Geospatial Technology
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GPS & GIS

Subject Area: CTE – Geospatial Technology   Grade Levels: 9-12
                                                          Date: November 2010

LESSON OVERVIEW

Students will produce a map showing the active nest sites for Swainson's Hawks in the Port of Sacramento. This project-based lesson has multiple facets. Students will learn how to use Geographic Information Systems (GIS), a high-end mapping software. In order to digitize nest site locations, students will be trained in the use of Global Positioning Systems (GPS) units. Students will add the digitized location data to a map. Additional data will also be added to each nest site: nesting activity and type of raptor, photos of each nest site and the presence of other species will also be added.

CTE STANDARDS:

1.3 History–Social Science
(11.11) Students analyze the major social problems and domestic policy issues in contemporary American society.

2.0 Communications

2.1 Reading
Specific applications of Reading Comprehension standards (grades nine and ten):
(2.1) Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes.
(2.6) Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).
2.2 Writing
Specific applications of Writing Strategies standards (grades nine and ten):
     (1.8)   Design and publish documents by using advanced publishing software and
 graphic programs.

4.0 Technology

Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments:

4.1 Understand past, present, and future technological advances as they relate to a chosen pathway.

4.2 Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.

4.3 Understand the influence of current and emerging technology on selected segments of the economy.

4.4 Understand geographic information systems (G.I.S.).

4.5 Determine the validity of the content and evaluate the authenticity, reliability, and bias of electronic and other resources.

4.6 Differentiate among, select, and apply appropriate tools and technology.

Materials Included in this Lesson

- GPS Garmin units
- Garmin software
- Data log sheets
- ArcView 9.3.1

Other Materials for this Lesson

- GPS technology introduction
- Field data collecting protocols

Skills the Student will Learn

Students will be able to:
•Use the Garmin GPS unit to read latitude and longitude
•Determine which direction they are moving based on how the lat/long numbers are changing
•Manipulating the ArcView 9.3.1 software

Student Deliverables

Students will be able to:
•Produce a map in Geographic Information Systems software, version ArcView9.3.1
• Layer Swainson's Hawk nesting data for the Port of Sacramento onto the map
• Each nest site will contain nesting data, photo of the nest and list of other species present

Length of Lesson: 5 Days

Activity Day One

Introduction to GPS data collection and use of WAAS satellites; outside trial with GPS units.

Activity Days Two to Four

Students will place location data into ArcView 9.3.1; add nest site data and photos.

Activity Day Five

Students will create a power-point presentation, using screen shots of the GIS map created.

Enrichment Suggestions

Students will do presentations to the Port of Sacramento and the Washington Unified School District Board of Education.

Student Resources

GIS software, Garmin GPS units, 10 years of nest site data from the Biology teacher.

State Standards Met

See standards list above.

Lesson Plan Relevance To Externship

The Externship placement with the GIS department at SMUD was fantastic. The skills I learned were immediately transferable to the classroom setting. The SMUD GIS coordinator along with myself and the students participating in this project are now moving forward with expanding the Swainson's Hawk Project. We are also looking at an opportunity for the students to tour the SMUD GIS facility, giving students a unique view of how a course in GIS can lead to a specific CTE skill set.

Rubric for the Geospatial Technology Project

Student Deliverables	1 Exceeds Expectations	2 Meets Expectations	3 Approaches Expectations	4 Fails to meet Expectations
ArcView 9.3.1 map	Map shows nest sites in relation to the Port of Sacramento on a physical features map; map has photos of nest sites, nesting activity data	Map shows nest sites; photos and other data not imported onto the map	Location data digitized but not imported to the GIS software	Failure to get data on the map
Power point	Extensive number of slides show the screen shots of various features of the student created map	Slides only show screen shots of GIS map, limited additional data included	Students able to produce slides of screen shots of GIS map, no additional dat included	Failure to produce a product
Presentation	Students are able to demonstrate knowledge of the GIS software by showing the layered information for any particular nest site	Students are unable to perform all necessary tasks using the GIS software	Students unable to adequately explain how to create a map	No show at presentation