember their sensory experiences from the field day, (What did the forest smell like? Did they touch any plants? Did they see or hear any animals? What color was Baker Lake? Did the water make any sounds?)
- Have students write their own individual poems in their journals, and then share them with the class.

Open ended reflection

- Ask students to remember the activities/lessons they did during the day. (Spawn till you die, forest ecology, water quality.)
- Ask each student to come up with a question about something they saw or learned about today. Encourage them to be curious.
- You don't necessarily have to answer their questions right now, but discuss what they could do to find the answers themselves. (Research in a library, interview an expert, conduct an experiment?)
- This would be a good time to discuss how what they are learning at KKOS is related to prior classroom lessons and to further discuss any topics the teacher would like to emphasize.

Tree of Life – Day Three

Time: 10-11:00 am and 11:00 – 12:00 am. (*Lesson is about 50 minutes with 10 minutes for bathroom break and transition to next lesson.)* Led by classroom teacher or KKOS instructor. High School Leader and parent chaperones assisting.

Summary:

Students will listen to a story about a typical day in the life of an Upper Skagit Tribal member and count how many items made from cedar are used. Students will make a small piece of twine using cedar bark.

Objectives:

1. Students will learn why the Western Red Cedar was so important to Pacific Northwest Native Americans and why they called it the "Tree of Life."
2. Students will learn that available natural resources help shape diverse cultures.
3. Students will have the hands-on opportunity to make something using the resource of cedar.

Materials:

- **Tree of life tub**
  - Story
  - Twining instructions
  - Examples of items made from cedar
- Soaked cedar bark strips
- Mats to sit on
- White board and markers
- Journals and writing implements

Procedure:

Intro:

- Welcome clan and set the mood. Inform them that they have actually traveled back in time.
- What would this place have looked like five hundred years ago? Would the lodge be here? Would the dams and roads be here? Would Baker Lake be here? Would there be people here?
- There were people hear, and although they didn't build roads and dams and have electricity, they had a very rich life using the natural resources from the watershed.

Story

- Explain that you are going to read a story about a typical day in the life of an Upper Skagit Tribal member. Every time students hear an item made from western cedar they will write it down on their journal.
- The HSL will write the items down on the whiteboard
- Read the story, pausing at appropriate times to pass around objects made from cedar.

- At the end of the story ask students to share what items they recorded.

Twining

- Now students will have the opportunity to make something out of Western Red Cedar.
- Demonstrate how to twine cedar with the HSL.
- One person holds two pieces of bark together, the other person is the main twister.
- First twist each piece of bark separately but in the same direction.
- Next twist or wrap the two piece of bark together, in the opposite direction that you twisted them separately.
- Have students work together in pairs and assist them if necessary.
- Students can make twine into bracelets if the pieces are long enough, or when dry they can use the pieces as bookmarks.
- While they are twining or finishing up you can discuss with them what life would have been like when there were no stores and you had to make everything you used by hand. How would you treat your possessions? If something broke would you throw it away or try to fix it? If something broke and was beyond repair would you still try to reuse or salvage some of the materials?

Conclusion

- Ask students why they think the Western Red Cedar is also known as the tree of life.
- Thank them and send them to the next lesson or transition to closing circle

"What wood we do without it?" – Day Three

Time: 10-11:00 am and 11:00 – 12:00 am. (*Lesson is about 50 minutes with 10 minutes for bathroom break and transition to next lesson.)* Led by classroom teacher or KKOS instructor. High School Leader and parent chaperones assisting.

Summery:

Students will brainstorm a list of all the different wood products we use in our everyday life. Through an interactive game students will discover all the resources, energy, and time that goes into producing and transporting an everyday object – a pencil. Students will also have the opportunity to make a product (a shake) using the natural resource of wood.

Objectives:

1. Students will realize that we use products made from wood, a natural resource, every day of our lives.
2. Students will realize that all material things we use in our daily lives are made from natural resources.
3. Students will learn that many people, places, jobs, and resources are involved in manufacturing simple everyday objects like pencils.
4. Students will learn that through their purchasing choices they can have an impact on our natural resources.

Materials:

- **Lesson tub**
  - Wood product pictures
  - Ball of string
  - Wood products job cards
  - Permanent markers
- Shake block
- Froe
- Mallet
- Safety goggles

Procedure:

Intro:

- Tell students that we are going to explore how we use one natural resource that we can harvest from the watershed – wood.
- Ask students to silently think of six things made from wood and list those things in their journals. You can hold up the wood product pictures to give them ideas.
- Have students share their lists with each other.

Wood Product Web:

- Tell students that they are going to investigate how one item made from wood, a pencil, is manufactured.

- Have students stand in a circle and pass out job cards. Keep the "consumer" card for yourself and stand in the middle.
- Ask students where a person would go to get a new pencil. As students look around the circle they should identify "shops and stores." Holding on to one end of the string, pass the ball of string to the student with the "shops and stores" card and have them read the back of their card out loud. The card will give a hint about where the ball goes next.
- Once the ball of string has connected all students have them vote on what they would do with their pencil when they are done with it. Put it in a landfill or try to recycle/reuse it?
- Have students close their eyes and then gently tug on your end of the string. Ask students if they feel a tug to give a gentle tug back.
- Ask students what this means. A decision that a consumer made was felt by all other parts of the wood product web, so consumers have a lot of power to influence how our natural resources are used.
- Have students trace the web in their journals.

Make a Shake

- Tell students that they will now have the opportunity to make a very useful item made from wood, a shake.
- Hold up example and ask if anyone lives in or has seen buildings with shake roofs.
- **Define safety rules - one at a time, wear safety glasses, ask HSL or person holding froe if they are ready before whacking with mallet, mallet never held higher than the shoulder, only one whack each.**
- HSL will assist instructor with the shake block and froe.
- After shake is split students may sign it with permanent markers. The clan may keep the shake and display it at their school.

Conclusion

- Now that students have explored how some everyday objects are made ask them if they can think of ONE thing that they use in their lives that doesn't come from nature.
- Be prepared to verbally trace items they may mention (computer, cars, phones, etc.) back to the original natural resources they are made from i.e.: plastic = petroleum ("dead dinosaurs"), glass =superheated sand, metal = rocks and minerals, etc.
- Help students arrive at the conclusion that everything they use comes from nature.

Part Three
Teacher Checklist and Forms

Checklist and Forms are also available on the website.
www.komokulshanoutdoorschool.org

Komo Kulshan Outdoor School
Teacher Checklist

1. Schedule session dates 3-6 month prior to your session.
2. Nominate High School Leaders (HSLs) and distribute applications.
    - KKOS staff will schedule a recruitment day from associated High Schools but please recommend any students you may know. *(Homeschools – let us know if you have HS-aged students in your group, too!)* HSLs should turn in applications to the designated school official or counselor. Upon approval, that school official will mail those applications to KKOS.

*** Note: In addition to the teacher, each class needs at least four adults in attendance. A combination of 2, KKOS-trained High School Leaders and 2 parent chaperones is ideal.*

3. Attend bi-annual **teacher training** at Baker Lake Lodge (Spring or Fall).
4. Schedule bus transportation from school to Baker Lake Lodge and return. Coordinate with others in your building and/or district.
5. Send Parent Packet home with students. **(Form#1, Form#2, Form#3.)**
6. Arrange informational parent meeting – select your parent chaperones and have them fill out KKOS Registration Forms.

Note: ***Registration forms *for teacher, chaperones, high school leaders and your students must be completed and turned in* ***prior*** *to your KKOS session.*

7. Make copes of all Registration Forms and send to KKOS at least 1-2 weeks prior to your arrival. Keep originals for yourself.
8. Arrange **pre-trip classroom visit** by KKOS staff 1-2 week prior to your session dates. At the pre-trip class visit, KKOS staff will pick up completed Registration Forms, if you have not yet mailed them.
9. Divide class into clans (learning groups) and lodge room-mates. **(Forms #4-5).** Bring these completed forms to KKOS.
10. Complete pre-trip section of KKOS journals, (green pages) with students at school.
11. Arrange for your HSLs to ride the bus with your class. HSLs will lead the "Magic Bus Ride" activity in student journals.
12. Arrange for at least one of your adult chaperones to bring their personal vehicle, in case of emergency, (i.e. student is ill and needs to depart early.)
13. Morning of departure: Be sure students have sack lunch and daypack, packed according to the Equipment Checklist in the Journals **(See form #3)**
14. Arrive at KKOS between 12:30 and 1:00. Please eat lunch before arrival, at school or en route.
15. Mail your bus reimbursement form to KKOS within the 30 days following your field session. Please plan to use your bus time efficiently, (For example - It is about a 45 minute ride to the lodge from most Sedro-Woolley schools, plus 15 minutes for unloading gear) Be sure mileage and hours are correctly recorded. Requests to refund overly long bus rides could jeopardize future funding opportunities.
16. Schedule **post-trip classroom visit** for 1-2 weeks after your field session. At the post-trip KKOS staff will collect Student Post-trip Surveys and Teacher Evaluations.

Form #1

Komo Kulshan Outdoor School
P.O. Box 842, Concrete, WA 98237

Dear Parent/Guardian,

Sponsored by a local non-profit (Community Arts, Recreation and Education coalition: CARE) and in partnership with Puget Sound Energy, we will be participating in an outstanding environmental education program, Komo Kulshan Outdoor School (KKOS), in the Baker Lake watershed. Our class will be attending from _____ to _____.

As a highly regarded part of our school curriculum, this opportunity will provide students with a positive educational experience. It is one in which they will have the opportunity to develop social and personal skills, as well as experience academic and physical challenges in a cooperative, outdoor adventure. Your child's teacher and professional environmental educators will lead hikes and activities focusing on watershed education, natural resources and energy conservation. In addition, selected, local high school students will assist in a leadership capacity during each session. Their classroom will be the forests, streams, plants and wildlife of the Baker Lake watershed.

Komo Kulshan Outdoor School is based at Puget Sound Energy's Baker Lake Lodge, 14 miles north of Highway 20, off Baker Lake Road, surrounded by the Mount Baker-Snoqualmie national Forest. The Baker Lake Lodge is reserved and secured just for KKOS participants. Students, teachers, high school leaders, parent chaperones and staff sleep in the lodge, spend their days hiking and participating in educational activities and practice cooperative living skills during the 3-day, 2-night field program. Thanks to the generous operational support from PSE and a grant from the Electric League, tuition is now FREE!

Support from parents enables this educational experience be successful and positive for all involved. **Parents can help in the following ways:**

- Help students in planning and packing clothes and equipment (Form #3). Necessary items may be available to borrow at KKOS (backpacks, ponchos, sweaters, etc).

- Be a chaperone for KKOS: go on hikes, assist with lessons, supervise student recreation times, join in the evening campfire programs, and share an unforgettable experience with your child. *If you are interested in this opportunity, please contact your child's teacher right away!*

Sincerely,

_____

Form #2

Komo Kulshan Outdoor School
P.O. Box 842, Concrete, WA 98237

Registration Form

PARTICIPANT NAME_____
PLEASE CHECK ONE: teacher___ student____chaperone____high school leader____
PARENT/GUARDIAN NAME (if student under age 18)_____
ADDRESS_____ CITY_____ ZIP_____
SCHOOL_____ TEACHER_____

Are you capable of hiking 2 to 3-miles? YES_____NO_____ If NO, specify below
Do you have any medical or health conditions? YES_____NO_____ If YES, specify below
(i.e. asthma, epilepsy, diabetes, physical challenge, sting allergies, etc)
Do you have special dietary needs? YES_____NO_____ If YES, specify below
(i.e. food allergies, lactose intolerance, vegetarian, etc)
Are you taking any medications or bringing any to KKOS? YES_____NO_____ If YES, specify below
Do you have any allergies to drugs/meds? YES_____NO_____ If YES, specify below
Date of most recent tetanus shot _____
Should there be any limits on your physical activity? YES_____NO_____ If YES, specify below
Can KKOS use photos of you on promotional materials? YES_____NO_____ If NO, specify below
(i.e. website, brochures, informational slideshow)

Notes:

Doctor's name_____ Telephone (____)_____
Covered by medical insurance? Yes__No__ Company Name_____ Card #_____

In addition to parent/guardian, please list two people (relatives, neighbors, friends) that may be called in case of an emergency:

Name	Relationship	Phone Number
1.		
2.		

If you are below the legal age of consent (18 years) the law requires that we have your parent's permission to give medical service should the need arise. The undersigned, who is one of the parents having legal custody, or the legal guardian, of the student named above, hereby authorizes the adult chaperones or other personnel of Puget Sound Energy/CARE-KKOS to consent to any X-ray examination, anesthetic, medical or special supervision and on the advice of a physician or surgeon licensed under the provision of the Medical Practice Act. For minor illness or injuries, Puget Sound Energy/CARE-KKOS will attempt to contact me before my son/daughter leaves the medical office. For major illness or injuries, Puget Sound Energy/CARE-KKOS will attempt to contact me before institution of treatment, unless such treatment is so urgent it must be done before contact is made. If I cannot be reached this authorization is effective. I also agree to assume any financial responsibility for my child's care.
I hereby release and hold harmless Puget Sound Energy/CARE-KKOS and their agent or agents from any or all claims by reason of an accident, illness, injury, or other consequences arising directly or indirectly from my child's participation in Komo Kulshan Outdoor School. In case of accident or illness I will bear the cost of any evacuation procedures and medical care. I understand that I must provide my own health insurance.

PARENT SIGNATURE_____ DATE_____

PARENT/GUARDIAN PHONE: DAY ( )_____EVENING ( )_____

The Komo Kulshan Outdoor School is a project of CARE (Community Arts, Recreation & Education coalition), and a member of S.E.E.(Social & Environmental Entrepreneurs) a 501.c.3 non-profit organization.

Komo Kulshan Outdoor School

Clothing & Equipment Checklist

I. Day pack (backpack or shoulder bag) packed with items below:

- ☐ Rain gear (KKOS has ponchos to lend)
- ☐ Field journal and pencil in a Ziploc bag
- ☐ Sack lunch for first day
- ☐ 1 liter, unbreakable water bottle

II. Duffle bag, suit case or other bag with items below not worn on arrival:

- ☐ 2 pairs of pants
- ☐ 2 shirts (short and long-sleeved)
- ☐ 1 warm sweater or jacket (wool or fleece are best)
- ☐ 2 pairs of extra socks
- ☐ Extra underwear
- ☐ 1 pair "indoor" shoes (sneakers, sandals, slippers)
- ☐ 1 pair "outdoor shoes (boots, sturdy for hiking)
- ☐ Warm knit hat (for cold/wet)
- ☐ Ball cap (for sun)
- ☐ Personal toiletries: toothbrush, toothpaste, comb, soap, shampoo & on-file medications (with instructions for the teacher)
- ☐ Washcloth and towel
- ☐ Sleepwear
- ☐ Flashlight (with batteries)
- ☐ Sleeping bag or bedroll of sheets and blankets
- ☐ **(ADULTS: watch and alarm clock)**

III. Optional:

- ☐ Camera (with film, batteries)
- ☐ Binoculars
- ☐ Insect repellant, sun screen lotion (no aerosol sprays)
- ☐ pillow
- ☐ Shorts

AND please remember:
Bring NO cosmetics, candy, gum, electronics (music, games, cell phones), knives or any other items not allowed at your school.

Note: cell phones do not work at Baker Lake Lodge.
The landline number is: 1-888-225-5773, choose option 8, then ext 86-2064.

Komo Kulshan Outdoor School

CLANS & COOKING GROUPS

Each clan should be assigned 1 High School Leader (HSL), 1 Parent Chaperone (PC) and approximately equal numbers of students in each clan. The clan is divided again into A & B, also equal numbers, to be used for cooking groups.

Trout

HSL:
PC:

Trout~A:

Trout~B:

Osprey

HSL:
PC:

Osprey~A:

Osprey~B:

Form #5

Komo Kulshan Outdoor School

LODGE ROOMS

Divide the class into lodge rooms (room-mates). Please try to arrange in a harmonious way with adults (teacher, parent chaperones and high school leaders) interspersed throughout. Please note there are 2 cots available that can be added to any room.

Room#1
1
2
3
4

Room#2
1
2
3
4

Room#3
1
2
3
4
5

Room#4
1
2
3
4

Room#5
1
2
3
4

Room#6
1
2
3
4

Room#7
1 KKOS STAFF
2 KKOS STAFF

Room#8
1
2
3

Room#9
1
2
3
4

Form #6

Komo Kulshan Outdoor School
CARE/KKOS P.O. Box 842 Concrete WA 98237
www.komokulshanoutdoorschool.org

High School Leadership Application

Name:_____ Circle: Male or Female

Address:_____

Home Phone: (____)_____ Other Phone: (____)_____

Email:_____ High School:_____

Grade:____ (*Must be a sophomore or older to apply*.) Grade Point Average: _____

Clubs, Sports, Organizations:_____

_____

Any previous outdoor education experience (Mountain School, Camp Orkila, Waskowitz Outdoor School, Warm Beach, 4-H, Scouts, etc) and/or camping and hiking experience:

_____

_____

Please list any responsibilities you have had working with children:

_____

_____

List any "leadership" positions you have held:

_____

_____

Briefly describe why you want to be at High School Leader at KKOS:

_____

_____

(OVER- more on back)

List two personal references (not related to you) who have known you for two years:

Name	Occupation	Phone Number
1.		
2.		

Class Schedule

(Have each teacher initial by their name if they agree to release you from their class.)

Period #	Class	Teacher	Initial
1			
2			
3			
4			
5			
6			

Please read agreement carefully, then sign and date below:

- **I agree to attend the Leadership Training at Baker Lake Lodge on Saturday & Sunday, <u>September 19-20, 2009</u>.**
- **I agree to attend a ½ hour meeting with my participating teacher prior to my session as a HSL at KKOS.**
- **I agree to spend one session (3 days and 2 nights on site) this semester as a HSL at KKOS.**
- **I agree to complete an evaluation form after my HSL experience.**
- **I agree to complete all schoolwork missed during my session at KKOS.**

_____ _____

Signature **Date**

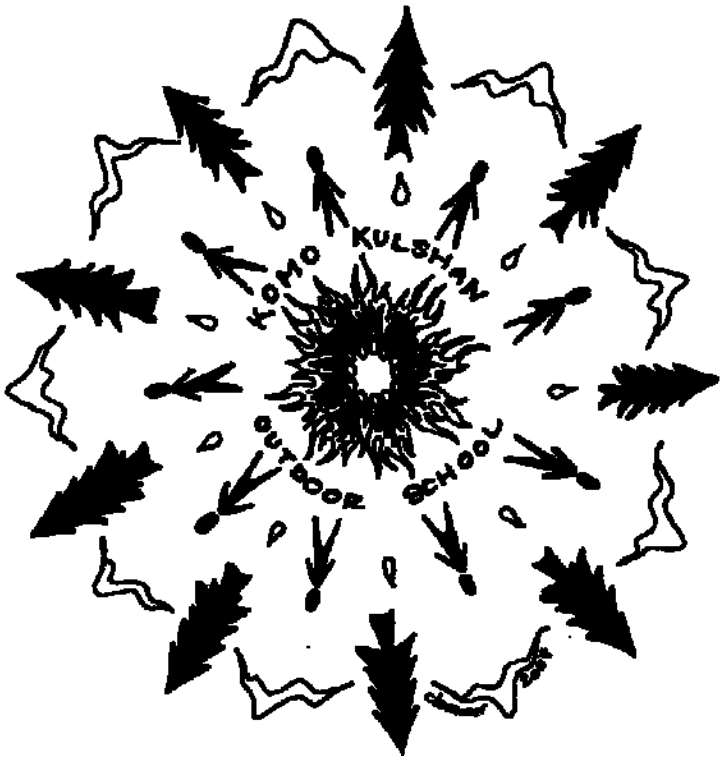
_____ _____

Parent/Guardian Signature **Date**

School/Teacher you will be assisting at KKOS (if known): _____

Please turn application into designated school official. Upon their approval they will send application to KKOS. Upon receipt, KKOS will send you a confirmation packet. Remember to make a copy of this completed form to keep for yourself

Part Four
Appendices



Appendix A

Sample Outdoor School Menu

Day 1 (*Students bring own sack lunch on day 1.)*

Snack at lodge	Some combination of the following: Fresh fruit, (i.e., grapes), Graham crackers, Whole grain crackers and cheese, veggie sticks and ranch dip, Gluten free rice crackers or rice cakes available, Lactose free Rice or almond cheese available
Dinner at lodge	Make your own Burritos, ingredients include: Flour Tortillas, Refried beans, Ground beef, Grated cheese, Chopped green onions, Tomatoes, Lettuce, Fresh made guacamole, Salsa, Sour cream, Olives, Rice, Corn (fresh/frozen/canned), Corn chips, Milk and fruit juice, Gluten free tortillas available, Lactose free rice or almond cheese available
Snack at Campfire	One of the following: Ginger bread, Rice Crispi Treats, or other home backed cake, gluten and dairy free options available

Day 2

Breakfast at lodge	Pancakes w/ butter and syrup, Sausage (and soy-sage) links, variety of cold cereals with milk, Cottage cheese and/or yogurt, Fruit bowl or cut fresh fruit, Orange Juice and milk, (Coffee and tea for adults), Gluten free pancakes available (We use Red Mill flour mixes.)
Field Snack	Trail mix or granola bars, Gluten free bars available, Nut free bars available
Sack Lunch	Sandwiches (PB and J), Apples, Chips, Cookies, Almond or sesame butter available, Rice bread or Spelt bread available, (Water Bottle)
Snack at lodge	Same as Day 1
Dinner at lodge	Spaghetti with marinara sauce, Ground beef on the side, Soy crumbles on the side, Green beans or peas, Green salad with dressings, Garlic bread, Parmesan Cheese, Gluten free spaghetti noodles available, Lactose free rice or almond cheese available
Dessert at campfire	Same as Day 1

Day 3

Breakfast at lodge	Scrambled eggs, Hash browns, Bacon and soy bacon Assorted muffins, Assorted cold cereals with milk, Cottage cheese and/or yogurt, Cut fresh fruit, Coffee and tea for adults, Gluten free muffins available (We use arrowhead mills muffin mix.)
Lunch At Closing Circle	Grilled Cheese sandwiches, Bananas or oranges, Chips, cookies, gluten and dairy free sandwich options

Apendix B

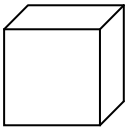
Student Worksheets for KKOS adapted MESA Pre-trip Lessons

World's Water Supply
Student sheet 1.1 – What's the volume?
Student sheet 1.2 – A cubic meter
Student sheet 1.3 – A very big cube
Student Sheet 1.4 – How much water on earth?
Student sheet 1.7 – Earth Water
Student sheet 1.8 – Fresh water

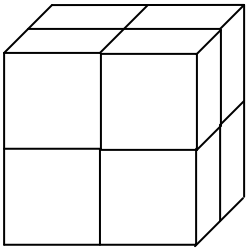
Watersheds
Student sheet 3.2 – Water around us
Student sheet 3.3 – Rain and watershed

Student Sheet 1.1
What's the Volume?

1. This cube has a side of 1cm. What is its volume? What do we call this cube?



2. This Cube has a side of 2 cm. What is its volume?



3. Sketch a cube that has a side of 3 cm. What is its volume?

4. Sketch a cube that has a side of 4 cm. What is its volume?

5. Sketch a cube that has a side of 5cm. What is its volume?

6. Sketch a cube that has a side of 10 cm. What is its volume?

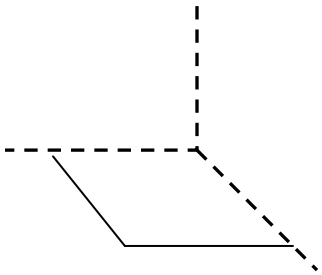
7. Describe any patterns you see.

Student Sheet 1.2
A Cubic Meter

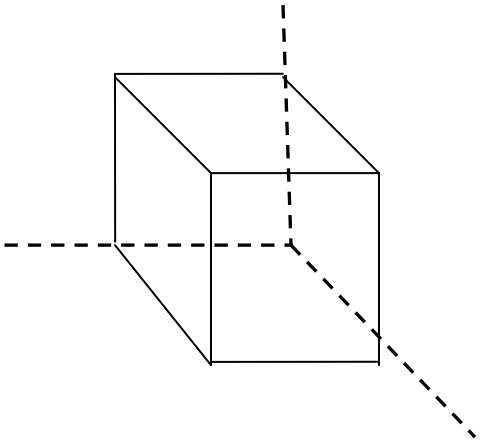
You are going to build a cubic meter using masking tape, a corner of the room, and three meter sticks.

1. In a corner, measure a one-meter length against one wall and mark it with masking tape.

form a square on the floor in a corner using masking tape.



2. Repeat this on the other wall.
3. Using these two tape lengths, form a square on the floor and mark it with tape.
4. Next measure one meter up the corner and mark it with masking tape.
5. Measure one meter along each wall parallel to the tape on the floor and mark them with tape. Connect the ends of the tapes to each other.
6. Take your three meter sticks and complete the cube. Now you have a box which is also a cubic meter.



7. Gather all cubes in the class and see if you can fill this cubic meter.

8. How many cubic centimeters did it take to fill your cubic meter? If you didn't have enough cubic cm to fill it, determine how many it would take to fill it.

Student Sheet 1.3
A Very Big Cube

1. Visualize a length that is 10 meters long.

    a. Name something that you know that is about 10 meters long.

    b. Visualize a cube that has a side of 10 meters. With you group discuss how you would describe a cube that has a side of 10 meters. Write your description below and be prepared to share it with the class.

    c. What is the volume of this 10-meter cube?

    d. How many cubic cm would it take to fill this cube?

2. How long is a soccer field?
    a. Visualize a cube that has a length of a soccer field. Write a description of this big cube.

    b. What is the volume of this big cube?

    c. How many 10-meter cubes would it take to fill this cube?

    d. How many cubic meters would it take to fill this cube?

    e. How many cubic cm would it take to fill this cube?

3. If you put 10 soccer fields end to end, how long would it be?
    a. What is a name for this length?

    b. With your group decide on a point that you think is the length of 10 soccer fields from your school.

c. With your group discuss how you would describe a cube that has a side the length of 10 soccer fields, or a cube that has a side the length of _____. Write your description below and be prepared to share it with the class.

d. What is the volume of this very big cube? Explain how you determined it's volume.

e. How many cubic soccer fields would it take to fill this cube?

f. How many 10-meter cubes would it take to fill this very big cube?

g. How many cubic meters would it take to fill this very big cube?

h. How many cubic cm would it take to fill this very big cube?

i. Name this very big cube.

4. Discuss with your group any patterns that you observe. Describe your observations and be prepared to share them with the group.

Student Sheet 1.4
How Much Water on Earth?

Amount of Water on Earth by Scientific Category

Source	Total amount of Water in cubic Kilometers	Amount of water In the classroom Scale
Oceans and saline lakes	1,320,000,000	4 cups
Glaciers and Icecaps	29,200,000	1.5 tablespoons
Groundwater	8,340,000	0.5 tablespoons
Fresh water lakes	126,000	3 drops
Soil Moisture and Water Vapor	80,000	2 drops
Total Water	**1,360,000,000**	

The classroom scale is 1 cup = 330,000,000 cubic kilometers.

1. With your group discuss the different types of water found on earth.

2. How do these figures compare with your estimates based on the findings from tossing the inflatable globe?

3. What type of water is found the most on earth?

4. What type of water is found the least on earth?

5. What type of water do plants and animals need to survive?

Eye dropper Practice

Practice using the eyedropper. While one of you holds the tablespoon, the other very carefully squeezes drops of water into the tablespoon until you both agree it is absolutely full. Both of you count how many drops it takes to fill the tablespoon. Record your data in the table below. Then change tools and repeat the process.

	Name:	Name:
Trial	Drops	Drops
1.		
2.		
3.		
4.		
5.		
6.		

6. How many drops in a tablespoon?

7. How many tablespoons in a cup?

8. How many drops in a cup?

Student Sheet 1.7
Earth Water

The following table gives the relative amounts of each type of water on earth, using the scale of 1 cup = 330,000,000 cubic kilometers

Amount of Water on Earth by Scientific Category

Source	Total amount of Water in cubic Kilometers	Amount of water In the classroom Scale	Number of drops	Decimal Equivalent	Percent Equivalent
Oceans and saline lakes	1,320,000,000	4 cups			
Glaciers and Icecaps	29,200,000	1.5 tablespoons			
Groundwater	8,340,000	0.5 tablespoons			
Fresh water lakes	126,000	3 drops			
Soil Moisture and Water Vapor	80,000	2 drops			
Total Water	**1,360,000,000**				

1. Using the labeled jars, the "Worlds Jar of Water", the cup, tablespoon and eyedropper, demonstrate how water is distributed on earth. Any surprises? Discuss your observations with your group and record your thoughts.

2. With your group, determine how many drops of water in each category and record the results in the above table.
3. With your group, determine the fraction of water in each category and record the results in the table.
4. With your group, determine the decimal equivalent of each fraction. Use calculators.
5. With your group, determine the percent of total water in each group. Use calculators.
6. Discuss your findings with your group. Record your thoughts and be prepared to share your findings with the class.

7. Brainstorm about the uses we have for water. Record your ideas.

Student Sheet 1.8
Fresh Water

You are going to investigate where fresh water is on the planet earth. Why do you think scientists are interested in this? After discussing with your group record your thoughts.

The following table give the relative amounts of each type of fresh water on earth. Using a scale of 1 tablespoon = 8,340,000 cubic kilometers of water you will show the relative amount of fresh water in each category on earth.

Why do you think this new scale is necessary? Discuss with your group and record you ideas.

Fresh Water on Earth by Scientific Category.

Source	Total water in Cubic kilometers	Amount in classroom scale	Number of drops	Decimal Equivalent	Percent Equivalent
Glaciers and Ice Caps	29,200,000	3.5 tablespoons			
Ground Water	8,340,000	1 tablespoon			
Fresh Water Lakes	125,000	100 drops			
Soil Moisture	67,000	54 drops			
Water Vapor	13,000	10 drops			
Rivers	1,300	1 drop			
Total Fresh Water	**37,700,000**				

1. With your group, determine how many drops of fresh water are in each category and record the results in the above table.
2. With your group, determine the decimal equivalent of each fraction. Use your calculators.
3. With your group determine the percent of fresh water in each group. Use your calculators.
4. Discuss you findings with your group. Record your thoughts and prepared to share your findings with the class.

5. You calculated the percent of fresh water that is rivers. You also know the percent of all water that is fresh water. Determine the percent of all the water that is in rivers.

6. Brainstorm about all the uses we have for fresh water. Record your ideas.

7. Think about what could happen if any of the water becomes unusable, because we choose to use it for other things or it becomes polluted. Record your ideas.

KKOS Student Worksheet 3.1

Water Around Us

Discuss the following questions with your group. Record how your group decides to answer each question. Be prepared to share your answers with the class.

1. List all the mountains in Washington State that you have visited, hear about, read about, or seen pictures of.

2. Describe a mountain that you have seen as if you were describing it to someone who has not seen it.

3. List all the places you can think of where rain water might end up?

4. When it rains on a mountain where does all the water end up?

5. How are all the places where rain water ends up connected?

6. Draw a picture of how all the places are connected? What is a name for this entire system?

KKOS Student Worksheet 3.2
Rain and Watersheds

Discuss the following questions with your group. Record how your group decides to answer each question. Be prepared to share your answers with the class.

1. What do you notice when the water was first sprayed on your model?

2. Does the water collect in any areas? What are these bodies of water called?

3. How does the water flow over steep areas of you mountain range compared to flat areas?

4. If you spray only one side can the water get to the other side?

5. Is there more than watershed in your model?

6. What happened in the watershed where people are present?