Bioethics@
IOWA STATE UNIVERSITY

Marine Mammal Protection and Management: A Case Study

By: Dr. D. J. Orth, Virginia Polytechnic Institute, Participant in the 1996 MSU Bioethics Institute

Relevant Facts about Marine Mammals
Biologically, marine mammals are those members of the Class Mammalia that are morphologically adapted to life in the ocean. They include three taxonomic Orders, the Cetacea (whales and porpoises), Pinnipedia (seals, walruses and sea lions), and Sirenia (manatees and dugongs). Other groups (sea otters and polar bears) are considered marine mammals in US legislation. Many coastal cultures hunted whales and thrived on the meat, skins, and other products of whales, seals, and polar bears. Threats to these creatures have been well publicized. Some whales were hunted to near-extinction, porpoises were killed during purse netting for Pacific tuna, contaminated sea lions aborted young, Northern fur seals were overharvested, and manatees were injured from motorboat collisions.

The Marine Mammal Protection Act, passed by the U.S. in 1972, is the most comprehensive protective mechanism for marine mammals. It established a moratorium on hunting, capturing, or killing marine mammals in U.S. waters and by U.S. citizens on the high seas and on importing marine mammals and marine mammal products into the U.S. The MMPA also directs that commercial fishing operations reduce incidental kill or serious injury to marine mammals. Taking of marine mammals is permitted only after scientists determine that a population is at or above the Optimum Sustainable Population (OSP) level. Additionally, the U.S. Endangered Species Act (1973) protects 16 marine mammals (as of Aug. 1996) threatened with extinction. Internationally, thirty five marine mammals receive indirect protection under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates trade in threatened plants and animals. The International Whaling Commission (IWC), formed to serve the whaling industry concerns, now primarily addresses whale concerns.

Cetacean Biology and Classification
There are over seventy-five species of whales and dolphins, arranged in nine families: Balaenidae (right whales), Balaenopteridae (rorquals, which include Brydes, blue, fin, minke, and sei whales), Eschrichtiidae (gray whale), Physeteridae (sperm whales), Monodontidae (Narwhal and Beluga), Ziphiidae (beaked whales), Delphinidae (oceanic dolphins), Phocoenidae (true porpoises), and Platanistidae (river dolphins). The first three families are baleen whales, collectively known as Mysticeti ("mustache whales"), which feed by trapping prey in keratinous plates (baleen) that hang from the roof of their mouth. Baleen whales are usually found alone or in small groups during nonbreeding times. The other families are toothed whales, or Odontoceti, which are predators on squid.
and fish. The mysticetes have paired blowholes while the odontocetes have a single orifice. The toothed whales are usually highly social and capable of rapid evasive action. Several traits of whales make them particularly vulnerable to harvest. The population rate of increase is low (from 0.03 to 0.08 percent per year) due to delayed sexual maturity, long gestation periods (16 months in some whale species), a single offspring at each birth, and longevity up to 90 years or more (i.e., K-selected). Their large size, air breathing, and social behavior have all further contributed to vulnerability.

Much has been written about intelligence of cetaceans. The widely-held belief that a large brain implies a high level of intelligence has led to claims about intelligence of cetaceans. However, there are no objective definitions of what constitutes "intelligence" and how to measure intelligence in animals (even human animals); whether cetaceans are more intelligent than pigs, for example, cannot be definitively answered. The neocortex (brain structure associated with advanced mental processes) in cetaceans is extensive, but that fact leaves many questions of cetacean intelligence unanswered. Cetaceans are sentient beings, capable of experiencing pleasure and pain.

**Products**

Oil was historically the most economically important product from whales. Oil of baleen whales is similar to that found in plants and other animals, i.e., triglycerides, consisting of one molecule of glycerine with three molecules of fatty acids. In the past, these oils were used for lighting, heating, foodstuffs, margarine, soaps, and lubricants. Oil of toothed whales is a wax used for candles, leather dressing soaps, and lubricants. One exceptionally valuable byproduct from sperm whales was ambergris, a gray, waxy substance formed as an impaction in whale intestines. Ambergris was incorporated in cosmetics, love potions, headache remedies, and perfume. Whale bone, or the keratin baleen plates, were used to make corsets. Bones were used to make furniture (vertebrae), fence pickets (ribs), and housing beams. Whale meat is still popular in Japan and Norway, where the lack of agricultural lands limits space for economical production of livestock.

**History of Whaling**

"a whale ship was my Yale College and my Harvard." Ishmael in Moby-Dick

Early human-whale encounters (hundreds of years B.C.) were due to whale stranding behavior; today the mystery of whale beaching remains. Early descriptions of whales were based on beached specimens and these encounters would eventually lead to whaling. Somewhere around 1000 B.C. the Basques began commercial whaling for right whales (so named because they had thick blubber, did not swim too fast for little boats, and floated when killed). Use of protected bays and inlets for breeding made some whales particularly vulnerable to whalers.

As stocks were depleted, the Basque, British, and Dutch whalers expanded the hunt to bowhead whales in arctic waters and eventually to sperm whales worldwide. Early whaling was a dangerous profession as men, armed with slim iron harpoons, attacked whales from rowboats and held on to wounded, thrashing 60-ton whales. Despite the inefficient hunting techniques, bowhead, sperm, gray, right, and humpback whale populations were seriously depleted by the beginning of the 20th century. Late in the 19th century the Norwegians developed mechanized whaling (exploding grenade harpoons, bow-mounted cannons, and steam catcher boats), which made the fast-swimming rorqual whales (blue, fin, sei, Brydes, minke) vulnerable to capture. Whales were a common property resource, implying freedom of access. Consequently, local coastal stocks were quickly depleted, demonstrating the "tragedy of the commons." The response was for whalers to move farther in search of whales. Floating factory ships with stern slipways allowed processing far from land and whale stocks in the Antarctic and all oceans were targeted by various whaling nations. International agreements to regulate whaling were not made until the 1930s and 1940s. First regulations were
intended more to stabilize the market, preventing overproduction of whale oil, and to increase the output of oil per whale. Harvest was restricted to after summer feeding had fattened the whales.

In 1946, the International Whaling Commission was formed to "provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." The commission is open to whaling and non-whaling nations. However, regulations of the International Whaling Commission are difficult to enforce; any nation may object to decisions of the IWC and thereby exempt itself from certain IWC rules. Since regulations are left to the national fisheries agencies to enforce, international pressure and trade sanctions are the only way to encourage compliance.

Scientific management was slow to be applied to whaling. In the mid 1950s virtually no quantitative studies were being done on whale stocks and scientists attending IWC meetings had little, if any, quantitative expertise. As expertise in whale population analysis was applied in the 1960s, the world demand for whale products declined. Some American whaling persisted for pet food as recently as 1960s. However, by the mid 1970s all eight great whales were widely regarded as endangered and the public acceptance of whaling was changing, especially in the U.S.

Since 1970 U.S. society has treated whales as conservation symbols and herculean efforts were made to "save the whales" For example, in 1988, $5.8 million was spent in an attempt to save three trapped gray whales (see Tom Rose, Freeing the whales). During recent development of U.S. policy the protectionist community has advanced a non-consumptive use philosophy, often supplanting scientific management with emotion. Support for a moratorium on whaling shifted from a resource management question to an ethical question. Former Chairman of the U.S. Marine Mammal Commission, writes:

"Whales are different. They live in families, they play in the moonlight, they talk to one another, and they care for one another in distress. They are awesome and mysterious. In their cold, wet, and forbidding world they are complete and successful. They deserve to be saved, not as potential meatballs but as a source of encouragement to mankind."

Popular culture reinforces a mediagenic image of whales. In Startrek IV: The Return Home humankind is saved because whales are brought back from the brink of extinction. Management procedures followed by the IWC are based on the maximum sustained yield (MSY) concept. The MSY concept states that the surplus of recruits beyond natural mortality is greatest at some intermediate population level and the surplus can be harvested without depleting the population. Estimating the MSY and population levels for whale species proved very difficult, preventing agreement on management recommendations. Therefore, in 1982, the IWC imposed a moratorium on all commercial whaling because data on whale stocks and dynamics were deficient. The moratorium took effect in 1986 and was to last until 1990, by which time the IWCs Revised Management Procedure (RMP) would set scientifically defensible quotas. The moratorium remains in effect today, despite the unanimous recommendation by the IWC's scientists that the RMP quota setting is defensible. Japanese and Soviet whalers continued to take whales under scientific research permits; Japan has killed approximately 300 minke whales per year since 1987. The worldwide ban on commercial whaling cannot be justified on efforts to "save the whales" because of the 79 species of cetaceans, only nine (plus three species of river dolphins) are in fact endangered. However, you must realize that the demography of cetaceans is a highly imprecise science. Furthermore, the blue whale and humpback whale have been totally protected from commercial hunting since 1965 and right whales and gray whales since the 1930s.
**Lessons Learned**
The history of whaling and attempts to regulate whaling highlight several important lessons for natural resource management.

1. Sustainable use requires science-based management.
2. Early intervention to limit access is needed to prevent overharvest.
3. Accurate biological data are needed on each species and subspecies.
4. Monitoring of users is needed to ensure compliance with regulations.
5. Political agreement that your goal is desirable (e.g., sustainable whaling) must be reached before you can do science-based management.
6. Scientific advice is seldom neutral. It is generated in a cultural context, which influences the outcome. Consequently, interpretations of the same information by the whaling industry, environmentalists, and cetologists are usually conflicting.

**Current Controversy over Whaling**

**The case for whaling**
Once petroleum based products replaced whale oil (circa: 1900) and vegetable oils could be hydrogenated to make margarine (1960s), the justification for large-scale whaling ceased to exist. In the 1970s and 80s, whaling continued to provide meat in those societies where it had historically been an important part of the diet. Meeting this need requires small-scale fisheries, not the industrial-scale factory ships that decimated the great whale stocks. Total value of whale products in 1972 was estimated at $100 million with potential value up to $500 million. Iceland, Japan, and Norway currently express interest in resuming commercial whaling and most other nations have low consumer demand for whale meat. Therefore, the market demand for whale products is limited, alleviating fears of overharvest. Furthermore the Norwegian quota of minke whales (425 in 1996) can be harvested from the northeast Atlantic population of 110,000 minke whales with little or no risk to the population.

A ban on whaling does not safeguard ecosystem integrity. The three countries involved have limited land areas suited for modern agricultural meat production. Whaling is energy efficient and results in less environmental damage than land-based food production (e.g., soil erosion, wildlife habitat loss, contaminants, greenhouse gases). Compared to coastal whaling where fossil-fuel energy input to protein-energy output ratios are 2:1, farm raised chicken, pork, and feedlot beef production ratios are 22:1, 35:1 and 78:1, respectively. Small-scale whaling is also ten times more fuel efficient than major fisheries for finfish (cod, tuna, etc.) and shrimp. Whale fisheries can be effectively regulated with quotas because the targeted whale can be identified to species and sex and prohibitions against catching females with calves can be enforced.

The coastal communities of Japan, Norway, and Iceland have traditionally acquired most of their dietary protein from marine fisheries. Many whalers also derive income from fishing; thus whales and humans compete for seafood. Food consumption by sperm whales worldwide is 100 million tons per year; by comparison the total world catch of seafood is ~100 million tons per year. Therefore, increasing whale stocks may threaten the livelihood of coastal communities dependent on fisheries.

The argument for whaling is not entirely based on use values. In Japanese coastal whaling villages, minke whale meat and blubber are important for thirty different culturally significant events. Hunting, processing, distribution, consumption and celebration phases of whale use are important components of the society's cultural identity. The promotion of whales as conservation symbols to be protected at all cost has ignored the cultural values of those communities that have historically harvested whales. Many Japanese view the protectionist attitudes of Western countries as ethnocentric or downright racist.

**The case against whaling**
Although historically the case against whaling has centered on the ethics of contributing to the extinction of whales, the rebound in whale populations has forced whale
protectionists to develop an alternative position. Whales have intrinsic values apart from their human uses. This value can only be protected by recognizing cetacean rights and preventing inhumane treatment and killing.

The intrinsic values far exceed the economic value of whale products. Whales are unique in their intelligence level, playfulness, and grace. As sentient beings it is morally wrong for humans to unnecessarily cause them pain and suffering. Furthermore, there are alternatives for most products derived from whales and it is not necessary to kill whales to fulfill essential human needs. Other non-consumptive uses of whales are more acceptable to our society and contribute to economies. For example, in 1991 over 4 million people spent over $300 million on whale watching activities.

**Oversimplifying the case**

Those opposed to whaling tend to talk about the whale in the singular, not the 75 or more species of cetaceans. Consequently the image of the >super-whale< is created. The super-whale is the largest mammal on earth (blue whale), has a large brain-to-body-weight ratio (bottlenose dolphin), sings (humpback whale), has nurseries (some dolphins), is friendly (gray whale), and is endangered (blue whale, right whale). The super-whale is endowed with all the qualities we like to see in fellow humans: kindness, caring, playfulness. The super-whale is the image of a single whale possessing all these generalized traits; such a creature does not exist. Norwegian whaling - Norway, Japan, and Iceland oppose the current IWC moratorium on commercial whaling. Norway has been most successful in preserving its whaling industry. Currently Norwegian whalers operate out of small (50-60 foot), family-financed boats. They do not see themselves as a threat to whale populations. Norway ceased commercial whaling in 1987, pending research into the status of minke whale population of the northeast Atlantic. They resumed harvest in 1993 with a quota of 293 minke whales. Minke whales, at eight tons, are the smallest of the great whales. The quota in 1996 for 31 licensed boats was 425. An international minke whale sighting survey in 1995 produced an estimate of 110,000 whales (95% confidence intervals of 97,000 to 144,000). Whalers shoot them with a small harpoon; in the 1994 season 30% died instantly and the average time to death was 3 minutes. Whalers earn $13 a kilogram for the whale meat, which in shops cost four times that. What is your opinion on whaling by Norway? Is it wrong? Why or why not?

**Aboriginal subsistence whaling**

In 1982, the IWC distinguished between commercial and subsistence whaling. Aboriginal subsistence harvest means whaling for purposes of local aboriginal consumption, carried out by native peoples who share community, family, societal, or cultural ties related to traditional dependence on whaling or on the use of whales. The U.S. government requested an IWC permit for harvest of endangered bowhead whales by the Alaskan Inuits; the justification was to satisfy cultural and nutritional needs. The bowhead quota for Alaskan Inuits was a total of 141 for the three years 1992, 1993 and 1994. A maximum of 54 bowheads may be hit (by harpoons) every year, a maximum 47 may be landed every year (a number of wounded whales escape after being hit) and no mothers with calves may be hunted. The quota for 1994-98 was 204 bowheads and Russian and Canadian natives are now requesting quotas. The Alaskan Inuits continue to use seal-skin boats (umiak), but have adopted penthrite projectiles, small grenades designed to ensure a quick death when a whale is harpooned. The Bering-Chukchi stock in the Beaufort Sea (from which the Inuits hunt) is estimated to be 6,400 to 9,200 animals (most likely number is 7,500). Scientists estimate the replaceable yield of bowhead whales is 254 animals (most likely), or 92 animals (minimum) per year.

In 1996 the U.S. petitioned the IWC on behalf of the Makah Tribal Council to kill 5 gray whales off the coast of Washington. The Makah support resumption of the hunt for cultural reasons. Because they stopped hunting gray whales in the 1920s when gray
whales were approaching extinction the Makah cannot prove that they have a subsistence need. The gray whale came off the endangered list in 1994, and there are now about 21,000 gray whales. World Wildlife Fund, Sea Shepherd Conservation Society, Cetacean Society International, and the US Congress pressured the U.S. delegation to drop the petition. How can the U.S. justify dropping the request of the Makah to hunt a recovered whale population while it supports Alaskan harvest of an endangered bowhead population.

**Ethical Dilemma**
The whale controversies involve ethical dilemmas in addition to scientific problems. It is important to separate the two in order to make the rationale for one’s position clear. Is it morally wrong to kill whales (or other cetaceans)? Should commercial whaling be banned? Should aboriginal whaling be banned? Whose rights take precedence? Human rights to pursue traditions or animal rights? Think about the logical consequences of your arguments. What general moral principle did you use to support your argument? Is it possible that anti-whaling forces are missing a larger threat? What is our ethical obligation to preserve ocean habitats for the whales, other marine life and humans? Depleted fisheries, pollution from oil tankers etc., ozone depletion and phytoplankton productivity declines, coastal development, harassment of whales by enthusiastic whale watchers, and other difficult dilemmas affect all forms of life dependent on the oceans.

**Evaluating Moral Arguments**
General moral principles guide our everyday decisions. For example, one principle is "one must respect human rights or be banned from society." Along with the rights come responsibilities as rights granted to one individual may limit the freedom of another. The form of your moral argument regarding whaling takes the following form:

- Empirical premises
- General moral principle
- Conclusion

**One example would be:**
1. Whaling involves the infliction of unnecessary suffering and death on sentient beings.
2. Causing unnecessary suffering, or unnecessary death, in sentient beings (whales) is wrong.
3. Conclusion: Whaling is wrong.

**Another possible example is:**
1. Whale hunting is a part of the cultural tradition of certain societies.
2. Whale hunting provides protein in coastal communities with limited land for crop production.
3. Whale killing can be done in ways to minimize pain and suffering.
4. Whale hunting is sometimes permissible.

**In order to evaluate these and other arguments, you should evaluate three questions:**
1. Are the empirical premises true?
2. Does the conclusion follow logically from the premises? and
3. Is the general moral principle justifiable?

The best arguments will survive this scrutiny. Develop an alternative argument to support your position on whaling.
Take Home Message
The controversies surrounding marine mammal protection and management are similar to many controversies in fisheries and wildlife. Scientists and decision makers are involved in making hard choices about dynamic world situations in the face of uncertainty. Some of the decisions are scientific, some are moral decisions, but all are difficult. To foster dialogue and continued learning we must alleviate tensions among conflicting interests and develop creative solutions. We also must learn to debate moral as well as scientific arguments and recognize the difference.

For More Information
American Cetacean Society, PO Box 1391, San Pedro, CA 90733-1391 (e-mail: acs@pobox.com)

Information on the World Wide Web:
Cetacean Society International WWW site: http://elfnet1a.elfi.com/csihome.html
Tirpitz - Information on whales: http://tirpitz.ibg.uit.no/www/ss.html
Dancing Dolphin Institute: http://www.maui.net/%7Edolfyna/index.html
Dolphin Circle Homepage: http://www.premier1.net/~iamdavid/
High North Alliance Web: http://www.highnorth.no/th-ec-pe.htm
Sea Shepard Conservation Society: http://www.envirolink.org/orgs/seashep/
### Population Estimates

<table>
<thead>
<tr>
<th>Species</th>
<th>Pre-Whaling Stock</th>
<th>Current Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue</td>
<td>160,000-240,000</td>
<td>9,000</td>
</tr>
<tr>
<td>bowhead</td>
<td>52,000-60,000</td>
<td>8,200</td>
</tr>
<tr>
<td>Bryde's</td>
<td>unknown</td>
<td>66,000-86,000</td>
</tr>
<tr>
<td>fin</td>
<td>300,000-650,000</td>
<td>123,000</td>
</tr>
<tr>
<td>gray (E Pac.)</td>
<td>15,000-20,000</td>
<td>21,000</td>
</tr>
<tr>
<td>gray (W Pac.)</td>
<td>1,500-10,000</td>
<td>100-200</td>
</tr>
<tr>
<td>gray (Atl.)</td>
<td>unknown</td>
<td>extinct</td>
</tr>
<tr>
<td>humpback</td>
<td>150,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Minke</td>
<td>unknown</td>
<td>850,000</td>
</tr>
<tr>
<td>no. right</td>
<td>unknown</td>
<td>870-1,700</td>
</tr>
<tr>
<td>sei</td>
<td>100,000</td>
<td>55,000</td>
</tr>
<tr>
<td>so. right</td>
<td>unknown</td>
<td>1,500</td>
</tr>
</tbody>
</table>