

MAPS – GIS Lesson: Grey Whale Migration

Subject Area: Marine Biology, Environmental Science, and Geography

Designer: Albert Pooth, Carrie Newell, and Eric A. Sproles

Lesson Description: In this lesson students examine Grey Whale migration patterns off the coast of North America.

This lesson is comprised of two parts. The first portion looks at whale migration of the coast of North America. Students look at the timing of whale migration, when and where reproduction occurs, and use a simple mathematical model to calculate estimated arrival time in Alaska.

The second portion of the exercise examines the resident whale population off of the coast of Depoe Bay, Oregon (USA). Students examine how Sea Surface Temperatures affect kelp and mysid (small shrimp) populations, and thus impact the resident whale population for that year. Instructors can use the conceptual wind model included to improve understanding of the connections that exist between wind, ocean, temperatures and primary productivity.

The exercises compliment each other, but each section is designed to be independent of each other.

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) The physical processes that shape the patterns of earth's surface.
- 2) The characteristics and spatial distribution of ecosystems on earth's surface.
- 3) The changes that occur in the meaning, use, distribution, and importance of resources.
- 4) How to apply geography to interpret the past.
- 5) How to apply geography to interpret the present and plan for the future.

Objectives: The students will be able to:

- 1) Derive information from a GIS
- 2) Calculate migration rates from derived information, and use information to predict future whale migration.
- 3) Develop an understanding between sea surfaces temperatures and primary productivity.
- 4) Use information from maps to make basic predictions
- 5) Improve map skills and problem solving

Prerequisites:

- 1) Students should have completed the MAPS-GIS Tutorial activity and be familiar with geospatial skill such as viewing data layers, using the measure and identify tool.
- 2) Students should be able to calculate simple rates (kilometers per day) using information derived from map information.
- 3) Students should understand the basic patterns of whale migration.

Materials: Computer access with high-speed internet, student activity sheet, ability to complete simple math calculations (calculator or by hand)

Lesson Estimated Time: Approximately 60 minutes

Lesson Procedure: A basic introduction to the concepts of associated with grey whale migration.

Assessment/Evaluation: Each section will take approximately 1 hour to complete.