



<b>Author Name:</b> Sarah Durfee	<b>Content Areas:</b> Ecology
<b>Lesson Plan Title:</b> Comprehensive Study of Salmon of the Pacific Northwest and Assessment of Local Watersheds	<b>State:</b> OR
<b>Lesson Time Frame:</b> 2 weeks	<b>Inspired by an Earthwatch Expedition:</b> Salmon of the Pacific Northwest
<b>Student Level:</b> High School	

**Academic Standards Addressed:** Oregon State Standards referring to Diversity and Interdependence of Organisms (CIM/CAM); International Baccalaureate Biology Topic 4 (Ecology)

<http://www.ode.state.or.us/teachlearn/real/documents/05-06science.pdf>  
[www.ibo.org](http://www.ibo.org)

**Abstract:** Through a comprehensive study of salmon and watersheds, students will form field research teams that assess a local stream for its health by doing a macro-invertebrate study. Then, students will assess the same local stream for its viability as a habitat for wild salmon populations, making recommendations to local authorities for habitat restoration as needed.

**Goal:** Students will use the scientific method to assess a stream’s health and it’s viability as wild salmon habitat. Students will use their knowledge of healthy watersheds to make restoration recommendations related to making their stream more habitable for salmon.

**Performance Indicators (Objectives & Measurements):**

<b>Objectives</b>	<b>Measurements</b>
Teamwork	Self & Group Evaluations
Students assessment of stream health	Macro-invertebrate data, analysis of data
Student assessment of salmon habitat	Stream & habitat data, analysis of data
Student recommendations	Follow-up letters to watershed management

**Background Information:** Students will need to have a basic understanding of ecology, classification, life cycles of salmon, and watersheds.

**Materials:** For the aquatic macro-invertebrate study, see Wolfree’s website:

<http://www.eglimpse.org/Assets/J.%20Aquatic%20Inverts.pdf>

For the stream survey, students will need the following: Tape measures, clinometers, dowel rods marked to 1.5 meters to measure pool depth, clipboards, pencil & paper

**Technology:** Internet for research pertaining to the subject matter; Vernier probes for advanced stream measurements if accessible; Excel data entry for graphing field data

<http://www.vernier.com/>

### **Instructional Procedures:**

- Day 1: Introduction to Macro-invertebrate studies
- Day 2: Field trip to stream for macro-invertebrate study
- Day 3: Follow-up on data collected in the field
- Day 4: Introduction to stream study for viability of salmon habitat + lesson on uncertainty in measurements
- Day 5: Return to stream for habitat study
- Day 6: Follow-up on data collected in the field

**Assessment:** During this unit, students will be assessed on teamwork through their self and group evaluations as well as teacher observations. Students will also be assessed on a final laboratory write-up, which will focus on the data they gathered for both the macro-invertebrate study as well as the stream survey for salmon habitat. The IB rubric will be used to assess their laboratory write-ups in the areas of Data Collection, Data Processing & Presentation and Conclusion and Evaluation.

### **Connection to other Content Areas:**

Mathematics: calculating uncertainty in scientific measurements  
History / Social Studies: fluctuations in salmon populations over time  
English: letter-writing campaign to local authorities recommending restoration efforts based on scientific findings  
Technology: input data into excel and graph data; computer-generated map of stream  
Art: sketch of field site

### **Extensions:**

Students could volunteer their time to do actual stream restoration work if it is something they recommend for the stream site. This restoration work could include removal of non-native species, manipulation of woody debris into the stream to create more salmon-friendly habitat, etc...

### **Acknowledgements:**

International Baccalaureate Organization (rubric used for laboratory assessment)

[www.ibo.org](http://www.ibo.org)

Wolfree Organization (lesson plan for macro-invertebrate study)

<http://www.beoutside.org/>

<http://www.eglimpse.org/Assets/J.%20Aquatic%20Inverts.pdf>

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