MAPS – GIS Lesson: Examining Chinook Salmon Habitat in the Columbia River Basin Using Geographic Information Science

Subject Areas: Environmental Science, Environmental Studies, and Geography
Designer: Eric Sproles

Lesson Description: In this lesson students are led through a series of steps to examine the size and scale of a watershed and how dams have affected habitat in the Columbia River. Both the salmon habitat and dam data were supplied by the Northwest Habitat Institute (www.nwhi.org).

In this exercise students examine the function of a watershed (upstream/downstream), the size and scale of a watershed, the relevance of dam location in a watershed, and how salmon habitat has been affected by dams. Students learn about scale, elevation, contributing area of a watershed, and habitat range. Students also use simple mathematics to calculate percentages.

This lesson was written as a lesson for an aquatic environment course, and thus focuses on watersheds and habitat. In this watershed there are many contributing factors regarding energy generation, food supply, and navigation that are equally relevant. *An economics lesson would tell a different story.* If you would like to learn more about the complexity of the Columbia an recommended source is: A River Lost: The Life and Death of the Columbia by Blaine Harden.

ITSE National Technology Standards
1) Research and Information Fluency - Students apply digital tools to gather, evaluate, and use information.
2) Critical Thinking, Problem Solving, and Decision Making - Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
3) Demonstrate Creative Thinking - Students use technology to explore models and simulations of complex systems.

Geography Standards - Geography for Life 9-12th
1) How human actions modify the physical environment
2) The physical and human characteristics of places
3) How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
4) The changes that occur in the meaning, use, distribution, and importance of resources

Objectives: The students will be able to:
1) Describe the basic concepts of a watershed.
2) Describe the concepts of drainage area and its relationship to the effects of dams.
3) Design Boolean Logic queries.
4) Use GIS as a tool to form hypothesis of the causes of salmonid habitat change.

Prerequisites:
1) Students should have completed the MAPS-GIS Tutorial activity and be familiar with geospatial skill such as viewing data layers, performing Boolean logic queries and analyzing spatial patterns.
2) Students should be familiar with the concept of a watershed and migration patterns of salmonids.
3) Basic math skills

Materials: Computer access with high-speed internet, student activity sheet, calculator (can use one on computer).
Lesson Estimated Time: Approximately 60 minutes
Lesson Procedure: A basic introduction to the concepts of watersheds, salmonids, and GIS should proceed the exercise.
Assessment/Evaluation: Will vary
References and Citations: None