

Salmon Watershed Quality Audit

Created by:

Salmon Protection and Watershed Network (SPAWN)

www.spawnusa.org

Level: All Ages

Subject Areas: Environmental Science, Language Arts, Mathematics, Biology, Science, Social Studies

Time: 3 – 5, 50 minute sessions (Audit)
2 – 5, 50 minute sessions (Plan of Action)

Objectives:

1. To identify potential concerns on your school grounds or other “area” of choice that could be contributing to threats of salmonids.
2. To evaluate those threats and develop feasible “solutions” to reduce the impact.
3. To develop and implement an action or actions to make the school more “salmon friendly.”

Background Information

Almost everything humans do directly or indirectly affects salmon. The energy we use can come from hydroelectricity (dams), the trees that have been cut down cause erosion and increased water temperatures into creeks, the roads and buildings we construct cause increased runoff into streams, the cars we drive send CO₂ which heats the atmosphere, pesticides and herbicides we use in our lawns and gardens pollute our waterways, and urban sprawl and agricultural lands have destroyed all but 3% of our wetlands and marshes. The list can go on.

Our watersheds haven't been managed to be salmon friendly or preserve this invaluable indicator species. Projects are being implemented to improve the vast water courses that are hampered due to past and current human impacts. But, much more work needs to be done.

Ways to improve watershed health starts with education on the local scale. By investigating and auditing your campus or somewhere in your community, the students can begin to understand just how much “we” affect other species and the land and water around us.

Proper on-site infiltration of stormwater can decrease erosion and loss of topsoil. It also filters excess pollutants before draining into streams or groundwater. A healthy riparian area is also very important to preserving water quality. Trees provide shade, keeping water temperatures down and oxygen levels up. Tree roots, shrubs, and low lying vegetation keep soil in place, decreasing erosion and providing habitat for insects and other species which builds up nutrition sources for the soil, fish, and other inhabitants. Rain water catchment systems can also

contribute greatly to watershed health. Local water supply caught during storms can be used during drier periods of weather and decreasing run-off during storm events. The examples listed above are all ways to create greater resiliency and sustainability for water sources within the community and reduce harm to the salmonids and all life which inhabit the water.

Method

Students will survey their school grounds and buildings to determine how they are “connected” to issues impacting salmonids and brainstorm ideas of how to reduce those impacts. A Plan of Action can then be created and implemented to make the school more “salmon friendly.”

Advanced Preparation

Students will need to have background information on (See curriculum binder for preparation):

1. The life history of salmon... their “anadromous” existence from freshwater to ocean and back to freshwater.
2. The threats to salmon and why they are currently endangered with an emphasis on their freshwater life history and threats.
3. What Is A Watershed?
4. Simple ways to conserve water, energy and reduce adding pollutants into the environment.
5. Work with SPAWN to develop audit worksheets specific for your “area” or use Salmon Audit in curriculum binder.

Materials

1. Map view of school grounds or “area” chosen to be audited (Google Maps)
2. Tape measures or 100 foot lengths of string to use as 100 ft measures
3. Calculator
4. Graph paper

Procedures

1. Discussion: Have class discuss major issues impacting salmon survival and how the their school grounds may impact each of these:
 - A) Dams (to provide energy)
 - B) Water (for people, lawns, agriculture, etc.)
 - C) Loss of habitat and degradation of streams (dams, urban development, run-off from impermeable surfaces, tree harvesting, etc)

D) Over-fishing

E) Pollution

2. Divide students into 4-5 groups and assign each to survey school grounds and report back on each subject:

Energy Use: Have the students investigate the energy use on campus, using electricity as the focus. Have them explore the number of light bulbs, what types of bulbs they are using, how long lights are left on, what air conditioning and heating units are running, and kitchen stove use. They can also compare electricity bills with similar schools.

Water Use: Have the students investigate water use on the campus. Include bathroom use (flushes per day, type of toilets), cafeteria use, and irrigation or outdoor use. They can investigate the water bill and compare it with several similar schools in the area.

Buildings: Have the students use the measuring tapes to measure the perimeter of each building in the area, marking every 100 meters (less if it is a shed or smaller building). Also have them sketch the shape of the building as they walk around it, noting details such as number of stories (~3m to every story), type of roof, amt of overhang, location of chimneys, gutters, doors, stairs, air conditioners, balconies, etc.

Grounds: Have the students identify and measure parking lots, sidewalks, fences, walls, trails, baseball diamonds, bleachers or any other structure* that could affect water flow or absorption. Do not forget to include safety hazards and telephone lines. Get total square footage.

Natural Areas: Have the students include major natural features (streams, creeks, ponds, trees, shrubs, rocks, etc*) in relation to the buildings, roads, fences, or other human-made structures inventoried. Also note if the plants and trees are native or non-native.

3. Have each group complete their section of the audit worksheet, and then discuss the audit as a whole to the entire class. Have the students identify areas where improvements are needed.
4. Choose an area of focus and discuss/evaluate possible actions and write an “Action Plan” as a class.
5. Implement those actions! (See examples below for ideas)

Energy Use

Lighting (& or Energy Audit): Every building uses energy (connection: dams created to produce electricity, dams constrict salmon spawning habitat, less need for electricity = fewer dams or fewer new dams)

Possible Actions:

1. Are lights turned off when not in use? If not, make signs to post by each on-off switch. (Older students might want to investigate various technologies that automatically turn off lights and work toward convincing administrators, PTSA's, etc. to invest in these energy-saving technologies)
2. Are fluorescent or compact bulbs being used? (For appropriate-age groups, they can use actual energy use for different type bulbs and compare possible savings by switching over to more efficient bulbs for a math project.)
3. Older students can also research where their electricity comes from (dams, coal, nuclear, etc.). If not from hydroelectricity, impacts may be air pollution such as mercury that ends up in oceans and impacts the food chain.
4. Investigate if it is feasible for your school to run on solar power.

Water Use

Water Use Audit: We all need water (connection: dams also created to harvest water, less need = fewer dams and less water = less run-off and waste water which degrades streams as makes for poor water quality and salmon habitat) How much water does your school use and how we can you reduce that use?

Possible Actions:

1. What are your schools irrigation methods? What are they watering?
Investigate water-saving devices and the possibility of installation and times to irrigate. (See environmental curriculum for rainwater harvesting and rain gardens.)
2. Is the school's water appliances water efficient? Check with local water district to see if they provide incentives for replacing dishwashers, toilets, etc with more water efficient models.

Grounds

Buildings, parking lots, roads, etc. create impermeable surfaces which prevent infiltration of rainwater and often run directly into storm drains that deliver them to creeks and cause stream bank erosion, high flows that kill baby fish, lowered water tables, and pollution.

Possible actions:

1. Does your school create a large amount of run-off? Setup and design a rainwater harvesting system (See environmental curriculum on Rainwater Harvesting)
2. Can any impervious surface be replaced or taken out? Design a plan to educate your school and administration on replacing pavement with impervious material.
3. Can you slow the runoff? Living roof, rain gardens, native bee garden which uses the rain water harvested, etc.

Natural Areas

Natural areas HELP salmon. The more native trees, organic gardens, healthy streams, and wetlands you have, the better off the fish are (groundwater recharge, shade for cooler stream water, filtration for cleaner water).

Possible actions:

1. Are there lawn areas that can be replaced with native plants? Grow native species in classrooms to plant outside.
2. Is there a creek on campus or nearby that has non-native, invasive species?

Work with local native plant societies and watershed groups to replace non-native plant species with native species for restoration.

Optional/Amendment:

Pollution: Pesticides, fertilizers, litter, trash, loose soil, etc. are carried into streams from runoff and impact salmon as well as their food resources directly. These pollutants are also carried by streams into coastal and ocean ecosystems and impact adult salmon and ocean health.

(For older students) Interview school administrators and maintenance personnel to learn what pesticides and fertilizers are being used. Have students do online research to understand the impacts of specific compounds used and their impact on salmon and aquatic life.

Possible Actions:

1. Determine if there are alternative products and practices (integrated pest management, replanting w/species that don't require fertilizers/pesticides, etc.).
2. Present findings to school grounds employees and administrators and/or school board.

(For younger students) Identify litter and trash found on campus. Determine where it is coming from. (Is it around trash cans without lids, coming from cafeteria, blowing on campus from off-campus sources, etc.?)

Possible Actions:

1. Presentations to others in schools about the impact of litter.
2. Weekly litter pick-ups around campus or in your creek
3. Reduce, Reuse, Recycle
4. Start herbicide/pesticide free gardens, inform school administration and ground maintenance employees about safer alternatives than chemical pesticides and herbicides.

Evaluation/Follow-Up/Discussion:

Have the students discuss and evaluate and quantify (if possible) their actions to improve their watershed or campus. How has it helped? How much run-off did it reduce? How much energy has it saved? How many pounds of trash was collected and saved from entering the creek?

