

GEO STAC Teaching Guide

Lesson Developer: Stefan Aumack, Kennedy High School

Subject Area: Environmental Studies

Grade Level: High School (9-12)

Lesson Description: Students will study the oak savanna ecosystems in Oregon to determine the environmental conditions that support this specific ecosystem. This lesson will be an inquiry based lesson that will create the foundation of a larger class project in which students explore the ecological changes to an area over time, and, using this data, develop an ecosystem determination and restoration plan for a site east of Cottage Grove.

Students will gather data for the Willamette River Basin, including current species prevalence, rain fall, and slope, as well as historic data from the original plats of cadastral surveys. Students will create a map, based on the cadastral surveys, that plots the vegetation type listed on the survey. Students will then walk the original section lines of the survey and record the species type, age of species, and prevalence of species to compare to the original plat. After comparing the historic and current vegetation assessments to the GIS web-based map and assessing the rainfall condition of the site and the correlation to Oak survival, students will make hypotheses about the pre-European condition of the site and create a site-specific restoration plan. (Currently the land has oak and fir interspersed, and the land-owner would like to determine which species to focus the restoration on).

Students will explore the related careers of forest technicians, botanists, forest ecologists, GIS technicians, and surveyors that have obvious relevance to this assignment.

Education Standards:

Common Core Standard English Language Arts Standards: English language Arts Standards » .History / Social Studies » Grade 12

CCSS.ELA-Literacy.RH.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

Common Core Standard English Language Arts Standards: English Language Arts Standards » Science & Technical Subjects » Grade 11-12

CCSS.ELA-Literacy.RST.11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

ITSE National Technology:

3. Research and Information Fluency
 - a. Plan strategies to guide inquiry
 - b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
 - c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
 - d. Process data and report results
4. Critical Thinking, Problem Solving, and Decision Making
 - c. Collect and analyze data to identify solutions and/or make informed decisions
5. Digital Citizenship
 - b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
6. Technology Operations and Concepts
 - a. Understand and use technology systems
 - b. Select and use applications effectively and productively

National Geography Standards

- 1) How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information
- 2) How to analyze the spatial organization of people, places, and environments on Earth's surface
- 3) How to apply geography to interpret the present and plan for the future

Learning Objectives:

► **Geospatial Concepts:**

Correlation – Students will determine correlations between rainfall and oak stands in the Willamette Basin.

Patterns – Students will analyze patterns of oak disbursement in the Willamette Basin (including the implications of slope).

Comparison – Students will compare historic records, GIS maps, and student-conducted vegetation field reports.

► **Other Discipline: Social Studies**

- **Career Connection:** Students will explore careers relevant to this lesson, including forest technicians, botanists, forest ecologists, GIS technicians, and surveyors.

Web-based GIS Tools:

Find – Willamette Basin

Query – species type and rainfall prevalence

Measure – Stand size

Materials:

- On-line vegetation/rainfall GIS map
- BLM Plat of Cadastral Survey
- Original Survey Field Notes
- GPS units
- County maps with tax ID lots with GPS coordinates

Prerequisites:

- Basic knowledge and understanding of ecosystems
- Web-based GIS tutorial
- Basic GPS and compass skills

Beginning the Lesson

- How do humans affect nature?
- How have humans changed the landscape over time?
- What benefits are there to preserving or restoring a landscape?
- What tools can we use to scientifically assess the “natural” condition of the site?

Developing the Lesson

Students will meet with land-owners on site to discuss the specific goals of the project. Students will then use GPS units to walk the section lines that cross the property, taking field notes and measurements along those transect lines. In the classroom, students will research and compare their field notes to the original 1853 field notes along the same transect lines.

Students will research the historic changes (and ecological significance) of the oak savanna in the Willamette Valley. Using the GIS lesson, students will determine correlations between oak savannah ecosystems and rainfall.

Concluding the Lesson

Students will conclude the lesson by making specific hypothesis about the pre-European condition of the site, using field and GIS evidence to support their statements. Students will then create a restoration plan that takes into account their scientific inquiry and field

analyses.

Career Connections: Students will explore the related careers of forest technicians, botanists, forest ecologists, GIS technicians, and surveyors that have obvious relevance to this assignment. Students will explore the employment trends, salaries, and educational requirements applicable for these careers.

Assessment/Evaluation: Students will be assessed on this project through:

- Their field notes, reporting on-site conditions, age of stands, and species composition.
- The data collection and analysis used to determine correlation between rainfall and species prevalence.
- A final report, with supporting documentation, evidence, and analysis, that will guide the restoration plan on the Carnine property