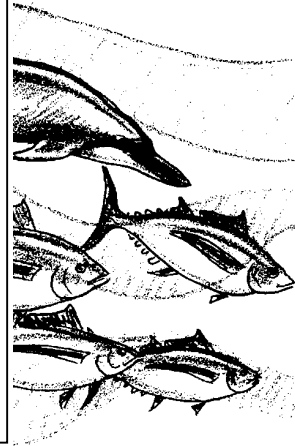


The Tuna/Dolphin Controversy – Part 2

Lesson by Barbara Baldwin, San Jose, CA

Key Concepts

1. When a resource is free for the taking, humans in modern economies tend to harvest as much of that resource as possible.
2. The harvesting of a food species can impact other marine animals. The “fishing on dolphins” method of fishing for tuna is a prime example.
3. People disagree about how whether any dolphins may be killed to help catch tuna. The tuna/dolphin international controversy is based on this disagreement.
4. Issues surrounding protection of marine mammals are complex but important.



Background

(Note: The following background information is also found in “The Tuna/Dolphin Controversy - Part 1”)

. Human interaction with marine mammals is surrounded by controversy. The nature of an ongoing controversy, such as that surrounding dolphin kills from tuna fishing, is that there are no hard and fast answers. This is likely to be frustrating for students and the general public alike.

For centuries, the nations of the world have refused to accept any restrictions or limitations on the quantity of fish that any one nation could catch. The international law of the seas provided for “complete freedom of the seas” outside accepted territorial waters. For most of previous history, this lack of catch restrictions is understandable. For example, both the size of the ships and the methods used to catch fish ensured the continuation of almost all of the species. A ship would put to sea, catch as many as it could hold, and return to port to process and sell its catch. Enough of the fish stock would remain behind to ensure species survival. Even so, humans did manage to overfish some coastal populations as witnessed by the decline or disappearance of whales in many coastal areas.

Modern technology, however, has enabled fishers to increase the total fish catch often to the point of destruction of the fish resource. In the case of tuna fishing, modern technology has inadvertently had a major impact on dolphins,

as well. In recognition of the potential adverse impact humans can have on populations such as those of tuna and dolphins, the U.S. "Law of the Sea" agreement and a similar United Nations agreement call on nations to conserve and protect resources. Some successes in conserving and protecting fish stocks have occurred along with many failures. Although disappointing, the failures are more often due to a lack of enforcement than to a continued philosophy of unlimited exploitation.

The story of the interactions between dolphins and tuna is an incredible one, bathed in ambiguity, political power plays, and a haze of legalities. The issues have been emotional and hotly debated. It is an international issue requiring international solutions.

For many years, people in the eastern tropical Pacific Ocean have observed that schools of yellowfin tuna commonly swim beneath schools of dolphins. Tuna fishermen were among the people who observed this phenomenon. In order to catch the tuna underneath, they set mile-long purse-seine nets around the dolphins. In so doing, tens of thousands of dolphins were caught and drowned in tuna nets each year. In the early 1970s, conservationists brought these drownings to the public's attention. Thus began the tuna/dolphin controversy.

It is important to note that the problem is virtually unknown to those under the age of 25. The vast majority of the public are either unaware that dolphin drownings occurred and continue to occur, or believe that the problem was solved long ago.

The controversy really has its roots in a method of fishing developed by the American tuna industry about 1960. The technique, called "fishing on dolphin", depends on the mysterious relationship between dolphins and tuna. This method, which came to dominate the yellowfin tuna industry, is called "fishing on dolphin". For unknown reasons, yellowfin tuna and certain dolphins (especially the spotted dolphin) swim together. One research theory states that the tuna rely on the dolphin's acute sense of hearing, or echolocation, to find food or to avoid predators.

Since dolphins are air breathing mammals, spotting dolphins when they come to the surface is relatively easy. The tuna boats search for the dolphins. When they locate the dolphins, the boats deploy very long purse seine nets to entrap the tuna that swim below the dolphins. As the net is pursued (drawn together), the tuna and dolphins are caught. This is a critical moment for the dolphins. Since they are air breathers, they are highly susceptible to drowning as the net encircles them. Since the late 1970s, American boats have used a technique called "backing down" in which the boat pulls the net out from under the dolphins. This strategy has greatly reduced dolphin drownings.

(Note: While the term "drowning" is used in these lessons and commonly in articles and news stories about this topic, technically dolphins are incapable of drowning; that is, inhaling

below the water surface and filling their lungs with water. A dolphin's blowhole will not open unless it is above water. If prevented from reaching the surface (by getting entangled in a net, for example), a dolphin will asphyxiate from lack of oxygen.)

At any point in this fishing method, dolphins may be killed or injured. People disagree about whether or not it is acceptable to kill any dolphins in these fishing operations. Such a disagreement is called a "controversy". The tuna/dolphin controversy centers over whether dolphins may be killed in order to catch the yellowfin tuna (and if so, how many?).

Since 1960, when the U.S. developed the technology of "fishing on dolphins", an estimated 6,000,000 dolphins have died in purse seining nets. From 1959 to 1972 a total of about 4.8 million dolphins is estimated to have been killed. When the Marine Mammal Protection Act was passed in 1972, the U.S. fleet was responsible for 87 percent of the dolphin kill. Since then, there has been a decrease in dolphin kill as shown in the table below.

<u>Year</u>	<u>U.S. Vessels</u>	<u>Non-U.S. Vessels*</u>	<u>Total</u>
1971	246,213	15,715	261,928
1972	368,600	55,078	423,678
1973	206,697	58,278	264,973
1974	147,437	27,245	174,682
1975	166,645	27,812	194,457
1976	108,740	19,482	128,222
1977	25,452	25,901	51,353
1978	19,366	11,147	30,513
1979	17,938	6,837	20,454
1980	15,305	29,598	49,551
1981	17,890	17,146	35,036
1982	23,267	5,065	28,332
1983	8,513	(no estimate available)	
1984	17,732	15,018	32,750
1985	19,205	36,032	55,297
1986	20,692	103,905	124,597
1987	<u>13,992</u>	<u>97,941</u>	<u>111,933</u>
TOTAL	1,443,685	552,198	1,995,883

Data from: Lo and Smith (1986); NOAA Fisheries (1987); and Hall and Boyer (1988)
 * Derived from subtracting U.S. from total mortality estimate

Above data is from Table 10 (Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972-1996) of the Marine Mammal Commission's 1996 Annual Report.

Some people say that the decrease has not been enough. They fear that yellowfin tuna fishing has already drastically reduced the dolphin populations. Some scientists state that dolphin population danger signs already exist. They note that because estimates on the number of animals killed are based on actual body counts, the numbers can be seriously misleading. Individuals that have been injured and escaped only to die a short distance away are not counted.

Because of these fears, various environmental groups initiated a successful campaign to change the regulations governing yellowfin tuna fishing. They recognized that the United States Marine Mammal Protection Act (MMPA) of 1972 calls for the reduction of marine mammal kills “to insignificant levels approaching zero mortality”. As noted in the table above, in spite of the law a large number of dolphins continued to be killed each year.

In 1984, the U.S. Congress reviewed the Marine Mammal Protection Act. Congressional representatives recognized that the dolphins were still in danger. They also recognized that U.S. tuna fishing crews were at a competitive disadvantage. U.S. boats spent more money to fish in ways that did not capture dolphins. To provide help for the dolphins and the fishers, Congress amended the Marine Mammal Protection Act. The new Act required that each nation exporting tuna to the United States provide documentary evidence that it had adopted a program comparable to the U.S. dolphin protection program. Exporting nations also had to provide evidence that the average rate of accidental dolphin deaths caused by its fleet is comparable to that of the U.S. fleet.

Since much of the tuna caught worldwide was destined for U.S. markets, the 1984 plan seemed like a good one. However, during an MMPA reauthorization hearing in April, 1989, it was noted that NOAA Fisheries hadn't yet completed regulations implementing the 1984 amendment. Foreign fleets were fishing and exporting tuna to the U.S. as they always had. It was also revealed that the U.S. tuna purse-seine fleet had declined by more than 60% in the last ten years but that the level of incidental dolphin take by the fleet had not gone down proportionately. The remaining boats were catching more, not fewer, dolphins. Finally, it was noted that the estimated numbers of dolphins killed by foreign fleets had increased dramatically in 1986 and 1987. Clearly, the 1984 changes in the Marine Mammal Protection Act were not being effectively implemented.

You might correctly guess that Congress was not pleased by these findings. In light of these developments, Congress enacted additional amendments that require the Secretary of Commerce (the person ultimately in charge of enforcing the MMPA) to find the regulatory programs of other nations unacceptable unless:

- They included prohibitions against encircling pure (i.e., single species) schools of certain marine mammals, and conducting “sundown sets”. Sundown sets were prohibited because dolphins are harder to see and remove from nets during sunset hours. The nation’s program would also need to implement other dolphin-saving measures applicable to U.S. vessels.
- The nation’s program reduced the average rate of incidental dolphin kills by its vessels to no more than 1 1/4 times that of American vessels.
- The total number of eastern spinner dolphins, Stenella longirostris, taken incidentally during the fishing season does not exceed 15% of the total number of all marine mammals taken incidentally by vessels of the harvesting nation.
- The total number of coastal spotted dolphins, Stenella attenuata, taken incidentally during the fishing season does not exceed 2% of the total number of all marine mammals taken incidentally by vessels of the harvesting nation.
- The rate of incidental takes during the fishing season is monitored by the Porpoise Mortality Observer Program of the Inter-American Tropical Tuna Commission or an equivalent international program in which the United States participates. The observer program must be based upon observer coverage equal to that of U.S. vessels during the same period.
- The harvesting nation complies with all reasonable requests by the Secretary for cooperation in carrying out the scientific research program required by the MMPA.
- The amendments also require that the government of any intermediary nation that exports yellowfin tuna or tuna products to the United States provide reasonable proof that these products didn’t originate from a country without an appropriate dolphin-protection program.

The message from the U.S. Congress to other nations was meant to be clear: “Play by these rules, or don’t sell tuna in this country”.

Congress also had a message for the U.S. tuna purse-seine fleet. The amendments to the Marine Mammal Protection Act which affect the U.S. fleet specified that:

- The Secretary of Commerce issue regulations to ensure that purse-seine sets on marine mammals are completed no later than 30 minutes after sundown.
- The Secretary establish performance standards encouraging U.S. fishermen to use the best marine mammal safety techniques and equipment that are economically and technologically practicable.

- The Secretary prescribe regulations prohibiting the use of Class C explosive devices (i.e., large firecrackers) to herd dolphins during fishing operations unless a study shows that the use of the devices doesn't harm or kill dolphins;
- Each U.S. tuna purse-seiner carry an official observer to conduct research and observe fishing operations during each trip to the eastern tropical Pacific;
- The Secretary contract with the National Academy of Sciences to help identify possible alternatives to the practice of setting-on-dolphin to catch tuna and submit to Congress a plan for developing and implementing any promising techniques; and
- The secretary submit to Congress a report describing efforts to reduce the incidental take of dolphin in the yellowfin tuna purse-seine fishery, and propose legislation or other measures to reduce or eliminate it.

Clearly, the U. S. Congress, responding to public outcry, wants to drastically reduce or eliminate dolphin kills. You should want that, too. But as with many complex issues, things are not always what they seem. Marine Mammal Biologist, Doug DeMaster at National Marine Mammal Laboratory has spent over ten years working on this problem. He notes that there are some important things to keep in mind:

- First, he notes that past levels of kill of spinner and spotted dolphins killed by tuna fisherman were not sustainable. The populations of these dolphins declined by 60 to 80%.
- Second, he and other scientists believe that the current kill level of less than 3,000 animals per year is sustainable. A sustainable level of kill means that, even though individual members of the population are killed, the size of the population does not drop dramatically. A population being harvested at a sustainable kill level is not in jeopardy of extinction.

Dr. DeMaster notes that the current kill rate is less than 0.5% per year. This means that for the population as a whole less than one out of every 200 animals dies in tuna nets each year. How can the tuna population keep from declining when there is a continuing tuna net kill rate of 0.5%? There are two ways for the dolphin population to maintain a constant size when a "new" mortality factor such as net kills is added: increase the birth rate, or decrease the mortality from some other factor. The dolphins have apparently been successful at one or the other or a combination of both since the population is now stable.

- Third, the U.S. tuna fleet in the eastern tropical Pacific, which included as many as 110 boats in the 1970s, now includes fewer than 10 vessels.

- Fourth, tuna boats now have individual quotas for the number of dolphins they can kill as part of their tuna fishing. Since these quotas have been established, the number of dolphins killed in tuna nets has decreased dramatically.

This all sounds as if the move toward “dolphin safe” tuna has been successful. True enough, but this success comes with a real threat to the ecosystem of which the dolphin is a part. Let’s see how by looking at Dr. DeMaster’s final point.

- Fifth, there are three ways to catch tuna in the eastern tropical Pacific. “Dolphin fishing” in which the nets encircle associations of dolphins and tuna is the way we’ve been focusing on. “School fishing” in which schools of tuna are encircled is a way which poses little danger to dolphins. The third way to catch tuna is called “log fishing” in which the net encircles associations of tuna, turtles, sharks, and other animals that gather around floating objects.

The “by-catch” (i.e., animals other than tuna) is vastly different depending on whether one dolphin fishes or not. The by-catch for dolphin fishing, for example, is 100 pounds of animals per net set. Virtually 100 pounds are dolphin. The by-catch for school fishing, on the other hand, is 5,000 pounds per set and for log fishing is 20,000 pounds per set. The by-catch consists of shark, turtles, small tunas, etc.

Clearly, “log fishing” is most harmful to the marine ecosystem. Contrary to what anyone hoped, “dolphin safe” policies might be a disaster for the eastern tropical Pacific ecosystem because of the annual removal of huge numbers of a variety of organisms as by-catch from school fishing and log fishing activities. The magnitude of the removal of organisms can be quickly calculated by knowing that about 10,000 dolphin sets are made each year. If all 10,000 were shifted to school fishing, 50,000,000 pounds of by-catch would occur; if all were shifted to log fishing, 200,000,000 pounds of other marine organisms would be lost.

At this point, the dolphin safe policy has primarily affected the U.S. fleet. Most U.S. boats now fish elsewhere. The Earth Island Institute, a environmental group, has been successful in forcing changes in the way people fish for tuna. They are working to eliminate the practice of “dolphin fishing” for tuna in the eastern tropical Pacific. If they are successful, however, the result could be the loss of 50,000,000 to 200,000,000 pounds of marine animals from the marine ecosystem each year. The reduction in the sustainable yield of tuna in the area will be 30%. These would be exchanged for not killing approximately 3,000 dolphins per year out of an estimated population of 10,000,000.

Our actions have very real consequences. Sometimes the choices are hard. Do you think the trade of 50,000,000 to 200,000,000 pounds of other marine animals and 30% of the tuna for 3,000 dolphins is a good one? In the view of many scientists, the trade is **not** a good one. The long term effects on the eastern tropical Pacific ecosystem (including the dolphins which live there) could be extremely deleterious.

Surely, no one wants to destroy the eastern tropical Pacific ecosystem. So, how do we find ourselves in this predicament. After more than 10 years of study, Dr. DeMaster sums it up by saying: “This is a classic case of ...creating a bigger problem than necessary because of the way we value charismatic vertebrates relative to non-charismatic vertebrates.”

By “charismatic vertebrates” Dr. DeMaster means that dolphins have a special charm or spiritual attraction. This attraction tends to make people value certain animals as “more important” or “more worthwhile”. If nothing else, our study of ecosystems shows us that each animal and plant has a special role to play in keeping a system functioning. We’ve come to learn that when we simplify an ecosystem (say, turn a forest into a corn field), that ecosystem becomes more vulnerable to damaging change. We would do well to apply that knowledge to complex problems. From the tuna/dolphin controversy we can see simple solutions to complex problems sometimes become problems of their own.

The tuna/dolphin controversy also provides an opportunity for your students to examine different interpretations of the same data. For example, few will argue with the fact that the number of dolphins killed in the eastern tropical Pacific yellowfin tuna seine fishing has declined dramatically since the 1970s. People will argue, however, about the causes of the decline. Some will claim that it is the “dolphin-safe” policy which has led to the dramatic increase. Others look at fishing effort and changes in fishing techniques and management and state that the cause of the decline is due to these actions. The article “The Tuna Dolphin Controversy” by Michael C. Scott cited in the bibliography provides an interesting insight into these questions and provides a technique for distinguishing between the effects of the “dolphin-safe” policy and other effects such as improved performance by fishers brought about by individual vessel limits on dolphin mortality and 100% observer coverage.

And what about dolphin mortality in other areas of the world ocean? Many tuna fisheries outside the eastern tropical Pacific kill dolphins during fishing operations. In these areas all that is required to certify the catch as “dolphin-safe” is a statement by the vessel captain. There are no observers at sea to verify the statement.

Complex problems such as the tuna/dolphin controversy require complex solutions. This problem has both scientific and social facets which must be

considered in any solution. In the next activity, “Canned Tuna”, some concrete ways you can help solve this problem are provided.

Sources for additional resources for information about marine mammals are found at the end of this Teacher Background section.

Materials

For each student:

For the class (optional):

- pictures of: tuna, dolphins, purse seine boats fishing for tuna, sportspeople fishing for tuna
- maps of the Eastern Tropical Pacific from California to Chile and extending to Hawaii

For each student:

- “The Tuna/Dolphin Controversy - Part 2” text and activity pages

Teaching Hints

“The Tuna/Dolphin Controversy - Part 2” examines the dolphin-tuna controversy. The nature of an ongoing controversy is that there are no hard and fast answers. This is likely to be frustrating for your students. The issues need to be discussed and developed. Unfortunately, the discussion does not provide the solution. “What Can You Do?” provides some concrete ways in which to approach this dilemma.

You may choose to encourage your students to become involved in the efforts outlined in “What Can You Do?” to reach an effective and sustainable management policy for tuna and dolphins. Provide encouragement for your students’ efforts but temper enthusiasm with a discussion of how we harvest meat in our country, recognizing that the way we view our slaughter of cattle, chickens, pigs, or turkeys might be similar to the way people of other countries view the killing of marine mammals. During the discussion pose the question: which group can claim the moral high ground on this issue? Is the answer, both? Or neither? Probably. The key to the problem of depleted marine mammal stocks likely lies in the proper management and controlled harvests which provide for a healthy population and an optimum sustainable yield.

In your discussions encourage students to recognize that the ethics or “humaneness” of the accidental harvesting of dolphins can (and one could argue, should) be separated from the issue of sustainability. As a nation, we

have not done a good job of separating the two. On this issue, Dr. Doug DeMaster, Biologist at the National Oceanic and Atmospheric Administration National Marine Mammal Laboratory, in reviewing these lessons noted:

“For example, typically conservation among scientists refers to ‘wise and sustained’ use; whereas to most Americans or at least some environmentalists, it is equated with ‘protection’. Further, people, who believe for ethical reasons that whaling should be banned, typically believe whaling is inhumane. Therefore, for these people the issue of sustainability is irrelevant. Perhaps the class should discuss the standards used in this country for what is humane relative to the production of beef, veal, chicken, etc. As is my usual ‘beef’, the American public is entirely inconsistent in the way it approaches complex issues. Ethics and emotion have a valid place in policy and decision making, but it needs to be recognized when a decision has been made for these reasons, as opposed to reasons relating to more traditional issues of conservation, such as ‘is a particular practice sustainable’. Out of respect for non-U.S. cultures, I recommend incorporating the concept of sustainability separate from ethical issues in evaluating the merits of whaling.”

In a time of a developing “global village”, this seems like wise advice.

Preparation:

Duplicate the student pages. The lesson is best completed by individuals working at home or in class. After the text is read and the text questions are answered, encourage small groups or class discussion of the questions included below. These materials allow for flexibility. Use the approach that will provide the most positive experience for your students

Key Words

back down - a way to pull the seine net out from under entrapped dolphins

boycott - refuse to purchase a product or service

conservationist - a person who promotes or advocates conservation of natural resources

controversy - a debate or argument

dolphin-safe tuna - tuna that was caught without the incidental death of dolphins

“fishing on dolphin” - a method for fishing for the tuna that swim under dolphins

cork line - the buoyant top of a seine net

lead line - weighted line at the bottom of a seine net

marine mammals - mammals (vertebrate animals that nourish their young

with milk) that live in marine waters

purse line - the line at the bottom of a seine net that pulls the net closed

purse seine - a fishing method using a purse seine net

purse seine net - a large seine net, generally deployed by two boats, that is drawn around a school of fish and then closed at the bottom by means of a line passing through rings attached along the lower edge of the net, like the draw string on a purse

sacrificed - lost or forfeited for a cause

tuna (yellowfin, Albacore, skipjack, bonito) - large deep-water fish that is a popular food source

Answer Key

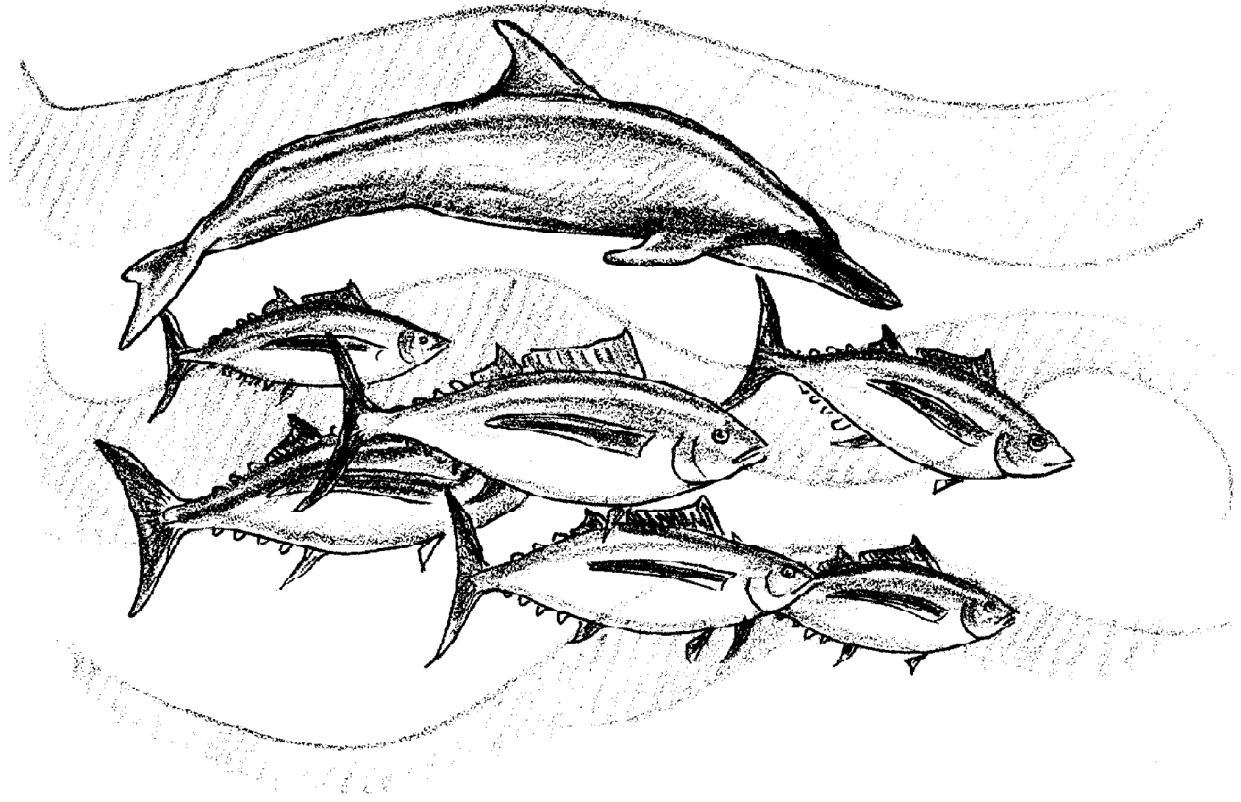
1. The effect of modern technology has been to increase the total fish catch often to the point of destruction of the fish resource.
2. The two warning signs that indicate a marine mammal population is being over-exploited are: a decline in the average size of the marine mammal of a given species that is taken; and, an increased intensity of the effort necessary to catch the same amount as harvested in previous years. In other words, more effort to catch smaller (often immature) individuals.
- 3 a. Between 1971 and 1987, 1,995,371 dolphins died in tuna purse seine nets.
b. In 1971, 246,213 dolphins died in the nets of U.S. fishing vessels. In 1987, 13,992 dolphins died.
c. In 1971, 15,715 dolphins died in the nets of non-U.S. fishing vessels. In 1987, 97,941 dolphins died.
d. The number of dolphins killed each year by non-U.S. vessels has increased.
e. The number of dolphins killed each year by U.S. vessels has decreased (but is still far from zero).
4. Thailand has to provide evidence that:
 - a. it has adopted a program comparable to the U.S. dolphin protection program, and
 - b. the average rate of accidental dolphin deaths caused by its fleet is comparable to that of the U.S. fleet.
5. The 1984 changes were not effective largely because they were not implemented.
6. Answers will vary but should be supported by reason.

7. Answers will vary but should be supported by reason.
8.
 - a. Zero dolphins died in the nets of U.S. fishing vessels in 1996.
 - b. Two thousand five hundred forty seven (2,547) dolphins died in the nets of non-U.S. fishing vessels in 1996.
 - c. Since 1989, what has happened to the number of dolphins killed each year by U.S. vessels has decreased.
 - d. Since 1989, the number of dolphins killed each year by non-U.S. vessels has also decreased.
9. Since the question calls for an opinion, answers will vary. A sustainable level of kill means that, even though individuals members of the population are killed, the size of the population does not change.
10. There are two ways for the dolphin population to maintain a constant size when a “new” mortality factor such as net kills is added: increase the birth rate, or decrease the mortality from some other factor. The dolphins have apparently been successful at one or the other or a combination of both since the population is now stable. In fact, the estimated population growth rates in 1997 are 2-4%, much higher than the 0.5% fishery mortality.
11. Two factors that have reduced the pressure on dolphins from tuna fishers include a reduction in the number of boats fishing for tuna, and individual quotas for the number of dolphins each boat may kill incidentally to the tuna fishing effort.
12.
 - a. Answers will vary, but most students will think that “dolphin fishing” is most harmful to dolphins.
 - b. Again, answers will vary. Many students will think that “log fishing” is most harmful to the ecosystem.
13.
 - a. This question is a re-asking of question 10. b. which asked for an opinion. Students now have the factual information to recognize that “log fishing” is most harmful to the marine ecosystem.
 - b. “Dolphin safe” policies might be a disaster for the eastern tropical Pacific ecosystem because of the annual removal of huge numbers of a variety of organisms as by-catch from school fishing and log fishing activities. The magnitude of the removal of organisms can be quickly calculated by knowing that 10,000 sets are made each year. If all 10,000 were made during school fishing, 50,000,000 pounds of by-catch would occur; if all were made during log fishing, 200,000,000 pounds of other marine organisms would be lost.
14. Since this question calls for an opinion, accept any reasoned answer. In the view of many scientists, the trade is not a good one. The long term effects on the eastern tropical Pacific ecosystem (including the dolphins

which live there) could be extremely deleterious.

15. Answers will vary. Use this question as an opportunity to discuss the role of public involvement and the need for that involvement to be informed.

The Tuna/Dolphin Controversy – Part 2



The nations of the world have for centuries refused to accept any restrictions or limitations on the quantity of fish that any one nation could catch. The international law of the seas provided for “complete freedom of the seas” outside accepted territorial waters. For most of previous history, this lack of catch restrictions is understandable. For example, both the size of the ships and the method used to catch marine mammals ensured the continuation of all the species. A ship would put to sea, catch as many as it could hold, and return to port to process and sell its catch. However, modern technology has provided fishing fleets entirely capable of decimating fish populations.

1. What has been the effect of modern technology on the total fish catch ?

The extermination of a species occurs through what is technically called “over-exploitation”. The results of over-exploitation vary from a slow decline in

the abundance and availability of a species to an abrupt and permanent elimination.

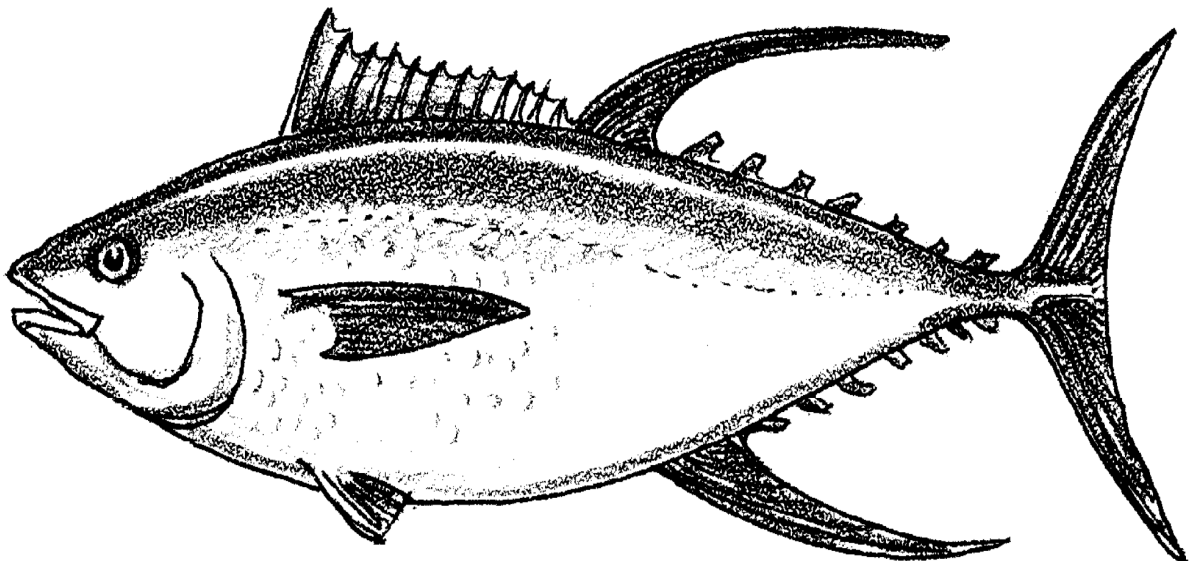
The usual signs of over-exploitation are a decline in the average size of the animal that is taken, **and** an increase in the effort necessary to catch the same amount as harvested in previous years.

The normal response to a declining marine species has been for the fleet to increase hunting time and energy, while making improvements in gear and methods.

2. What are the two warning signs that indicate a marine mammal population is being over-exploited?

In most cases, an attempt to revive the species by halting or limiting the size of the catch is not initiated. Some scientists think that we are seeing warning signs in tropical tuna populations.

For many years, people in the Eastern Tropical Pacific Ocean have observed that schools of yellowfin tuna commonly swim beneath schools of dolphins. Tuna fishermen were among the people who observed this phenomenon. In order to catch the tuna underneath, they set mile-long purse-seine nets around the dolphins. In so doing, tens of thousands of dolphins were caught and drowned in tuna nets each year.



Many people in the United States and elsewhere were alarmed by the numbers of dolphins killed in tuna fishing nets. As a result of this concern, the United States Marine Mammal Protection Act (MMPA) of 1972 was enacted. The

Act calls for the reduction of marine mammal kills “to insignificant levels approaching zero mortality”. The table below shows the number of dolphins killed each year during this period.

Incidental Mortality of Dolphins in the Eastern Tropical Pacific Yellowfin Tuna Purse-Seine Fishery			
<u>Year</u>	<u>U.S. Vessels</u>	<u>Non-U.S. Vessels</u>	<u>Total</u>
1971	246,213	15,715	261,928
1972	368,600	55,078	423,678
1973	206,697	58,278	264,975
1974	147,437	27,245	174,682
1975	166,645	27,812	194,457
1976	108,740	19,482	128,222
1977	25,452	25,901	51,353
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1986	20,692	103,905	124,597
1987	13,992	97,941	111,933
TOTAL	1,443,684	552,200	1,987,371

From Table 10 (Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972-1996) of the Marine Mammal Commission's 1996 Annual Report.

3. Use the table above to answer the following questions:
 - a. How many dolphins died in tuna purse seine nets between 1971 and 1987?
 - b. How many dolphins died in the nets of U.S. fishing vessels in 1971? in 1987?
 - c. How many dolphins died in the nets of non-U.S. fishing vessels in 1971? in 1987?
 - d. What has happened to the number of dolphins killed each year by U.S. vessels?
 - e. What has happened to the number of dolphins killed each year by non-U.S. vessels?

In 1984, the U.S. Congress reviewed the Marine Mammal Protection Act. Congressional representatives recognized that the dolphins were still in danger. They also recognized that U.S. tuna fishing crews were at a competitive disadvantage. U.S. boats spent more money to fish in ways that did not capture dolphins. To provide help for the dolphins and the fishers, Congress amended the Marine Mammal Protection Act. The new Act required that each nation exporting tuna to the United States provide documentary evidence that it had adopted a program comparable to the U.S. dolphin protection program. Exporting nations also had to provide evidence that the average rate of accidental dolphin deaths caused by its fleet is comparable to that of the U.S. fleet.

4. In order to be allowed to export tuna to the United States, what two pieces of evidence does Thailand have to provide to the U.S. government?

a.

b.

Since much of the tuna caught worldwide was destined for U.S. markets, the 1984 plan seemed like a good one. However, during an MMPA reauthorization hearing in April, 1989, it was noted that NOAA Fisheries hadn't yet completed regulations implementing the 1984 amendment. Foreign fleets were fishing and exporting tuna to the U.S. as they always had. It was also revealed that the U.S. tuna purse-seine fleet had declined by more than 60% in the last ten years but that the level of incidental dolphin take by the fleet had not gone down proportionately. The remaining boats were catching more, not fewer, dolphins. Finally, it was noted that the estimated numbers of dolphins killed by foreign fleets had increased dramatically in 1986 and 1987.

5. In terms of reducing the deaths of dolphins, how effective were the 1984 changes in the Marine Mammal Protection Act?



Spotted Dolphin

You might correctly guess that Congress was not pleased by these findings. In light of these developments, Congress enacted additional amendments that require the Secretary of Commerce (the person ultimately in charge of enforcing the MMPA) to find the regulatory programs of other nations unacceptable unless:

- They include, no later than the start of the 1990 fishing season, prohibitions against encircling pure (i.e., single species) schools of certain marine mammals, and conducting “sundown sets”. Sundown sets were prohibited because dolphins are harder to see and remove from nets during sunset hours. The nation’s program would also need to implement other dolphin-saving measures applicable to U.S. vessels.
- The nation’s program reduces the average rate of incidental dolphin kills by its vessels to no more than two times that of American vessels by the end of the 1989 fishing season. By the end of the 1990 fishing season and thereafter, the average rate could be no more than 1 1/4 times greater.
- The total number of eastern spinner dolphins, Stenella longirostris, taken incidentally during the 1989 and subsequent fishing seasons does not exceed 15% of the total number of all marine mammals taken incidentally by vessels of the harvesting nation.
- The total number of coastal spotted dolphins, Stenella attenuata, taken incidentally during the 1989 and subsequent fishing seasons does not exceed 2% of the total number of all marine mammals taken incidentally by vessels of the harvesting nation.
- The rate of incidental takes during the 1989 and subsequent fishing seasons is monitored by the Porpoise Mortality Observer Program of the Inter-American Tropical Tuna Commission or an equivalent international program in which the United States participates. The observer program must be based upon observer coverage equal to that of U.S. vessels during the same period.
- The harvesting nation complies with all reasonable requests by the Secretary for cooperation in carrying out the scientific research program required by the MMPA.
- The amendments also require that the government of any intermediary nation that exports yellowfin tuna or tuna products to the United States provide reasonable proof that these products didn’t originate from a country without an appropriate dolphin-protection program.

The message from the U.S. Congress to other nations was meant to be clear: “Play by these rules, or don’t sell tuna in this country”.

6. In your opinion, which of the requirements imposed by the Congress seems to be most important in reducing the number of dolphins killed? Why?

Congress also had a message for the U.S. tuna purse-seine fleet. The amendments to the Marine Mammal Protection Act which affect the U.S. fleet specified that:

- By January 1, 1989, the Secretary of Commerce issue regulations to ensure that purse-seine sets on marine mammals are completed no later than 30 minutes after sundown.
- By January 1, 1990, the Secretary establish performance standards encouraging U.S. fishermen to use the best marine mammal safety techniques and equipment that are economically and technologically practicable.
- The Secretary prescribe regulations, effective April 1, 1990, prohibiting the use of Class C explosive devices (i.e., large firecrackers) to herd dolphins during fishing operations unless a study shows that the use of the devices doesn't harm or kill dolphins;
- Until at least the 1991 fishing season, each U.S. tuna purse-seiner carry an official observer to conduct research and observe fishing operations during each trip to the eastern tropical Pacific;
- The Secretary contract with the National Academy of Sciences to help identify possible alternatives to the practice of setting-on-dolphin to catch tuna and, by December 5, 1989, submit to Congress a plan for developing and implementing any promising techniques; and
- On or before April 1, 1992, the secretary submit to Congress a report describing efforts to reduce the incidental take of dolphin in the yellowfin tuna purse-seine fishery, and propose legislation or other measures to reduce or eliminate it.

7. In your opinion, which of the new requirements imposed on the U.S. tuna purse-seine fleet is most important in reducing the number of dolphins killed? Why?

How effective have the changes regulations and fishing techniques been in reducing the number of dolphins killed? The following table extends the dolphin mortality information presented earlier.

Incidental Mortality of Dolphins in the Eastern Tropical Pacific Yellowfin Tuna Purse-Seine Fishery			
<u>Year</u>	<u>U.S. Vessels</u>	<u>Non-U.S. Vessels</u>	<u>Total</u>
1971	246,213	15,715	261,928
1972	368,600	55,078	423,678
1973	206,697	58,278	264,975
1974	147,437	27,245	174,682
1975	166,645	27,812	194,457
1976	108,740	19,482	128,222
1977	25,452	25,901	51,353
1978	19,366	11,147	30,513
1979	17,938	6,837	24,775
1980	15,305	29,598	44,903
1981	17,890	17,146	35,036
1982	23,267	5,065	28,332
1983	8,513	(no estimate available)	
1984	17,732	15,018	32,750
1985	19,205	36,032	55,237
1986	20,692	103,905	124,597
1987	13,992	97,941	111,933
1988	19,712	61,881	81,593
1989	12,643	84,403	97,046
1990	5,083	47,448	52,531
1991	1,002	26,290	27,292
1992	439	15,111	15,550
1993	115	3,601	3,716
1994	105	4,065	4,170
1995	0	3,274	3,274
1996	0	2,547	2,547
TOTAL	1,482,783	800,820	2,275,090

From Table 10 (Estimated incidental kill of dolphins in the tuna purse seine fishery in the eastern tropical Pacific Ocean, 1972-1996) of the Marine Mammal Commission's 1996 Annual Report.

8. Use the table above to answer the following questions:

a. How many dolphins died in the nets of U.S. fishing vessels in 1996?

- b. How many dolphins died in the nets of non-U.S. fishing vessels in 1996?
- c. The MMPA was reauthorized in 1989. Since then, what has happened to the number of dolphins killed each year by U.S. vessels?
- d. Since 1989, what has happened to the number of dolphins killed each year by non-U.S. vessels?

Clearly, the U. S. Congress, responding to public outcry, wants to drastically reduce or eliminate dolphin kills. You should want that, too. But as with many complex issues, things are not always what they seem. Marine Mammal Biologist, Doug DeMaster at National Marine Mammal Laboratory has spent over ten years working on this problem. He notes that there are some important things to keep in mind:

- First, he notes that past levels of kill of spinner and spotted dolphins killed by tuna fisherman were not sustainable. The populations of these dolphins declined by 60 to 80%.

9. What do you think the term “sustainable” means in relation to kill levels of dolphins?

- Second, he and other scientists believe that the current kill level of less than 3,000 animals per year out of an estimated population of 10,000,000 is sustainable. A sustainable level of kill means that, even though individual members of the population are killed, the size of the population does not drop dramatically. A population being harvested at a sustainable kill level is not in jeopardy of extinction.

10. Dr. DeMaster notes that the current kill rate is less than 0.5% per year. This means that for the population as a whole less than one out of every 200 animals dies in tuna nets each year. How can the dolphin population keep from declining when there is a continuing dolphin net kill rate of 0.5%?

- Third, the U.S. tuna fleet in the eastern tropical Pacific, which included as many as 110 boats in the 1970s, now includes fewer than 10 vessels.
- Fourth, tuna boats now have individual quotas for the number of dolphins they can kill as part of their tuna fishing. Since these quotas have been established, the number of dolphins killed in tuna nets has decreased dramatically.

11. What are two factors that have reduced the pressure on dolphins from tuna fishers?

- a.
- b.

This all sounds as if the move toward “dolphin safe” tuna has been successful. True enough, but this success comes with a real threat to the ecosystem of which the dolphin is a part. Let’s see how by looking at Dr. DeMaster’s final point.

- Fifth, there are three ways to catch tuna in the eastern tropical Pacific. “Dolphin fishing” in which the nets encircle associations of dolphins and tuna is the way we've been focusing on. “School fishing” in which schools of tuna are encircled is a way which poses little danger to dolphins. The third way to catch tuna is called “log fishing” in which the net encircles associations of tuna, turtles, sharks, and other animals that gather around floating objects.

12. a. Which of the three tuna fishing techniques do you think is most harmful to dolphins? Please explain your choice.

- b. Which of the three tuna fishing techniques do you think is most harmful to the marine ecosystem? Please explain your choice.

The “by-catch” (i.e., animals other than tuna) is vastly different depending on whether one dolphin fishes or not. The by-catch for dolphin fishing, for example, is 100 pounds of animals per net set. All 100 pounds are dolphin. The by-catch for school fishing, on the other hand, is 5,000 pounds per set and

for log fishing is 20,000 pounds per set. The by-catch consists of shark, turtles, small tunas, etc.

13.a. Which of the three tuna fishing techniques is most harmful to the marine ecosystem?

b. Many U.S. canneries have announced policies to only buy “dolphin safe” tuna. How might these policies be a disaster for the eastern tropical Pacific ecosystem?

At this point, the dolphin safe policy has primarily affected the U.S. fleet. Most U.S. boats now fish elsewhere. The Earth Island Institute, a environmental group, has been successful in forcing changes in the way people fish for tuna. They are working to eliminate the practice of “dolphin fishing” for tuna in the eastern tropical Pacific. If they are successful, the result could be the loss of 50,000,000 to 200,000,000 pounds of marine animals from the marine ecosystem each year. The reduction in the sustainable yield of tuna in the area will be 30%. These would be exchanged for not killing approximately 3,000 dolphins per year.

14. Our actions have very real consequences. Sometimes the choices are hard. Do you think the trade of 50,000,000 to 200,000,000 pounds of other marine animals and 30% of the tuna for 3,000 dolphins is a good one? Please explain your choice.

After more than 10 years of study, Dr. DeMaster sums it up by saying: “This is a classic case of well meaning environmentalists creating a bigger problem than necessary because of the way we value charismatic vertebrates relative to non-charismatic vertebrates.”

By “charismatic vertebrates” Dr. DeMaster means that dolphins have a special charm or spiritual attraction. This attraction tends to make people value certain animals as “more important” or “more worthwhile”. If nothing else, our study of ecosystems shows us that each animal and plant has a special role to play in keeping a system functioning. We’ve come to learn that when we simplify an ecosystem (say, turn a forest into a cornfield), that ecosystem becomes more vulnerable to damaging change. We would do well to

apply that knowledge to complex problems. From the tuna/dolphin controversy we can see simple solutions to complex problems sometimes become problems of their own.

15. What types of action could you take to let others know about this complex problem?

In the next section, you will find some concrete ways you can help solve this problem.

What Can You Do?

Here are some actions you can take immediately.

Write letters

Let the tuna companies know that you appreciate their efforts to reduce dolphin kills but that the problem needs further study, or why you won't buy their "Dolphin Safe" products.

Starkist Foods, Inc., 180 E. Ocean Blvd., Long Beach, CA 90802

H.J. Heinz Co., P.O. Box 57, Pittsburgh, PA 15230

Van Camp Seafood Co., 901 Chouteau Avenue, St. Louis, MO 63164

Ralston Purina Co., Checkerboard Square, St. Louis, MO 63164

Let Congress and the U.S. Commerce Department know that the Marine Mammal Protection Act's intent was to reduce dolphin mortality not to destroy the ecosystem of the eastern tropical Pacific. The U.S. should take a leadership role in avoiding ecosystem destruction in the name of dolphin protection

Chairman
House Subcommittee on Fisheries, Wildlife Conservation and the Environment
544 House Annex 11
Washington, D.C. 20515

National Ocean Policy Study
Senate Commerce Committee
527 Hart Senate Office Bldg.
Washington, D.C. 20510

U.S. Department of Commerce
National Marine Fisheries Service
Universal Bldg.
1825 Connecticut Avenue N.W.
Washington, D.C. 20235

Your Representative
U.S. House of Representatives
Washington, D.C. 20515

Your Senator
U.S. Senate
Washington, D.C. 20510

Write letters to the editor, opinion pieces or editorials in your local newspapers.

Let Others Know about the Issue

Write to Earth Island Institute, Dolphin Project, 300 Broadway, Suite #28, San Francisco, CA 94133. Thank them for their past efforts and ask them to redirect their efforts toward protection of the eastern tropical Pacific ecosystem.

Prepare a public service announcement for your local radio station and television.

But, Does It Work?

Just as public opinion helped cause the Soviet Union to stop whaling and public opinion caused the tuna purse-seine fleet to change their fishing techniques, so can public opinion work for a solution which protects the ecosystem as well as the dolphins. We can make our voices heard and have an effect. Let's do it now!