MAIDU SCIENCE DOCENT PROGRAM
LIFE CYCLE OF THE SALMON – DOCENT INFORMATION

1. Due to the fact that this lesson is usually presented in the Multipurpose room (for space purposes), the classroom time available to present this lesson is usually:

    - 9:30 – 10:30 AM (schedule with the teacher)

2. The Introduction and Activity One are best conducted in the Multi-Purpose Room (MPR) or on the outside stage behind the MPR.

IMPORTANT!!!!!

You MUST reserve the MPR to use it for this lesson.

To schedule the MPR:

1. Find open dates on the MPR schedule in the office (see Toni Anderson)
2. Coordinate a date with your teacher.
3. Submit a "Multipurpose/Stage Request Form" to Toni Anderson (copies are in the office) – make sure that you reserve the cart first before you reserve the MPR!

3. Prior to starting the lesson you will want to:

    - Obtain the rotating activity center from the last classroom to have this lesson. You should find these items: red microscope and salmon scales; magnifying glass and pond water; blue microscope with salmon eggs; written materials.

4. The set-up for this lesson will take about 30 – 45 minutes. You will need to find the rotating activity center; set up microscopes, scent cups, etc. in the classroom; and set up the Introduction and Activity One in the MPR or elsewhere.

5. This is a very ACTIVE unit. Briefly review Activity One with your teacher; she should be the person in charge of keeping control of the students during this activity.

LIFE CYCLES – SALMON
Second Grade Science Docent

OBJECTIVE: Students will be able to: identify different cycles that are in nature, identify living things need to survive, identify the stage of the life cycle of the salmon; recognize that there are limiting factors that affect all populations.

Unit Preparation

Prior prep - 20 minutes. This unit involves the students simulating the life cycle of the salmon and the hazards faced by the salmon.

Activity One – Hooks and Ladders can be done in the Multi-Purpose Room (during bad weather), on the playground or on the outside stage behind the MPR. Check with the classroom teacher for available times. This is a high-energy, physical activity. The teacher needs to keep the students on task for safety reasons.

Activity Two – The Smell of Home requires that scents be placed into containers with lids prior to the introduction of the unit.

Rotating Activity – The students observe pond water, salmon scales, and salmon eggs with microscopes and magnifying glasses. Check the communication notebook for the classroom where the center is located. Retrieve the materials and set-up prior to the beginning of the unit.

INTRODUCTION (10 minutes)

- There are three main concepts to introduce/review with the students; Life Cycles, Needs of Living Things and The Salmon Life Cycle.

Life Cycles

- What is a cycle?
- You have learned about different types of cycles. A cycle is something that starts, goes on, ends, and starts all over again. (Show students posters of the following cycles.)
  Examples of cycles: the rock cycle, the water cycle, the food chain (consumers, producers, decomposers), the cycles of the days and nights (rotation of the Earth on its axis), the cycle of the seasons (rotation of the Earth around the sun), the lunar cycle (the moon revolving around the Earth) and the oxygen cycle.
- Like all cycles, life cycles occur over and over again. All living things die. But plants and animals reproduce, so their species live on.
- What is a life cycle?
- Life cycles describe the different stages in the lives of living things. These stages include birth, growth, reproduction, and death. A life cycle begins again with the offspring of the plant or animal.
- Today you are going to learn about the life cycle of the salmon. But first, it is important to review the five things that all living things require to live.

  Materials: posters of various cycles (rock cycle, water cycle, food chain, seasons, day and night, lunar cycle, oxygen cycle)

INTRODUCTION (continued)

Needs of All Living Things

(Show students "Essentials to Life" posters while describing their importance. The following descriptions are written on the back of the posters.)

All living things need five things to live:

1. Sun – the sun gives us both heat energy and light energy. Its mass also provides the gravity that holds the solar system together.
2. Water – all living things need water to survive. The Earth's surface is 75% water.
3. Food – all living things need energy from food to live. Ecologists study the food chains in an ecosystem to see how living things link together.
4. Air – plants provide oxygen for the animals, which in turn, provide carbon dioxide for the plants.
5. Shelter or Space to Live - all living things require space to live that contains the things that their species require to live. Animals and plants need their own habitat. Within this habitat or space the animal finds shelter.

- What are the five things that all living things need to survive? Sun, water, food, air, and shelter or space to live.
- While I explain the life cycle of the salmon, look for the five essential things needed for life in the salmon's habitat.
- There are things that may limit the salmon's ability to survive. Listen carefully to see if you can think of some of these limiting factors.

Materials: 5 "Essentials to Life" posters (sun, water, food, air, shelter)

Salmon Life Cycle

- Pass out the Salmon Life Cycle chart to students. Two students per chart. Read the brief summary or detailed summary that is provided on the back of the science docents copy of the salmon life cycle chart. Both summaries are provided below.

Brief Summary (Better for 2nd graders):

Some animals, such as the salmon, have life cycles that involve great journeys. Salmon are spawned (hatched) near the sources of large rivers. When young salmon are about a year old, they swim down river until they reach the open ocean. This migration (trip) can be as long as a thousand miles. After two or three years, the mature fish return upriver to spawn. The trip is even more difficult for the salmon. They must swim upstream and sometimes leap over waterfalls. After lying and fertilizing their eggs, the exhausted salmon die and the new fish eggs spawn. During their life cycle, salmon encounter many obstacles and predators.

INTRODUCTION (continued)

Detailed Summary: Salmon Life Cycle (more appropriate for 3rd graders)

Eggs
In the first stage of a salmon's life, they go through a period of being eggs. The female salmon lays 3,000 to 7,000 eggs in a "nest" that is called a red. The eggs are deposited during Spring or early Summer in a shallow gravel depression scooped out by the female. Once deposited, the eggs are fertilized by the male and then both fish nudge the gravel back over the eggs to offer protection to the eggs. Within a few the both the male and female salmon have completed their reproduction and soon die. The eggs, before and after hatching, are susceptible to many limiting factors: silt (pollution) can be washed into the nesting area; erosion following road building or logging; fires; predators can eat some eggs; and dropping water levels can isolate the eggs.

Alevin
After hatching, the small fish are called Alevin. They spend their first two weeks hiding in the gravel of the shores of the river or stream. The Alevin absorb their yolk sac which contains protein, sugar, minerals, and vitamins as their food source.

Fry or Fingerlings
When the yolk sac is gone, the salmon become known as Fry or Fingerlings. Then they begin their journey from the fresh water of lakes or rivers to the open ocean and are ready to find their own food. When salmon are fingerlings, they are the size of a pine needle.

Smolt
A young salmon that is ready to migrate to the sea is called a Smolt. Some migrate directly to the ocean while others wait up to two years. The small ocean-bound salmon are confronted by many obstacles on the way to the ocean including: predatory birds, mammals (bears or humans), large fish, and low water in streams and dams. Up to 90% of the salmon that hatch never reach the ocean.

Spawning
In two to five years salmon start their journey that will guide them back to the rivers and streams leading to their own hatching site. This trip is even more difficult for the salmon because they must swim upstream against the river and stream currents. Sometimes the salmon must leap waterfalls and rapids and/or climb fish ladders that are water-filled staircases allowing the migrating salmon to swim upstream, around a dam. Predators along the way to the salmon's spawning ground include humans who fish, eagles, bears, and other predatory mammals.

Nesting
Once back to their own spawning ground, the salmon make nests in the streambeds, hatch and fertilize the new eggs and then die when spawning is completed. The life cycle of a salmon then begins anew. To maintain the salmon population, some biologists believe that only one pair of fish from each spawn must return to deposit and fertilize eggs.

Activity One – Hooks and Ladders

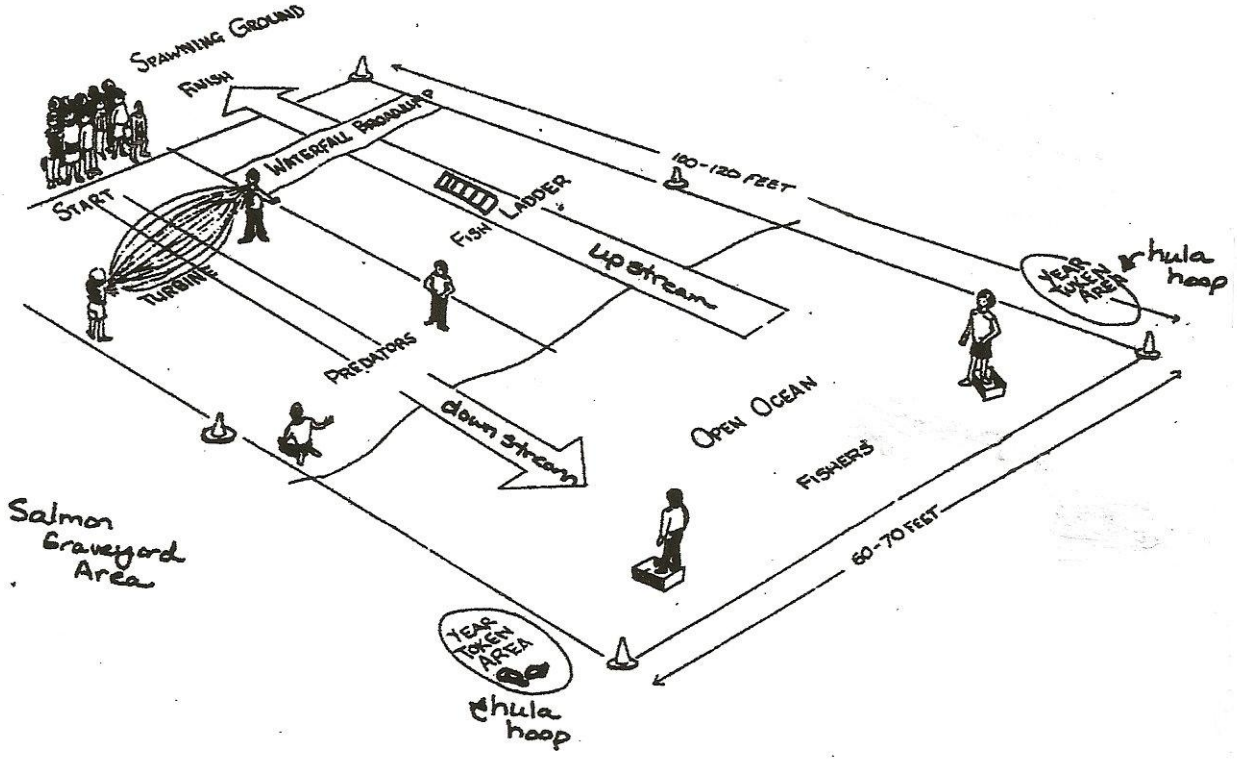
- You have just heard a little about the life cycle of the salmon, now it is actually time to go through the life cycle of the salmon in this role playing game called "Hooks and Ladders."

1. Set up the "playing field" prior to the explanation. See diagram.
2. Explain to the students that this is a physical activity. They will become salmon that are traveling through their life cycle. There are two safety rules: No running and Freeze if you hear the whistle blow.
3. The teacher assigns roles to the students as follows (model each role for the students):
    a. Turbine Team and Waterfall Monitors (2 students)
    They are to operate the jump rope which represents the turbines in hydroelectric dams. The rope should be swayed back and forth like a snake on the ground NOT swung in the air. When the salmon have passed the turbine going downstream, these students move to the upstream side to become waterfall-broad jump monitors.
    b. Predatory Wildlife/Bears (2 students)
    At the start of the simulation, the predators will be below the turbines where they catch salmon headed downstream. Later in the activity when all of the salmon are in the ocean, these same two predators will patrol the area above the waterfalls.
    c. Humans in Fishing Boats (2 students)
    The fishermen catch the salmon in the open ocean. The students in the fishing boats must keep one foot in the cardboard box ("fishing boat") to reduce their speed.
    d. Salmon – all remaining students
4. The activity starts with all the salmon in the spawning ground and ends when all the salmon are captured before the spawning ground is reached – or when all surviving salmon reach the spawning ground.
5. Traveling through the salmon life cycle: The salmon start their journey downstream trying to avoid the obstacles ahead which are as follows:
    a. Turbine at the dam – Students cannot jump around the jump rope. They must jump OVER the rope. A salmon dies if it is hit by the turbine (jump rope).
    Note: any student salmon that dies during the activity stands to the side in the salmon graveyard until the next round.
    b. Predatory Wildlife/Bears – The bears must gently catch the salmon with both hands. Tagging is not enough. Captured salmon are escorted to the side by BOTH bears into the salmon graveyard.
    c. Fishing Boats – The salmon can be captured by the fishing boats. Fishermen capture the salmon by tagging gently. Then fishermen take the captured salmon to the salmon graveyard.
    d. Tokens (yellow, cardboard fish) – While the salmon are in the open ocean, the salmon move back and forth across the ocean area in order to gather four tokens. Each token represents one year of growth. The salmon can only pick up one token at a time on each crossing. Once the student has four tokens, they can begin to migrate upstream.
    e. Fish Ladder – Student salmon must WALK through the fish ladder. Predators may NOT capture the salmon on the fish ladder.
    f. Waterfall-Broad Jump – The salmon then jump over the waterfall. The students that were at the turbine monitor the waterfall. If the student salmon does not jump over the waterfall then they must return to the bottom of the fish ladder.
    g. Predatory Wildlife/Bears – same as above.
    h. Spawning Ground – When the student salmon have reached the spawning ground, they have completed the life cycle of the salmon and survived the journey.

Activity One – Hooks and Ladders (continued)

- Allow the students to go through the activity twice. Reassign the roles so that all students are given the opportunity to be salmon.
- After the students complete the activity, engage the students in a discussion. Explore topics such as: salmon survival rate, meaning of the life cycle, the things that are needed for all living things to survive…
- Note: Most of the time only one or two students make it through the salmon life cycle role play. The average survival of salmon family is 2:7.500.

HOOKS AND LADDER DIAGRAM FOR SET-UP



Materials: whistle, jump rope, six cones (to mark boundaries), 2 bear "costumes," 2 boxes (fishing boats), ladder, 2 hula hoops, 80 fish tokens (yellow cardboard), waterfall broad jump, signs to mark areas (spawning ground, turbine, downstream arrow, open ocean, fish ladder, upstream arrow).

Activity Two – The Smell of Home

Prior Prep: Pour a small amount of scent onto a cotton ball and place in tupperware container with lid. There are six containers with lids; use two containers per scent (peppermint, vinegar and vanilla). Leave one set of containers in the classroom (without lid on) and have one set with Hooks and Ladders activity.

- Review with students that salmon are born in streams, go out to the open ocean and return to their homes to spawn.
- How do salmon find their way home? Salmon use their sense of smell to navigate their way back to their home stream.
- Divide students into three groups (schools of fish).
- Each group of students sniffs one of the three scent bowls.
- Staying with their group, they need to return back to their home classroom.
- When the students enter the classroom, they try to locate the scent bowl that matches the first scent bowl at the Hooks and Ladders activity.
- This simulates the student salmon coming back to their home stream using the same sense as the salmon.

Materials: peppermint extract, vanilla extract, vinegar, cotton balls, six Tupperware containers with lids.

Rotating Activity Center – Microscopes, Magnifying Glasses , Scales, Eggs, and Pond Water (5 MINUTES)

Prior Prep: Check the 2nd grade science docent communication folder located on the cart for the last classroom where the rotating activity center is located. Set up microscopes prior to the introduction of the unit. Set up one microscope for each object (except pond water) and leave in classroom for students to observe.

- Explain to the students that there will be an observation center set up in the classroom for them to investigate.

Salmon Scales – Like rings on a tree, fish scales form rings with each year of growth. The rings grow faster in warm weather when there is an abundance of food. During this growing season, the growth band is lighter in color and much wider than during the colder months of winter. The winter growth produces dark slim bands because the growth is so very slow. A chart is provided that explains this process.
Salmon Eggs – Students are to observe the salmon eggs in under with the blue microscopes. Survival chart and pictures of salmon eggs, alevin, smolt, and adult salmon can be left in the classroom.
Pond Water – Pond water contains microscopic life that is essential for many forms of life. These microscopic life forms are the beginning to many food chains in the pond and adult habitat. The magnifying glass works best for this observation.
Salmon Books – *Magic School Bus Goes Upstream, Come Back Salmon,* and *The Atlantic Salmon*

Materials: Red microscope - salmon scales, magnifying glass – pond water, blue microscope – salmon eggs, Survival chart, pictures, books.

CONCLUSION – 5 MINUTES

- Review the objectives of the unit with the students.

- What is a cycle?
- What is a life cycle?
- How does a salmon go through its life cycle?
- What are the five things that all living things need to survive?
- What is an ecosystem? (An ecosystem is a community made up of living things, such as plants and animals, and the nonliving things that affect them.)