



Lesson Plan: Following Fishes; An introduction to Idaho's Anadromous Salmon.

Created by Leslie Reinhardt: Idaho Fish and Game/Pacific States Marine Fisheries Commission, Idaho Chapter, American Fisheries Society Anadromous Committee Education/Outreach 2013.

Target: High School General Biology Class

Unit: Ecology

Topic: Anadromous Idaho Salmon Ecology, Populations, Migration, and Survival

Purpose: The wild salmon is an Idaho icon, however habitat degradation, stream blockage, and over harvest have led to extreme population declines. Tribal treaties and the Endangered Species Act mandate management for recovery of these fish. Inter-agency and inter-state cooperation combines biologists, hydrologists, geologists, geneticists, land managers, information technology experts, and fisheries users to save these complex fishes while allowing for harvest and preserving valuable genetic diversity. This endeavor provides future job opportunities for today's high school students and works to preserve a valuable resource for future Idaho citizens. It is our hope that educating students about anadromous fish issues now will create a future population with understanding and interest in this issue and encourage students to pursue fisheries management as a career interest.

Description:

- This is a 3-day lesson in which students will use technology to learn basic Idaho salmon biology including salmon species, migration behavior, dangers to and survival of smolt, human impact, and adult survival and return.
- A PowerPoint presentation front-loads with basic vocabulary and salmon information.
- In the second day a lab type exercise can be conducted by individuals, if a computer lab is available, or by groups, to allow the use of limited classroom computers. A work sheet is provided.
- On the final day students compile information on a map to observe migration and mortality. This can be followed by a teacher or student led discussion.

Objectives:

- Using assigned pit tag number
 - Access the PTAGIS and DART databases to follow Steelhead or Chinook smolts as they migrate downstream and return
 - Fill out the table or create a table in excel including:
 - Location
 - Date
 - Water temperature
 - Fish characteristics

- Demonstrate knowledge and understanding by using data to answer questions on the worksheet and create hypotheses
- Map fish migration on the map provided
- Compile data as a class on a PowerPoint or paper wall map
- Discuss survival and hypothesize dangers to migrating fish

Modification Option:

In order to meet further content standard objectives and to increase lesson richness, teachers may require students to research peer reviewed journal articles to provide supporting documentation to their hypotheses in the work sheet. Teachers may also require students to expend on one or many of the hypothesis questions in a paper using these sources. This will add at least one additional day to the process. A list of some relevant journal articles is included.

Skills:

- Operate a computer and navigate the internet
- Interpret and analyze information including query a database and compare graphs and tables
- Fill out a table (use the table to graph data (optional))
- Use numeric knowledge to formulate interpretive understanding
- Communicate knowledge

Materials:

- Provided PowerPoint presentation for vocabulary and salmon biology
- Computers with internet access
- Copies of the included worksheet
- Provided maps (either projected or a paper wall map with pins or stickers)

Assessment:

- Worksheet demonstrates ability to follow directions, find information, record and analyze data
- Map and discussion demonstrate comprehension

Modifications for Special-needs Students: (as per/IEP)

- Print PowerPoint
- Pair students or form groups
- Fill in the worksheet as a group instead of as individuals
- Answer questions during class discussion

Companion materials (not included): can be used for additional information

- Several videos exist (PBS etc.) that chronicle salmon migration.
 - Life on Fire: the Surprise Salmon
 - http://video.idahoptv.org/video/2324276959_3
 - Nature: Salmon: Running the Gauntlet
 - <http://video.idahoptv.org/video/1891112523>

- Idaho Outdoors: Idaho Salmon
 - <http://video.idahoptv.org/video/2258499877/>
- Other lesson planning aids
 - Helping and Harming: Human Impact on Salmon Populations. A companion to Nature: Salmon: Running the Gauntlet
 - <http://www.pbslearningmedia.org/resource/nat11.sci.living.eco.lphelpharm/helping-and-harming-human-impact-on-salmon-populations/>
- Trout in the Classroom
- Freshwater Illustrated:
 - <http://www.freshwatersillustrated.org>

Idaho Content Standards: Biology Grade 9-10 (as per 2013)

Standard 1: Nature of Science

Goal 1.1: Understand Systems, Order, and Organization

- 9-10.B.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a)
- 9-10.B.1.1.2 Apply the concepts of order and organization to a given system. (648.01a)

Goal 1.2: Understand Concepts and Processes of Evidence, Models, and Explanations

- 9-10.B.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a)
- 9-10.B.1.2.2 Develop models to explain concepts or systems. (648.02b)
- 9-10.B.1.2.3 Develop scientific explanations based on knowledge, logic and analysis. (648.02c)

Goal 1.6: Understand Scientific Inquiry and Develop Critical Thinking Skills

- 9-10.B.1.6.1 Identify questions and concepts that guide scientific investigations. (649.01a)
- 9-10.B.1.6.2 Utilize the components of scientific problem solving to design, conduct, and communicate results of investigations. (649.01b)
- 9-10.B.1.6.3 Use appropriate technology and mathematics to make investigations. (649.01c)
- 9-10.B.1.6.4 Formulate scientific explanations and models using logic and evidence. (649.01d)
- 9-10.B.1.6.5 Analyze alternative explanations and models. (649.01e)
- 9-10.B.1.6.6 Communicate and defend a scientific argument. (649.01f)

Goal 1.8: Understand Technical Communication

- 9-10.B.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a)

Standard 5: Personal and Social Perspectives; Technology

Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced

- 9-10.B.5.1.1 Analyze environmental issues such as water and air quality, hazardous waste, forest health, and agricultural production. (656.01a)

Goal 5.2: Understand the Relationship between Science and Technology

- 9-10.B.5.2.1 Explain how science advances technology. (655.01a)
- 9-10.B.5.2.2 Explain how technology advances science. (655.01a)
- 9-10.B.5.2.3 Explain how science and technology are pursued for different purposes. (656.01b)

Goal 5.3: Understand the Importance of Natural Resources and the Need to Manage and Conserve Them

- 9-10.B.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)