A DOLPHIN'S RETURN

A film by Tom Fitz

Classroom Discussion Guide

Middle School Version (6-8)

Content created for **Schoolyard Films, Inc.**
by Cypress Curriculum Services, LLC

Film Overview

In a captivating account of rescue and rehabilitation, *A Dolphin's Return* introduces students to "Cutter," a young Atlantic spotted dolphin found in a busy harbor in Key West—alone, dehydrated, and malnourished. While only thirteen minutes long, the film is packed full with the spirit of human dedication, intervention, and commitment necessary for wildlife rehabilitation.

The extraordinary Florida Keys landscape—both on land and in the water—undeniably helps to draw students' attention to the efforts of marine mammal experts determined to rescue, rehabilitate, and release Cutter back to the wild. The film follows this young dolphin's recovery at the Marine Mammal Conservancy where he is slowly nursed back to health. When Cutter is ready to return to the wild, scientists and volunteers transport him back to the ocean and release him among a pod of dolphins. Through Cutter's story, students get a glimpse into the world of wildlife conservation and the role of science, partnerships, and technology in the everyday work of scientists and conservationists.

Technology and teamwork play key roles in this rehabilitation effort—an effort that Dr. Denise Herzing of the Wild Dolphin Project says is increasingly necessary since many of the problems for wildlife are caused by human impacts. Even though these scientists and researchers were left "…dangling with the outcome" having lost contact with Cutter almost immediately, all of them agree that their efforts were his best shot at survival in the wild.

Since dolphins are sentinel species, they give clues about the health of our oceans. This and other science-based concepts make this film and guide an excellent supplement to a study of the Florida Next Generation Sunshine State Science Standards. Specific content areas of focus include scientific investigation, the processes and diversity of life, interactions between living organisms and their environments, and the impact of scientific knowledge and technology on communities, cultures and societies.

Key Terminology

Be sure that students are comfortable with these terms either before the film, or as part of discussion after the film. If the students are doing writing prompts, provide these terms as a "word bank" to help guide their writing.

aquatic, autotroph, blowhole, bycatch, carnivore, cetacean, classification, echolocation, evolve, fitness, food chain, food web, fossil, heterotroph, immigration, juvenile, limiting factor, marine mammal, multicellular, notochord, pod, population, radio-tracking, rehabilitation, sonar, stranded, transport, trophic level, vertebrate, warm-blooded

National Standards Correlations

Discussion Guide Element	Unifying Concepts and Processes	Science in Personal and Social Perspectives	Life Science	Science and Technology	History and Nature of Science
Discussion Question #1	●		●		●
Discussion Question #2	●		●		
Discussion Question #3		●	●		
Activity 1: Watch a Marine Food Web Come to Life!	●		●		
Activity 2: Track a Dolphin		●	●	●	●

State Science Standards Correlations

Next Generation Sunshine State Standards

Discussion Guide Element	Standards Addressed
Discussion Question #1	SC.6.L.15.1
Discussion Question #2	SC.6.L.15.1, SC.7.L.15.1, SC.7.L.15.2, SC.7.L.15.3
Discussion Question #3	SC.7.L.17.1, SC.7.L.17.2, SC.7.L.17.3
Activity 1: Watch a Marine Food Web Come to Life!	SC.7.L.17.1, SC.7.L.17.2, SC.7.L.17.3
Activity 2: Track a Dolphin	SC.6.N.1.5, SC.7.N.1.5, SC.8.E.5.10

Discussion Questions/Writing Prompts

Use the following questions as a springboard to stimulate classroom discussion or use them as writing prompts. Either way, the goal is to foster discussion on the level of synthesis and analysis. Below each question, you will find discussion prompts, background information, and details on common misconceptions.

1. **Cutter is an Atlantic spotted dolphin. Along with porpoises and whales, dolphins belong to the order Cetacea. These three different types of animals are classified in the following way:**

   I. Kingdom Animalia
   II. Phylum Chordata
   III. Class Mammalia
   IV. Order Cetacea

a) **What features do these organisms have that make them all animals and chordates?**
   - *Like all members of Animalia, dolphins, porpoises, and whales are mulitcellular and they rely on other organisms for food energy (heterotrophs).*
   - *Like all members of Chordata, dolphins, porpoises, and whales have a notochord—a flexible rod-like structure that provides structural support. In the subphylum Vertebrata, the notochord is surrounded by bony vertebrae.*

b) **What features do dolphins, porpoises, and whales share that make them all mammals?**
   - *All mammals have hair, produce milk for young (females), breathe air, and have middle ear bones.*
   - *Students will be surprised to know that dolphins have a very small amount of hair at birth. Explain that the only hairs on dolphins are small whisker-like hairs near their mouth, which fall off just before or soon after birth.*

c) **Why do you suppose these animals are all placed in the order Cetacea? What shared characteristics can you think of among dolphins, porpoises, and whales?**
   - *paddle-shaped forelimbs and tail*
   - *hairless or nearly hairless body*
   - *blubber under the skin*
   - *blowhole on top of the head*

***Note to the teacher: Along with the discussion of question #1, include some conversation about the Linnaean system of classification. Guide students in thinking about science as a human endeavor and discuss how it must have been to come up with an organizational pattern for ALL living things. Where did Linnaeus begin?*

2. **There is another marine animal that many people call "dolphin." This fish, *Coryphaena hippurus*, is also commonly called "mahi-mahi."**

   a) **What traits or characteristics do mahi-mahi and the Atlantic spotted dolphin have in common? In what ways are they different?**

      - *Prompt students to compare and contrast morphological or physiological traits of the two species. If necessary, provide illustrations of fish and dolphin anatomies. Organize student responses into two columns on the board.*
      - *Discuss the importance of precise identification of organisms in scientific endeavors. Ask students to name other unrelated organisms with similar colloquial names.*

Similarities	*Differences*
Dorsal fin	*Dolphins have lungs; fish have gills.*
Pectoral fin (flipper)	*Dolphins bear live young; most fish lay eggs.*
Streamlined body shape	*Dolphins can echolocate; fish cannot.*
Cannot survive out of water for long	*Dolphins have smooth skin; fish have scales.*
Strong tail muscles	*Dolphins move their tails up and down; fish move their tails side to side.*
	Fish have a gas bladder; dolphins do not.
	Fish are cold-blooded; dolphins are warm-blooded.

b) There is fossil evidence that marine mammals (such as whales) evolved from land mammals. For example, scientists discovered 50 million year old fossils of whale-like creatures (Protocetidae) with fore and hind limbs. More recent fossils of similar animals have no hind limbs and their fore limbs are paddle-like. Modern Ccetaceans still have simple hip bones but no hind limbs. Most scientists now agree that the common ancestor of cetaceans was a land-dwelling, wolf-like creature. What other features do you think changed that allowed early whale-like creatures to live and thrive in a marine environment?

- *Explain to students that the wolf-like ancestor (Pakicetidae) had four limbs for walking, hair, nostrils at the tip of its snout, external genitalia, and many other traits common to land-dwelling mammals.*
- *Prompt students to compare these traits with those of the Atlantic spotted dolphin. Ask students to surmise the adaptive quality of these changes over time—for example, how might the loss of hair increase the fitness of the dolphin?*

c) Since dolphins and fish evolved from different ancestors with completely different body plans, what would explain the development of similar physical traits such as the dorsal fin?

- *Discuss adaptive traits and remind students that the early ancestors of dolphin and fish faced similar environmental conditions.*
- *Because of similar biotic and abiotic constraints, similar morphological and behavioral solutions developed through evolution. This phenomenon is known as convergent evolution.*

3. **Any part of the environment that controls the growth of a population is a *limiting factor*. Limiting factors on a population's growth can be direct (e.g., predation, temperature) or indirect (e.g., disease outbreak on prey population). Do you think humans are a limiting factor, either directly or indirectly, to Atlantic spotted dolphin populations?**

- *Begin by leading a class discussion to identify things that dolphins or dolphin populations need to grow. Students should readily identify basic needs such as prey, habitat, and air. Ask students what constitutes good habitat for dolphins. Consider factors such as water quality, feeding grounds, and protection from predators on the overall growth of a dolphin population.*
- *Ask students to identify ways that humans can limit the availability of the identified basic needs to the point where these needs become limiting factors. Examples:*
  - *i. direct predation resulting from use of seine nets or long lines (bycatch)*
  - *ii. reduction in food supply from over-fishing, pollution*
  - *iii. accumulation of toxic substances from pollution*
  - *iv. disruption of pods by excessive boat traffic*

Suggested Activities for Further Study

Activity One: Watch a Marine Food Web Come to Life

In this classroom activity, student teams will work together to illustrate the roles and relationships of and between organisms by depicting a marine food web. Students will review and research appropriate food web vocabulary and a specific trophic level. Then, each student group will contribute their research to the creation of the class food web.

Teachers: Set aside a bulletin board or part of a wall to put together a class food web that includes an Atlantic spotted dolphin. The idea is to create a visual display of all food web terminology - drawn and clearly labeled. If time allows, reserve one class period for research, one for drawing, and one for assembling the web. If time doesn't allow, research and/or drawing may be assigned for homework.

1. Review the following terms: *autotroph, heterotroph, producers, consumers, decomposers, energy flow, food chain, food web, parasitism, commensalism, mutualism, competition, predation*

2. Break the class into groups by assigning each group a different *trophic level* - primary producers (autotrophs), primary consumers (herbivores), secondary consumers (carnivores), decomposers. Make appropriate research materials available so that students are able to find information about each trophic level in the food web that includes an Atlantic spotted dolphin.

3. Each group must select five species to include in their trophic level. Student groups work independently (either in the media center or other resource area) to study the roles and relationships of their organisms in the food web.

4. After appropriate research time, student groups come together to discuss, draw, and assemble the class food web using the information brought to the class by each "trophic group."

5. The teacher then leads a whole-class discussion and adds arrows to review the concept of energy flow.

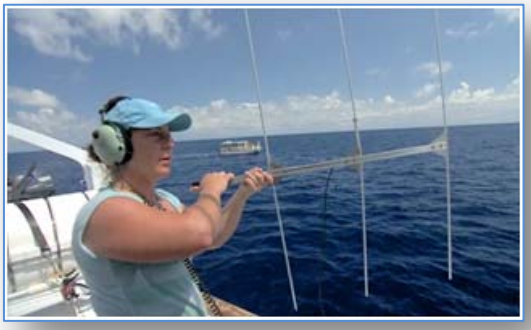
   (**Reminder: Be sure to point out that the arrows in a food chain or food web point in the direction of the flow of energy. It is a common student misconception to draw the arrows toward the organism that is "eating."*)

   Sample relationships to consider:

- Parasites – leeches, pathogens on fins, flukes
- Predators – sharks, people (fishing operations)
- Commensals – ramoras
- Mutualists – Pilot fish and tuna swim alongside dolphins and stay with the pod. Pod size increases the safety of all the animals within the group, especially the young.

Activity Two: Track a Dolphin

In this activity, students investigate the work of dolphin research scientists, including the scientific technology and data gethered from a dolphin radio-tracking device. Students will explore the abilities of radio-tracking techology. Students use resource materials and an online dolphin tracking site in order to form conclusions about the behavior of marine mammals.



- In the film, scientists attach a radio-tracking device to Cutter's dorsal fin. *Ask students what specific types of data the scientists were hoping to record (direction, depth, length of time spent in an area).*

- Using the classroom format that works best for your classroom, allow students time to gather information from an online dolphin tracking site. You might either work together as a class, pulling up the information and projecting it for a whole-group discussion, or take students to a computer lab or media center to work in groups or independently.

- An example of a web site that provides user-friendly tracking information is:

  http://www.mote.org/index.php?src=gendocs&ref=Dolphin%20Tracking&category=Main

  *(**Note: Even though the tracking records are a couple of years old, the information is easy to use in a classroom setting.)*

- Encourage students to follow the tracks of the dolphin over a specified time limit. Have students take rough measurements of the distance the dolphin travels each week or month. Make a data table and have students construct graphs as time permits.

Other Excellent Dolphin Resources

Spotted Dolphin Fact Sheet
http://www.acsonline.org/factpack/SpottedDolphin.htm

NOAA Atlantic Spotted Dolphin Fact Sheet
http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spotteddolphin_atlantic.htm

Marine Mammal Protection Act
http://www.nmfs.noaa.gov/pr/pdfs/mmpa_factsheet.pdf

Marine Mammal Conservancy
http://marinemammalconservancy.org/

The Wild Dolphin Project
http://www.wilddolphinproject.org/dev/index.php

The Whale and Dolphin Conservation Society
http://www.wdcs-na.org/

Mote Marine Laboratory
http://www.mote.org/

Marine Mammal Health and Stranding Response Program
http://www.nmfs.noaa.gov/pr/health/

Books

Biology of Marine Mammals by John Reynolds, Smithsonian Institution Press, 1999

Guide to Marine Mammals & Turtles of the U.S. Atlantic & Gulf of Mexico by Kate Wynne & Malia Schwartz, Rhode Island Sea Grant, 1999

Sierra Club Handbook of Whales and Dolphins by Stephen Leatherwood &Randall Reeves, Random House, 1983