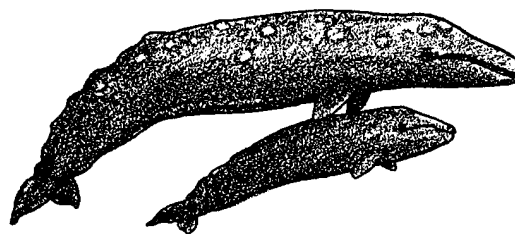


# THE YEAR OF THE GRAY WHALE

## FOR SEA: Marine Biology and Oceanography - Grade 6

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#### Unit I: Born

- 1. Big As Life .....** **51**  
 After comparing the length of an adult California gray whale to real objects, students enlarge a pattern of a gray whale to life-size on their playground or field.
- 2. A Whale Is Born - December 21 .....** **67**  
 Students use mapping skills to track the migration of gray whales as they begin the story line of the event-filled migration of a new calf and its mother.
- 3. How Old? .....** **85**  
 Through the simulation of a stratigraphy box, students find supporting evidence for theories of origins and ages of whales.
- 4. Putting All The Pieces Together .....** **99**  
 Students reconstruct model whale skeletons from pieces of a skeleton set.
- 5. Family Tree .....** **119**  
 Using their own reasoning, students explore the relationships between groups of whales before learning how scientists group whales.

## Unit 2: The Long Journey

1. **The Journey Begins - February 21**..... 149  
Students design a research study which would provide additional information about the northern migration of the gray whale.
2. **Field Study of Whales** ..... 159  
As classmates appear briefly from behind a butcher paper “ocean”, students test their powers of observation.
3. **Swimming Northward - March 7** ..... 165  
The breathing and diving rhythm of gray whales is examined as students calculate average daily progress during migration.
4. **Marine Mammal Adaptations: Diving Buoyancy**..... 179  
Students discover what ratio of materials enables the whales they “create” to neither float too high nor sink too deep.
5. **Marine Mammal Adaptations: Diving Buoyancy Part II: ..... 187  
Microscale Cartesian Divers**  
Easily adjustable Cartesian divers are made and used to examine the effects of buoyancy and pressure changes on diving animals.
6. **Marine Mammal Adaptations: Diving Response -Bradycardia** ..... 201  
As they immerse their faces in cold water, students experience and measure their own diving response.
7. **Gray Whale Photo I.D.**..... 211  
By matching photos of gray whales with photos from a gray whale identification catalogue, students identify whales.
8. **Hear-Sighted**..... 227  
Students investigate their own sense of location through experimentation and simulation.
9. **Echolocation** ..... 247  
Slinky wave puzzles are used to determine the distance between a student and an object.
10. **Sound Travels**..... 255  
Students build an echolocation model to determine distance to an object.

## Unit 3: Feeding Ground

1. **Researching Gray Whales - March 21** ..... 265  
Original research data in text and graphic forms is analyzed by students as they examine how gray whale research is conducted.

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- 2. Feast Waters - April 20..... 281**  
Imitating baleen whales, students strain “food” out of water with their own teeth and then with paint brushes.
  - 3. What Wiggles In The Mud? ..... 291**  
Students collect, observe and draw sediment animals from a nearby freshwater or saltwater wetland.
  - 4. Who’s For Dinner? ..... 301**  
This role playing game helps your students understand the food chain concept.
  - 5. Observing Living Plankton - June 20..... 307**  
Concrete experience with living plankton is used to stimulate student questions and further study.
  - 6. In Search of the Wild Plankton..... 329**  
Students construct a plankton net and collect live plankton for later observation.
  - 7. Magnifying the Problem ..... 337**  
Construction of a water lens microscope allows students to observe the live plankton they have collected with their plankton nets.
  - 8. Plankton - A Case Study..... 345**  
After an examination of critical factors which contribute to the abundance of plankton, students perform a simple experiment showing the influence of density on upwelling.
  - 9. String for Your Supper ..... 361**  
Student teams create a mobile representing a plankton-based food web which contains a baleen whale and a toothed whale.
  - 10. July 1 ..... 379**  
Students simulate whales feeding on krill, and then write a proposal for an international agreement to regulate the harvest of krill.

## Unit 4: Ice Cold

- 1. Returning South - October 1 ..... 393**  
In a “blubber lab”, students put one hand in a “blubber mitten” and hold that hand in ice water to experience the insulation of blubber.

- 2. Ice Rescue - October 1988 ..... 409**  
 Students make a time line of a 1988 rescue of whales from the ice pack, list “pros” and “cons” of using the resources involved, and write a newspaper article.
- 3. Storm Warning..... 425**  
 From knowledge of its speed, distance, and bearings, students learn to determine the time that a storm or vessel will arrive at a point. A history of a near disaster at sea is also included.
- 4. Hypothermia..... 445**  
 Creative dramatics and a variety of “cold water” activities accompany valuable information regarding hypothermia.

## Unit 5: Follow That Whale

- 1. Whale Watching - December 10 ..... 481**  
 The recommended procedures for observing whales are revealed as students learn how to identify whales.
- 2. Follow That Whale! ..... 493**  
 An essential skill for all who work on the water, students learn to read and understand nautical charts.
- 3. Hmmmm.....Where Did You Say We Were? ..... 507**  
 Students use a nautical chart and parallel rulers to plot locations, set course headings, and determine distances.
- 4. Whazzat!..... 525**  
 As students role play sailors, they move to ship locations or positions by following commands which employ nautical terms.
- 5. Keeping Afloat ..... 535**  
 Why do boats float? “Keeping Afloat” is designed to provide your students with a chance to answer this question.
- 6. Grand Banks ..... 547**  
 Plans are presented which allow students to construct an inexpensive rowing dory.

## Unit 6: Days of Whaling

- 1. December 15 - Days of Whaling: Native Whaling ..... 569**  
 Whaling by native peoples is one of three major types of whaling that have occurred historically. Students see how all of these have affected whale populations and the role whaling plays in economics.

- 2. Holding On ..... 581**  
Native American whaling people made whaling lines from natural fibers of cedar, hemlock, spruce, bull kelp, nettles, and animal sinew. Students make hand-made rope!
- 3. Canoe Building ..... 591**  
Directions are provided for the construction of a full-size or model canoe using northwest Native American methods.
- 4. December 15 - Days of Whaling: Sailing Whaling ..... 597**  
Whaling from sailing vessels is one of three major types of whaling that have occurred historically. Students see how all of these have affected whale populations and the role whaling plays in economics.
- 5. Save My Story!..... 607**  
Students organize the contents of a small booklet about sailing whalers, then layout, illustrate, and bind the booklet.
- 6. Blood Money ..... 615**  
Using actual cost figures for the outfitting and purchase of a whaling ship, students examine the “story” behind the figures.
- 7. Scrimshaw ..... 623**  
Scrimshaw, engraving whalebone, is an American folk art of the nineteenth century, produced by seamen on whaling ships. Students engrave on simulated “whale bone”!
- 8. December 15 - Days of Whaling: Modern Whaling ..... 631**  
Whaling from powered vessels is one of three major types of whaling that have occurred historically. Students see how all of these have affected whale populations and the role whaling plays in economics.

## Unit 7: Whales Count!

- 1. The Numbers Game - December 17..... 641**  
Students model gray whale population growth using a set of stated assumptions and actual population data as they explore the “come-back potential” of the species.
- 2. Count 'em High, Count 'em Low..... 661**  
Red and white beans are used to simulate the mark and recapture scientific method of counting the gray whale population.

- 3. Protecting Whales - December 21..... 677**  
A discussion of current whaling issues and the International Whaling Commission provide a springboard for student involvement.
- 4. Whale Symposium..... 703**  
Students conduct a symposium to share projects created from independent and small group research.
- 5. The Electronic Whale..... 713**  
Through a computer simulation, students follow gray whale migration, from summer feeding grounds in the Arctic to winter breeding and calving grounds in Mexico.