BIG SPRINGS CREEK STUDY
SESSION 1 – WATERSHEDS

I. Discussion – Ask the kids "What do you think a watershed is?"

A. Define watershed – An area of land that drains into a lake or river.

1. Activity – Have kids cup hands together to get visual idea of watershed. Explain that where hands meet is a river & their thumbs/forefingers are the ridges/high areas. Spray hands with water to demonstrate flow of water. Explain that watersheds have geographic boundaries (i.e. a ridge or high area from which water either drains into or away from a watershed).

2. Activity – Ask the kids to raise their hands if they think they live in a watershed.

3. Activity – Introduce model of watershed. Discuss model & have kids take turns interacting with it. Explain that everyone lives within a watershed.

II. Discussion – Ask the kids if they know what the water cycle is.

A. Define water cycle using illustration. Very briefly introduce concepts of precipitation, storage of water in lakes/ocean, evaporation, cloud storage, precipitation. Introduce concepts of infiltration/percolation and explain how some water travels through soils & is stored as groundwater. Mention that different soil types determine the rate that water infiltrates & ask them to compare sand (faster) vs. clay (slower).

B. Discuss concepts of groundwater vs. surface water. Explain that Big Springs Creek is spring fed (groundwater) type stream & that at one of the stations today they will be collecting data on this stream.

(Note: check with Vicky on what she is going to discuss in hydrocycle enactment, we don't want to duplicate any of her stuff & make it boring for the kids).

III. Discussion – Ask kids if they know what watershed they live in.

A. Size/scale of watershed – Explain that some watersheds are very small and some are very large. The very large ones include many small ones.

1. Big Springs Creek --- Lemhi River --- Salmon River --- Snake River --- Columbia River --- Pacific Ocean.

2. Ask kids again if they know what watershed they live in & discuss answers.

IV. Discussion – Ask the kids "Why do you think it is important to take care Care of your watershed?" "What is a watershed used for?" "Who uses it?"

A. Discuss answers to above questions

1. A watershed is used by everyone who lives in it. It provides the water we drink, the water to run our households & businesses, water for farmers, water for recreation, water for wildlife.

2. It is important to take good care of your watershed so that the water we drink is clean & safe and so that there is enough water for everyone.

B. Activity – Introduce pollution to watershed with the kids assistance (you Can use your imagination with this, use cocoa for dirt, koolaid for nutrients, powdered jello for bacteria).

1. Explain briefly the 3 major pollutants
   A. Dirt – Comes from activities that remove trees & shrubs and expose the earth.
   B. Bacteria – Comes from animal wastes (fecal coliforms)
   C. Nutrients – Comes from fertilizers/animal wastes. Causes algae to grow & turns water green.

2. Mention that at one of the stations today the kids will be learning how to use some of the tests that scientists use to measure the quality of our water.

V. Wrap-Up

A. Ask for any questions
B. Suggest that building a model of a watershed would make a great science fair experiment
C. Thank them & transition to next station.

BIG SPRINGS CREEK STUDY
FALL ITINERARY

Dates: September 17 and 18, 2002

Location: Big Springs Creek, about 0.1 mile past mile marker 93 (southbound on Hwy 28). Balloons will be used to mark entrance to gate.

Facilitators: Cheryl Dolen, Ingrid Enschede, Pat Hurt, Bruce Roberts, Vicky Runnoe
Photographer/timer/helper—get parent volunteer for each class

Group Session – entire Class
Riparian area function/mist net demo (new)--Vicky, Cheryl, and 3rd from Pattee crew
Rotating Sessions – Class divided into 3 groups

1. Watersheds – Cheryl & Ingrid
2. Stream data – Bruce
3. Water Quality - Pat

Morning Group

8:35 – 9:40 Travel to Big Springs Creek
9:40 – 9:50 Introduction by Vicky
9:50 – 10:20 Session 1
10:20 – 10:50 Session 2
10:50 – 11:20 Session 3
11:20 – 11:40 Electro-fishing at Big Springs Creek
11:40 – 12:10 Travel to Rodeo grounds, lunch
12:10 – 12:40 Wrap-up, hydrocycle enactment with Vicky at Rodeo
12:40 – 1:40 Travel to Brooklyn

Afternoon Group

9:30 – 10:35 Travel to Rodeo Grounds
10:35 – 10:45 Introduction by Vicky at Rodeo
10:45 – 11:05 Hydrocycle enactment with Vicky at Rodeo
11:05 – 11:35 Lunch at Rodeo, travel to Big Springs Creek
11:35 – 12:05 Arrive at Big Springs Creek, Session 1
12:05 – 12:35 Session 2
12:35 - 1:05 Session 3
1:05 - 1:35 Electro-fishing and wrap up
1:35 - 2:35 Travel to Brooklyn

Note: We probably need to adjust lunch times for the morning and afternoon groups. Right now the schedule shows the afternoon group arriving at Big Springs Creek before the morning group has left for the Rodeo. This will cause a traffic jam at Big Springs Creek.

BIG SPRINGS CREEK STUDY
SPRING ITINERARY

Dates: May 7 & 8, 2003

Location: Big Springs Creek, about 0.1 mile past mile marker 93 (southbound on Hwy 28). Balloons will be used to mark entrance to gate.

Facilitators: Cheryl Dolen, Pat Hurt, Bruce Roberts, Bob Rose, Vicky Runnoe
Photographer/timer/helper—get parent volunteer for each class

Group Session – entire Class
Riparian area function/mist net demo (new)--Vicky, Cheryl, and 3rd from Pattee crew
Rotating Sessions – Class divided into 3 groups

1. Macroinvertebrates (new)--Bob, tie in with outdoor classroom
2. Water quality (repeat from fall)--Pat
3. Stream data (repeat from fall)--Bruce

Morning Group

8:35 – 9:15 travel to McFarland
9:15 – 9:30 introduction, bathrooms
9:30 – 10:00 riparian areas/mist net demo
10:00 – 10:15 travel to Big Springs Creek
10:15 – 10:45 session 1
10:45 – 11:15 session 2
11:15 – 11:45 session 3
11:45 – 12:15 lunch at McFarland
12:15 – 1:15 travel to Brooklyn

Afternoon Group

10:00 – 10:45 travel to McFarland
10:45 – 11:00 introduction, bathrooms
11:00 – 11:30 riparian areas/mist net demo
11:30 – 12:00 lunch at McFarland
12:00 – 12:15 travel to Big Springs Creek
12:15 – 12:45 session 1
12:45 - 1:15 session 2
1:15 - 1:45 session 3
1:45 - 2:45 travel to Brooklyn

Vicky Runnoe plans on being at McFarland Campground by 8:30. Cheryl Dolen will meet her there.
Bruce Roberts, Bob Rose, and Pat Hurt will carpool to Big Springs Creek, stopping briefly at McFarland Campground to pick up 4 tables from Vicky.
The first teacher to arrive at Big Springs Creek Campground will have 3 calculators for Bruce Roberts to use at his station.
Bruce will do the dissolved oxygen test at his station. Pat will do the other 3 water tests at her station. And Bob is doing bugs.
I can't think of anything else right now. Dress warmly.

BIG SPRINGS CREEK
SPRING FIELD TRIP
RIPARIAN AREA/MIST NET DEMO
LESSON PLAN

1) **Introduction** – Welcome group to McFarland Recreation Site, introductions
Time: 5 minutes (probably what will be left of allocated 15 minutes after bathroom breaks).

A. Ask the kids – What is a riparian area? Give them a couple minutes to responds & then offer our definition.

1. **Riparian Area (Vocab definition - the green, vegetated areas on each side of streams & rivers)**

2) **Function of Riparian Area** – Ask the kids what they think riparian areas are used for for, what purposes do they serve?
Time: 10 minutes

A. Fill in the blanks – whatever functions/uses the kids don't come up with on their own, fill in for them,

1. Riparian Area Functions:
   a. Purifies water by removing **sediment (vocab definition – matter deposited by water or wind)** and other contaminants
   b. Reduces risk of flooding and associated damage, **floodplain (vocab definition – an area near a stream or river that floods regularly)**
   c. Reduces stream channel and streambank **erosion (vocab definition – the wearing away of land by the action of natural forces. Rate of erosion impacted by human activity)**
   d. Increases amount of available water by holding water in streambanks, riverbanks, ponds, lakes, aquifers
   e. Supports a diversity of plant and wildlife species
   f. Maintains a **habitat (vocab definition – the place or type of site where a plant or animal naturally or normally lives and grows)** for healthy fish populations
   g. Provides water, forage and shade for wildlife & livestock
   h. Creates opportunities for recreationists to fish, camp, picnic and enjoy nature

B. Healthy vs. unhealthy riparian areas – ask the kids what they think healthy riparian areas look like (suggestions: stable banks without excessive erosion, heavy vegetation on banks, healthy vigourous plants) versus unhealthy riparian areas (suggestions: poor vegetative growth, non-native plant invasions, excessive bank erosion).

1. Health of riparian area and health of the stream are related to each other. You will be seeing how scientists determine the health of a stream in your water quality tests, stream data tests and "bug" (macroinvertebrate) collection at Big Springs Creek, just as scientists at this station determine the health of the riparian area by examining the animals and plant life it contains. Introduction to mist-netting demonstration

3) Introduction to Mist-Netting Demonstrations
Time: 5 minutes

A. Why mist nest in riparian areas?

1. Certain species of birds found only in riparian areas. Riparian areas make good habitats for many species of animals (see if kids have ideas about why this is so).

2. Certain birds are management indicator species for health of riparian areas (for example yellow warbler lives in healthy riparian areas, if we survey & find no yellow warblers we may be concerned about the condition of the riparian area).

3. **Neotropical migrants (vocab definition – bird species that breed in the Neartic – North America – and spend the winter in the Neotropics – Central & South America).** It is important to collect data on these types of birds because much of their habitat is disappearing in their summer & winter homes.

4) Mist-Netting Demonstration
Time: 15 minutes

A. Basically this is a more free form section depending on whether or not there are any birds in the net. Recommend 2-3 experienced people to be on site to remove birds from net. As birds are removed from net we can be explaining this procedure, as well as reasons for placing birds in the bags.

1. If more than 1 bird is caught it is recommended that the class be

split into 2 groups, 1 around each bird. The person with the bird can explain a bit of what we look for, without going into too many **MAPS (Vocab definition – Monitoring Avian Productivity & Survivorship)** details:

a. Explain process of banding bird & reason why this is done (valuable data collected when the birds we band are recaptured in another area, explain that each time a bird is captured all the info we collect on that bird is entered into the computer & kept on a huge database – can expound on this if time allows – best to keep it brief & uncomplicated). We will not be doing any actual banding.
b. Note that we look for sex & age of bird, note any unusual things observed (injuries, unusual number of parasites). Briefly describe procedures we use to gather this date (blowing up the belly, looking at feathers).
c. Briefly show form we use to record data & books we use for reference.
d. Describe how bird is weighed (may be too stressful for bird to actually weigh it on site) & then release bird.

How much detail the "bird banding" crew goes into will depend on their experience & how many birds are captured in the net, so we need to be flexible during this last session!!

BIG SPRINGS CREEK
FALL SESSION
LESSON PLAN – WATERSHED STATION

Compiled by Cheryl Dolen, BLM, 6/17/03

LOCATION: BIG SPRINGS CREEK (0.1 mile past mile marker 93, southbound on hwy. 28)

MATERIALS REQUIRED

1. Watershed Model (can borrow one from Project WET if we haven't constructed one yet).
2. Table
3. 3-4 spray bottles filled with water
4. Bucket (to fill with water, used to clean model between sessions)
5. Paper Towel (for kids to dry hands with)
6. Trash Bag (s)
7. Koolaid/Cocoa Powder or other powders that dissolve quickly in water, we have found that jello powder doesn't work well (need 3 different colored substances to represent nutrients, bacteria and dirt)
8. 3 tupperwares to store koolaids & cocoa powder
9. 3 spoons
10. Props for watershed model (cars, tractors, people, animals….., appropriately scaled to model)
11. 3 laminated copies of water cycle page

TARGET AUDIENCE

4^{th} & 5^{th} Grade Elementary Students

OBJECTIVES

1. Identify what a watershed is using concepts of geographic boundaries and size/scale.
2. Demonstrate the flow of water in watershed.
3. Explain the water cycle using an illustration.
4. Identify three major pollutants to water and illustrate how these pollutants get into the watershed.

OUTLINE OF LESSON PLAN

1) Discussion – Ask the kids "What do you think a watershed is?"

A. Define **watershed** – (**vocabulary word) – an area of land that drains into a lake or river.**

1. Activity – Have kids cup their hands together to get visual idea of a watershed. Explain that where their hands meet is a river and their thumbs/forefingers represent high areas in the watershed (ridges). Spray their hands with water (with their permission) to demonstrate the flow of water in their "watershed". *Provide paper towels for the kids to dry their hands with, especially if it is a cool day.* Have a couple of kids join their watersheds together (place cupped hands side by side). Explain that where their "watershed" meets the other child's "watershed" is a geographic boundary, such as a mountain or hill.

2. Define **geographic boundary – (vocabulary word) – A ridge or high area from which water either drains into or away from a watershed.** Use the mountain behind to demonstrate this concept. Explain that if they stood on the top of this ridge they would be on the continental divide, which not only divides Idaho from Montana, but is a geographic boundary which separates watersheds.

2) Discussion – As the kids "Raise your hands if you think you live in a watershed". Explain that everyone lives in a watershed. Ask the kids "Do you know what watershed you live in?"

A. Explain size/scale of watershed – Explain that watersheds come in different sizes. Watersheds can be very large. The very large watersheds contain many small ones (can use example of nesting dolls toy where a tiny doll has next size larger doll that fits over it and so on, to help explain this concept).

1. Explain flow of water from Big Springs Creek, to Lemhi River, to Salmon River, to Snake River, to Columbia River, to Pacific Ocean. Explain that Big Springs Creek is a small watershed contained within these larger watersheds.

2. Ask the kids again if they can now state what watershed they live in. Discuss this briefly.

3) Activity – Introduce model of watershed. Have a few "props" for kids to place on model (i.e. place pigs/tractor on farm). Discuss model briefly. Have kids take turns "raining" on the watershed with spray bottles filled with water. Have them observe the flow of water. Ask them where the water goes & why they think this happens.

4) Discussion – Ask the kids "Do you know what the water cycle is?"

   A. Define water cycle using illustrated diagram. Briefly discuss the water water cycle: water evaporates from ocean/lakes, transformed from liquid to gas, stored in clouds, clouds move inland, cooling process occurs, precipitation occurs, some of water that falls is stored in ocean/lake/waterways……., some goes into ground in process of infiltration, percolation. Use example of parents coffee maker at home (they pour coffee into filter, pour water over coffee, water percolates down through coffee grounds and filter, liquid coffee comes out). Explain that water percolates through ground and is stored in groundwater.

   B. Briefly discuss what happens to groundwater when it reaches the surface (a spring). Explain that Big Springs Creek is a spring fed creek, as opposed to surface fed.

5) Discussion – Ask the kids "What is a watershed used for?" "Who uses it?" "Why do you think it is important to take care of the watershed?"

   A. Explain to the kids that a watershed is used by everyone that lives in it. Go over different ways a watershed can be used: clean drinking water, water for household uses, business uses, ranchers/farmers, recreation uses, wildlife uses…….

   B. Explain that it is important to take good care of your watershed so that the water we drink is clean & safe and so that there is enough water available for everyone and everything that needs it.

6) Activity – Introduce pollution to watershed model. Let the kids participate in placing the "pollution" on model and "raining" on the model to see what happens to the pollutants.

   A. Have the kids guess what the 3 major types of pollutants to water might be. Then go over the list below, adding some pollutant to the model as you discuss each one.

      1. **Nutrients – (vocabulary word) – substances necessary for growth of all living things, such as nitrogen, carbon, potassium and phosphorus.** Explain that nutrients come from fertilizers and animals wastes. Too many nutrients in our water can cause algae to grow and water to turn green. Use a powder to represent this pollutant and have a child place a spoonful or two on the watershed where they feel it is appropriate (where fertilizer would be used or animal wastes found). Pass spoon around and have 2 other children place a spoonful where they

feel it is appropriate. Have 2-3 other children "rain" on the watershed using spray bottles. Ask the children to observe what happens. Explain that, in one of the stations today, they will be learning how to determine if there is too much nitrogen and ammonia in the water, which comes from excess fertilizer/animals wastes. If they have already visited the water quality station, ask them if they remember what their results were for nitrogen and ammonia in Big Springs Creek.

2. Bacteria – Explain that bacteria, in the form of fecal coliforms, is found in animal/human wastes. Use a powder to represent this and follow the same procedure as did with nutrients. Explain that too much unhealthy bacteria in our water can make people sick.

3. Dirt – Explain that dirt comes from activities that remove trees, shrubs, vegetation and expose the earth. Cocoa powder works well to represent dirt. Follow the same procedure as above. Explain that too much dirt in the water is not good for fish and many other creatures that live there.

4. If time allows, briefly discuss ways we can help to reduce the amounts of pollution in our water

7) Wrap-Up

A. Ask the kids if they have any questions.
B. Suggest to the kids that making a watershed model would be a great science fair project.
C. Thank them for being such a great group and transition them onto next station.

Big Springs Creek Macroinvertebrate Station Lesson Plan

Concept / Topic To Teach: Macroinvertebrate Ecology and Habitat Relationships

Instructor: Robert Rose (Fishery Biologist, Salmon-Challis National Forest)
(756-5152 Work; 756-4978 Home)

Target Audience: 4th and 5th Grade Students

General Goal(s): Introduce students to aquatic macroinvertebrates and their use as an indicator of water quality and habitat conditions in trout streams.

Specific Objectives: 1) Conduct an on-site collection of macroinvertebrates at the Big Springs Creek site and identify organisms by general functional/tolerance groups.

2) Make conclusions of general water quality and habitat suitability based upon observed macroinvertebrate communities. Compare and contrast with observations and conclusions at Outdoor Classroom site.

3) Discuss observed macroinvertebrate anatomical structure and function as they relate to local aquatic and riparian habitat conditions. Discuss adaptations in structure and function related to changes in physical habitat features (ie water velocity, substrate type, riparian vegetation type and amount)

Required Materials:

Large Table

Pyrex Dish with laminated white paper sheets for background

Kick Screen and Surber Sampler

Hip Boots

Wet Suit Gloves

8 Tweezers

Paper Cups for temporary storage of insects while picking net

4 Hand Microscopes

Insect Vials

4 Laminated Water Quality Assessment Sheets

Towels

Paperweights for windy conditions

Step-By-Step Procedures:

Introduction / Statement of Station Objectives: See General Goals and Specific Objectives above (Time: 1 minute)

Instructor and students will recap macroinvertebrate collection activities, observations, and conclusions from the Outdoor Classroom site. Discussions should include types of organisms observed, their relative pollution tolerance indices, and general habitat conditions at the site relative to water velocity, substrate/sediment levels, and riparian vegetation type and extent (Utilize Water Quality Assessment Sheet as a guide to identify benthic organisms and their relative pollution tolerances). Have students identify their general conclusions about water quality and stream habitat conditions at the Outdoor Classroom based upon the macroinvertebrate populations observed at the site. (Time: 5 minutes)

Instructor will collect macroinvertebrates from Big Springs Creek riffle habitat utilizing a kick net. Students will remain on the streambanks observing collection procedures and discussing differences in general stream gradient, water velocity, general stream substrate particle size class, general sediment levels, and type and amount of riparian vegetation between the Outdoor Classroom site and the Big Springs Site. (Time: 4 minutes)

Instructor will bring net back to shore after completing instream collection. Students will pick the insects off the screen with fingers and/or tweezers and transfer to paper cups for eventual transfer to the Pyrex Dish. Instructor will assist students with preliminary insect identification techniques as they pick the screen. (Time: 5 minutes)

Once a sufficient variety of insects has been composited in the Pyrex dish, students will use the laminated Water Quality Assessment handouts to identify insect groups and their relative pollution tolerances. Based upon the numbers and types of insects observed, the students will make an assessment of the health of the macroinvertebrate community, and, from that assessment, formulate a conclusion about general water quality and aquatic habitat conditions at the Big Springs site. (Time: 5 minutes)

Instructor and students will identify differences in the observed macroinvertebrate communities at the Outdoor Classroom and Big Springs Creek sites and discuss these differences in the context of aquatic habitat conditions at the two locations. Those students who have already completed the Water Chemistry station will be asked whether their conclusions about stream health from the macroinvertebrate collections are supported by the water chemistry results. Those students who have not yet completed the Water Chemistry station will be asked to make predictions as to what the water chemistry tests might conclude. (Time: 5 minutes)

(Time Permitting)

Instructor will discuss variations/adaptations in the general anatomical structure and functional feeding mechanisms of selected macroinvertebrate groups in response to variations in aquatic habitat features (ie slow vs moderate vs fast water; silt/sand vs gravel vs cobble stream substrates; grass vs forb vs brush vs tree-dominated riparian areas). Insect samples from the instructors collection will be used as visual aids. (Any available remaining time)

Vocabulary:

Macroinvertebrates

Aquatic

Benthic

Substrate

Riparian

Habitat

Community

BIG SPRINGS CREEK
SPRING SESSON
RIPARIAN AREA/MIST NEST DEMO
LESSON PLAN

Compiled by Cheryl Dolen, BLM, 6/10/03

ACTUAL LOCATION: MCFARLAND BLM RECREATION SITE

MATERIALS REQUIRED

1. Master or sub-banding permit (must be held by someone in group)
2. Card Table (for holding & displaying supplies)
3. Poles (enough for 2 nets – 4 pieces)
4. Rebar (for 2 nets – 4 pieces)
5. Mist nets – 2
6. Small sledgehammer
7. Bird banding "tacklebox"
8. Bird Bags (at least 10)
9. Birding Field Guides
10. Pyle Guides
11. MAPS Data Sheets
12. 2-3 People **experienced** at bird banding

Note: Can take large bird-banding supply box, which should contain items 5, 7, 8, 9, 10 and 11, and anything else you may want to demonstrate.

TARGET AUDIENCE

4th and 5th Grade Elementary Students

OBJECTIVES

1. Identify what a riparian area is and what its functions are.
2. Identify reasons for mist netting for birds in riparian areas.
3. Demonstrate process of removing birds from net and related data collection, with or without a bird in hand.

OUTLINE OF LESSON PLAN

1) Introduction – Welcome group to McFarland Recreation Site, introductions. **Time: 5 minutes (probably what is left of allocated 15 minute bathroom breaks).**

a) Ask the kids – What is a riparian area? Give them a couple of minutes to respond and then offer our definition.

1. **<u>Riparian Area</u> (Vocabulary Word) – the green, vegetated areas on each side of streams and rivers.**

2) **<u>Function of Riparian Area</u>** – Ask the kids – What do they think riparian areas are used for? What purposes do they serve? **Time: 10 minutes**

   a) Whatever functions/uses the kids do not come up with on their own, fill in for them:

      1. Riparian Area Functions:
         - **a.** Purifies water by removing **sediment (vocabulary word) – matter deposited by wind or water)** and other contaminants
         - **b.** Reduces risk of flooding and associated damage, **Floodplain (vocabulary word) – an area near a stream or river that floods regularly.**
         - **c.** Reduces stream channel and streambank **erosion (vocabulary word) – the wearing away of land by the action of natural forces.** Rate of erosion is impacted by human activity.
         - d. Increases amount of available water by holding water in streambanks, riverbanks, ponds, lakes, aquifers.
         - e. Supports a diversity of plant and wildlife species
         - f. Maintains a **habitat (vocabulary word) – the place or type of site where a plant or animal naturally or normally lives and grows,** for healthy fish populations and other animals.
         - g. Provides water, forage and shade for wildlife and livestock.
         - h. Creates opportunities for recreationists to fish, camp, picnic and enjoy nature.

   b) Discuss healthy versus unhealthy riparian areas. Ask the kids what they think healthy riparian areas look like. Suggestions: stable banks without excessive erosion, heavy vegetation on banks, healthy vigorous plants. Ask the kids what they think unhealthy riparian areas look like. Suggestions: poor vegetative growth, non-native plant invasions, excessive bank erosion.

   c) Tie into other stations and what they are doing. How is health of riparian area related to health of stream? Explain that at the other stations at Big Springs Creek they will be seeing how biologists determine the health of a stream by performing water quality tests, streamflow data tests and macroinvertebrate collection, just as the biologists at this station determine the health of the riparian area by examining the animal and plant species it contains – in this case we are specifically looking at songbirds.

3) <u>Introduction to mist-netting demonstration</u>. Time: 5 minutes.

a) Why mist net in riparian areas?

1. Riparian areas make good habitats for many species of birds. Ask the kids why they think this is so. Suggestions: shelter from weather & predators, good nest sites, good place to feed on insects.
2. Certain birds are management indicator species for the health of riparian area. We can survey for certain species, i.e. yellow warbler, in riparian areas, and the presence/absence of this species gives us a good indicator of the health of the species.
3. We mist net to collect data on **neotropical migrants – (vocabulary word) – species that breed in the neartic – North America and spend the winter in the neotropics – Central & South America.** This is important because some of their habitat is disappearing in both their summer and winter homes.
4. Here in Lemhi County the BLM, FS and IDFG have set up a **MAPS (vocabulary word) – Monitoring Avian Productivity and Survivorship** station along Pattee Creek. We capture birds using mist nets, band the birds and collect data on them.

4) <u>Mist-Netting Demonstration</u>. Time: 15 minutes.

a) **Note: Must have someone with master or sub-banding permit on site.** Basically this a more free form section depending on whether there are any birds in the net or not. We should have 2-3 experienced people on site to remove birds from net.

1. If more than one bird is caught we might consider splitting the class into two groups, so that they can see better. The person holding the bird can explain the process, step-by-step, without getting too technical.

    a. Ask the kids why they think we place the birds in a bag after we capture them (suggest for safety of bird, decreases chances of escaping).

    b. Explain process of banding bird. Ask kids why they think we would band the birds (suggest valuable data collected, kept on computer database).

    c. Demonstrate how we determine sex and age of bird.

d. Show form we use to collect data and the books we use for reference.

e. Describe how bird is weighed and released. May be too stressful to actually weigh bird with so many people present.

f. If time permits, answer questions, close session by thanking everyone for participating.

BIG SPRINGS CREEK WATERSHED STUDY FOR 4TH GRADERS

Stream Data Station

Equipment:

Two large garbage bags (in case of bad weather to cover the cardboard box and other items)
Four rebar or wood stakes (3 feet long each)
Orange Flagging
Two to four oranges
Two hand held thermometers (^{o} F) in a protective cannister
Two 50-foot tapes (in 10th of feet)
Stopwatch
Cheap calculators with large buttons
Hipboots
Cardboard cubic-foot box
Laminated data forms and thermograph figures
Unlaminated data forms and thermograph figures
One Hobo thermograph with submersible case

Pre-work:

Install a thermograph in Big Springs Creek near the bridge in the spring. Record hourly water temperatures all summer. Prior to the fall field trip, download and plot data. Distribute data at the fall field trip. Install a thermograph in Big Springs Creek near the bridge in the fall. Record hourly water temperatures all winter. Prior to the spring field trip, download and plot data. Distribute data at the spring field trip.

Objectives:

Measure stream flow in September and May and discuss why there are differences, if any.
Measure water temperature at one point in time.
Display the data from the continuously recording thermograph.

Discussion – stream flow:

- Discuss why it is important to know how to measure stream flow. I attempted to discuss water rights associated with local ranches. These water rights allow one to divert a predetermined quantity of water down their ditches. A water right holder needs to know if they are diverting too much or too little water.
- Introduce the concept of cubic feet per second as volume measurement. While holding the cardboard box (i.e., cubic foot box) near the stretched out tape across the stream, ask the kids if you were to capture all the water in the stream that

passes this stretched out tape every second, how many full cubic-foot boxes of water would you have? Ask the kids for their educated guess.
- Measure the stream flow in cubic feet per second (cfs) using the methodology described on the data form, which is described in detail in the "R1/R4 Fish and Fish Habitat Inventory Procedures." Ask for one volunteer to make the necessary calculations using the data that was just measured to determine the volume of water per second.
- Discuss what might cause the stream flow to either increase or decrease.

Discussion – water temperature

- Take an instantaneous water temperature using a hand-held thermometer.
- Pass out the temperature graph from the previous 6 months (since the last field trip).
- Discuss what causes the temperature to fluctuate daily and seasonally.
- Discuss what might reduce or extenuate these daily and seasonal fluctuations (riparian vegetation, etc.).

BIG SPRINGS CREEK WATERSHED STUDY FOR 4TH GRADERS

Water Chemistry Station

Equipment

FS to Supply

4 tables – one for each chemical test
bucket – to carry water from stream to station
drinking water – in case someone swallows chemicals
data recording sheets
Instruction sheets for Dissolved O_2, NH_3, N, pH tests
syringes
Ipecac syrup (optional)

School to Supply

water chemistry set – bags, tablets, vials
chemistry color charts
test containers
garbage bag
3 timers
markers

Objectives

Identify water quality characteristics
Identify factors that influence water quality
Identify how water quality affects plants and animals

Procedure

Explain that we will be testing different characteristics of water using special tablets dissolved in stream samples. Discuss the importance of these water characteristics. Demonstrate operation of the timer. Divide each group into 4 teams, with at least 2 people per team (for moral support). Assign a different chemical test to each of the 4 teams. Because of time factors, start Dissolved Oxygen first, then Ammonia, then Nitrogen, and pH last. Have team members take turns reading the instructions and performing the tasks for the test they are running. Give them a timer to track required test times. Once tests are completed and results compared to color charts, dispose of the water samples & collect the vials for use with the next group of students. Gather up timers before students move to the next station.

Notes

1. Oxygen –O_2 comes from the atmosphere, at the surface of water & where waves or bubbles mix air & water together. O_2 is also produced by aquatic plants & algae during daylight; during photosynthesis, plants remove CO_2 from the water & give off O_2. Aquatic animals consume O_2 and produce CO_2. O_2 is also used up when organic material decomposes in water. Requirements for fish vary considerably depending upon species, temperature, carbon dioxide levels, and other factors. Oxygen requirements increase as water temperatures increase.

salmonids:	6 ppm
trout:	7.6 ppm

2. Ammonia – Nutrients get into water from human & animal waste, decomposing plant matter, and runoff of fertilizer from lawns & crops. Some NH_3 is absorbed by aquatic plants, but most is broken down further to Nitrite (NO_2) and then to Nitrate (NO_3) by bacteria.

3. Nitrogen – Byproduct of ammonia: Animal/plant wastes → NH_3 → NO_2 → NO_3. NO_3 acts as a fertilizer for aquatic plants and algae. When nitrogen & other nutrient levels are high, excessive plant & algae growth create water quality problems & speed up the natural process of eutrophication (the filling in of lakes & ponds by plant material).

4. pH – Measure of the acid intensity in water as indicated by hydrogen ion concentration. Changes in pH may result from chemical changes in the water (e.g. When CO_2 is removed from water, pH↑; when CO_2 is

added to water, pH↓). Fish have less tolerance to pH extremes at higher temperatures. Measured on a scale of 0 to 14, 7 is neutral, <7 is acidic (like vinegar), and >7 is basic (like baking soda)

pH of 6.5-8.5: best range for most fish & other organisms.
Slightly alkaline water is optimum for fish growth.

Turbidity – The ability of light to penetrate water. A measure of the suspended solids present in water, usually expressed in parts per million (ppm). Allowable turbidities have not been set.

muddy water > 2,000 ppm
Secchi disk (8" dia. plate with opposing black & white quadrants) transparency should be ≥15".

Carbon Dioxide – Necessary in photosynthesis and for keeping minerals, like calcium, in solution. High CO_2 levels reduce the ability of fish to take up O_2 and to excrete CO_2 through body membranes.

Waters supporting good fish populations usually have < 5 ppm CO_2
Short-term CO_2 levels > 20 ppm may be harmful to fish.

Temperature – Affects the development & growth of fish more than any other single factor.

salmonid spawning:	35-69 ºF	warm-water species:	80-85 ºF mid-summer
cold-water species:	50-70 ºF mid-summer		40-60 ºF winter
	< 58 ºF winter		

Station 1

Dissolved Oxygen

Procedure

1. Remove the cap from the little glass vial.

2. Gently submerge the vial below the surface of the water sample.

3. Make sure all the air bubbles escape from the vial.

4. Remove the vial from the water. *The vial should be full to the very top of the vial.*

5. Add two D.O. TesTabs to the vial. *A little water will spill out of the vial.*

6. Carefully screw the cap onto the vial. *More water will spill out of the vial.*

7. Slowly invert the vial back and forth until the tablets disintegrate. This will take about 4 minutes.

8. Wait 5 minutes more for an orange or pink color to develop.

9. Compare the color of the reaction to the Color Chart Poster.

10. Record the result as None, Low or High level of Dissolved Oxygen on your data sheet.

Station 2

Ammonia

Procedure

1. Open a plastic test bag

2. Use the syringe to fill the plastic test bag to line C with stream water.

3. Add one Ammonia #1 TesTab.

4. Add one Ammonia #2 TesTab.

5. Roll the bag down and shake until the tablets disintegrate. *(Do not pinch or squeeze the tablets in the bag or the bag may be damaged – just shake!)* This will take about 3 minutes.

6. Wait 5 more minutes for a yellow or green color to develop.

7. Compare the color of the reaction to the Color Chart Poster.

8. Record the result as None (0), Medium or High level of Ammonia on your data sheet.

Station 3

Nitrogen

Procedure

1. Open a plastic test bag
2. Use the syringe to fill the plastic test bag to line C with stream water.
3. Add one Nitrate #1 TesTab.
4. Roll the bag down and shake until the tablet disintegrates. *(DO NOT pinch or squeeze the tablets in the bag or the bag may be damaged – just shake!)* This will take about 30 seconds.
5. Open the bag.
6. Add one Nitrate #2 TesTab.
7. Roll the bag down and shake until the tablet disintegrates. *(DO NOT pinch or squeeze the tablets in the bag or the bag may be damaged – just shake!)* This will take about 2 minutes.
8. Wait 5 minutes more for the red color to develop.
9. Compare the color of the reaction to the Color Chart Poster.
10. Record the result as Low, Medium or High level of Nitrogen on your data sheet.

Station 4

pH

Procedure

1. Open a plastic test bag

2. Use the syringe to fill the plastic test bag to line C with the water sample.

3. Add one pH TesTab.

4. Roll the bag down and shake until the tablet disintegrates. *(DO NOT pinch or squeeze the tablets in the bag or the bag may be damaged – just shake!)* This will take less than 30 seconds.

5. Compare the color of the reaction to the Color Chart Poster.

6. Record the pH of your sample on your data sheet.

WATERSHED STUDY – Big Springs Creek

STREAM/WATER BODY_____

OBSERVER_____ DATE_____

LOCATION_____

WATER QUALITY MEASUREMENTS

TEMPERATURE: Air _____ Water _____ NITRATE _____

DISSOLVED OXYGEN (DO) _____ pH _____

AMMONIA _____

STREAM FLOW MEASUREMENTS

W = AVERAGE WIDTH _____ feet = *(width 1 + width 2 + width 3) 3 =* _____

STREAM WIDTHS (feet) (width 1) _____ (width 2) _____ (width 3)_____

D = AVERAGE DEPTH _____ feet = *(depth 1 + depth 2 + depth 3) 4 =* _____

WATER DEPTHS (feet) (depth 1) _____ (depth 2) _____ (depth 3)_____

k = VELOCITY CORRECTION FACTOR = 0.85

L = LENGTH = 30 feet

T= AVERAGE TIME _____ seconds = *(time 1 + time 2 + time 3) 3 =* _____

TIME (Seconds) (time 1) _____ (time 2) _____ (time 3)_____

STREAM FLOW (Cubic Feet per Second) = **(W x D x k x L) T =** _____

COMMENTS:_____

_____

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