

include direct hunting. The most seriously threatened cetaceans (by direct hunting and incidental captures in fisheries) are a number of species and populations of the smaller cetaceans. At present, there is no single international body responsible for their conservation and management. There is considerable disagreement within the IWC as to whether the present Convention is sufficient to allow the IWC to assume such a role. Fortunately, there is general agreement that the IWC Scientific Committee can consider the status of small cetaceans and provide advice to governments even though the IWC cannot set management regulations—it is to be hoped that governments individually and collectively respond. It remains a matter of some urgency that an international agreement or series of regional agreements be reached to ensure the conservation of small cetaceans.

5. *Whalewatching*: The IWC is involved (in a monitoring and advisory capacity) with aspects of the management of whale-watching as one type of sustainable use of cetacean resources. It has adopted a series of objectives and principles for managing whalewatching proposed by the Scientific Committee.

B. Other Scientific issues

The Commission funds and acts as a catalyst for much cetacean research. One major program is a series of Antarctic cruises to estimate abundance that has been carried out since 1978. These are now called SOWER (Southern Ocean Whale and Ecosystem Research) circumpolar cruises and include a component dedicated to blue whales.

With increasing awareness that detrimental environmental changes may threaten whale stocks, the IWC has recently accorded priority to research on the effects of such changes on cetaceans. Whilst the RMP adequately addresses such concerns, the Scientific Committee has agreed that the species most vulnerable to such threats would be those reduced to levels at which the RMP, even if applied, would result in zero catches. It has developed considerable efforts into examining the effects of chemical pollutants on cetaceans, the effects of noise, including seismic surveys, and habitat degradation, including the effects of climate change and ozone depletion. It is also increasing collaboration and cooperation with governmental, regional, and other international organizations working on related issues.

The work in these areas carried out by the IWC Scientific Committee is recognized worldwide. The Commission has increasingly published scientific reports and papers; this culminated in the launch of the *Journal of Cetacean Research and Management* in 1999.

C. Politico-ethical Issues

Of prime consideration from both a scientific and an ethical viewpoint is the possibility of extinction of any population due to whaling. No population of whales is currently under threat of extinction from whaling, and it is clear that any acceptable management procedure will ensure that this cannot happen. However, this presumes an acceptance that whales are a natural resource to be harvested. While this is the stated position of many members of the IWC, it is not universally accepted. A wide range of opinions have been expressed, ranging from the belief that whales are such a “special” group of animals that they should not be killed under any circumstances, through the view that they should not be commercially killed because whale products are not essential, to the view that whales are a natural resource to be used like any other.

In this regard, the question of humane killing has once more arisen within the IWC, with some nations stating that even if a safe management procedure is adopted, catch limits should not be set unless a “satisfactorily humane” killing method is available. This subject has been addressed several times during the history of the IWC and the Commission has been active in promoting work on more humane killing techniques for both commercial and aboriginal subsistence whaling. However, obtaining agreement on what comprises a “satisfactorily humane” technique will not be simple. In particular, in the case of aboriginal subsistence whaling, arguments of tradition and culture can clash with the adoption of modern technology.

VI. Conclusion

Many of the earlier discussed “politico-ethical” issues are linked to questions of culture and freedom; they are complex and almost inevitably will not be resolved unanimously. There is clearly a divergence of opinion within the IWC on such matters to an extent unparalleled in any similar organization. It is, for example, difficult to think of any fisheries organization where some of the members believe that it is immoral to catch fish under any circumstances. This is not the place to enter into a philosophical debate over the rights of nations or groups of nations to impose their moral values on others, but merely to point out the necessity of such a debate and the need for a degree of compromise if the IWC is not going to fragment, with potentially serious consequences for the world’s whales and other cetaceans (Donovan, 1992; Punt and Donovan, 2007).

See Also the Following Articles

Conservation ■ Management ■ Popular Culture and Literature ■ Population Dynamics ■ Stock Assessment ■ Stock Identity ■ Whaling, Modern

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INUIT AND MARINE MAMMALS

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I. Introduction

Inuit, meaning “people,” is used for the native “Eskimo” peoples of Chukotka, northern Alaska, Canada, and Greenland. Inuit represent one extreme of the hunter-gatherer paradigm, almost exclusively hunting to thrive in one of the Earth’s harshest

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environments, the Arctic. Most Inuit hunting focuses on marine mammals. The bowhead whale (*Balaena mysticetus*) is much of the harvest, particularly on the Western Arctic coast. Whaling determined the formation and survival of permanent sedentary villages. When whaling was not feasible, Inuit depended upon caribou (*Rangifer tarandus*) and other marine mammals.

Inuit have hunted marine mammals and caribou (*R. tarandus*), for millennia. The Birnirk culture (AD 400–900) was the first to incorporate hunting great whales into their subsistence regime. Whaling was completely integrated into the Thule culture by AD 900. Around AD 1200, Thule folk spread from Alaska into Canada and Greenland. The ancestral Inuit toolkit employed raw materials from hunted species, worked stone, and driftwood. Their technology relied upon compound tools. A harpoon might employ a driftwood shaft, a caribou antler foreshaft, a walrus (*Odobenus rosmarus*) bone-socket piece, a walrus ivory-finger rest, caribou sinew lashings, a whale bone head, a slate blade, a walrus hide line and a seal-skin float.

The harpoon head toggled, or turned, 90° upon penetrating the animal, preventing withdrawal. The shaft fell away, leaving a line running back to the hunter or to a float, an inflated sealskin. It marked the prey's location and tired it as it attempted to swim or dive. The first commercial whalers to enter the seas near Greenland found Inuit hunting bowhead whales from umiat (skin-covered driftwood framed boats), using compound harpoons with toggling heads.

Inuit clothing was superior to Western alternatives historically, and was often adopted by explorers and whalers. Entire Inuit families were hired to travel aboard commercial whaling ships in the Arctic; women made and mended clothing for the crew and men hunted with the Yankees. By the late 19th century, Yankee whalers also adopted toggling harpoons (Brower, 1942; Bockstoce, 1986).

Boat skins came from seals and walruses. These, with caribou and birds, also provided skins for clothing. Marine mammal oil provided fuel for lamps, the only heat source other than body heat in houses. In Alaska, driftwood semisubterranean houses incorporated long entrance tunnels made of whale bones, whereas in the areas of Canada and Greenland where driftwood was scarce, houses were constructed with whale bones, or with stone and bone. The only prehistoric qargi, or whalers' ceremonial house, excavated in north Alaska was constructed of whale bones (Sheehan, 1997).

The Inuit diet relied upon meat and blubber from whales, seals, and polar bears (*Ursus maritimus*). Caribou meat was eaten with seal oil or whale oil. Inland Inuit relied upon traded marine mammal oil for a critical part of their diet (Sheehan, 1997). Pokes (seal skins) filled with oil were used to preserve foodstuffs. Until the mid-19th century in Alaska, oil pokes were major trade items from coastal areas (Maguire, 1988).

Whaling provided a dependable food surplus to precontact coastal Alaskan communities, allowing them to organize their lives around the whale hunt (Sheehan, 1997). This whaling culture was successful for a millennium. Whaling remains the organizing focus of Inuit life today in Alaska and is an important part of Inuit ideology in other parts of the Arctic. Marine mammal hunting still underpins Inuit subsistence activities and social interactions.

II. Precontact Whaling

Inuit whaling developed independently in several areas. Sedimentary ancient DNA (*SedaDNA*) (Seersholm et al., 2016) and other evidence (Møbjerg, 1999) indicates that the Saqqaq culture of Greenland's west coast, part of a broader North American Arctic

tradition, were using baleen whales by 2500 BC. However, the roots of modern Inuit whaling apparently developed in the Bering Sea/Strait region roughly 2000 years ago in Okvik and Old Bering Sea cultures. The diversity and complexity of tools used for hunting and processing marine mammals increased between BC 100 and AD 600, although they continued to be a focus for technological innovation. This suggests increased dependence on whales and other marine mammals (Stoker and Krupnik, 1993). Adoption of dragfloat technology may have transformed whale hunting from a "status" activity resulting in lucky "windfalls," into a "normal" activity resulting in a substantial regular payoff. Transformation of the umialik (whaling captain) from a temporary hunt leader into a permanent political leader responsible for distributing the whaling surplus allowed the population to thrive and grow. The combination of technological and social change culminated in the Punuk and the Thule cultures starting at AD 800–900.

The Thule whaling culture developed in northwestern Alaska around AD 850–900 and in the 13th century spread rapidly across Arctic North America. This expansion coincided with a period of warming, which probably resulted in seasonally open water along the entire coast, making Pacific and Atlantic whale populations contiguous. These conditions encouraged the expansion of a shore-based whaling culture.

The climate was not warm and stable for long; colder weather increased sea ice cover and reduced the distribution and perhaps the number of whales. This reduced the coastlines where whaling-based subsistence was feasible. Accordingly, dramatic changes occurred in Thule whaling culture throughout its range. Thule culture gave rise to the contemporary Inuit cultures of present-day Canada, Greenland, and Alaska. In Alaska, people continued whaling by clustering in large permanent villages at points of land, where near-shore leads in the ice formed reliably. The leads became the foci of the whale harvest, supplemented by fall whaling in open water, as whales migrated south. Thule people who could no longer whale successfully focused on smaller marine mammals and other game. Parts of the central Canadian Arctic were depopulated.

III. Mysticetes

A. Bowhead Whale, agviq

The bowhead whale is the largest animal hunted by any hunter-gatherer society. Adults reach at least 20 m and weigh 50,000 kg or more. The slow moving, blubber-rich whale is an ideal target, often traveling close to shore in predictable migration patterns. However, the advent of commercial whaling and the consequent contact with Europeans forever changed the patterns of indigenous bowhead whaling. Commercial whalers reduced bowhead populations to levels too low to support subsistence hunting in most of their range.

Alaskan Inuit returned to a strictly subsistence bowhead hunt after commercial whaling ended in the early 20th century, averaging of 15–20 whales annually (Bockstoce, 1986). After 1970, there was a significant increase in the number of bowheads landed in Alaska, resulting from multiple factors. Increased cultural awareness by Alaska Natives, due to the passage of the 1971 Alaska Native Lands Claim Settlement Act, and the boost to the economy of northern Alaska from Prudhoe Bay oil and construction of the Trans-Alaska pipeline, led to an increase in the number of whaling captains. Only hunters who demonstrated great success and respect for customs could become captains, while the expense of whaling gear limited entry. The 1970s boom resulted in a doubling of whaling crews from 44 in 1970 to 100 in 1977. Numbers of whales landed also doubled. This increase, and NOAA's (National

Oceanic and Atmospheric Administration's) estimate that only 600–2000 bowheads remained in the Arctic, prompted the International Whaling Commission (IWC) to call for a total ban on bowhead whaling. The Inuit reacted strongly, arguing that the IWC had grossly underestimated the population. They formed the Alaska Eskimo Whaling Commission (AEWC), representing all whaling villages.

In 1978 the AEWC, through the United States delegation to the IWC, negotiated a quota of 12 bowheads landed or 18 struck for the Alaskan villages. The IWC continues to establish quotas for Alaskan whalers, and the AEWC distributes strikes to the villages. Research proved the whaling captains correct. The most recent census (Givens et al., 2013) of the Bering-Chukchi-Beaufort Seas bowhead stock estimated the population was 16,892 in 2011. The rate of increase is 3.7% per year. Thus, the number of strikes allotted to Alaskan whalers was increased to the estimated need level based on Inuit population size and patterns of customary and traditional usage of whale products. In 2012, a block quota of 336 whales was set for the years 2013–18. That includes whales allocated to Chukotka by the AEWC. Currently, the bowhead whale is hunted under the quota system in northern Alaska in 11 villages along the Bering, Chukchi, and Beaufort Sea coasts. In 1991, Canadian Inuit at Aklavik landed a bowhead for the first time since the early 20th century. This hunt continues with very low quotas. Greenland has an annual quota of two bowheads.

I Alaskan Inuit hunt bowhead during the spring and fall migrations. In spring, bowheads migrate from wintering grounds in the Bering Sea to feeding areas in the eastern Beaufort Sea. Typically, they move along open leads in the ice which occur in predictable places along the Alaskan coast. Bowheads migrate north in early spring, passing the whaling villages of Gambell and Savoonga, then past Point Barrow, arriving in the eastern Beaufort in late spring. Bowheads begin the return migration across the central Beaufort Sea in early fall and pass Alaska's north coast by mid-fall.

Today's whaling equipment is a combination of precontact technology and IWC-mandated tools adopted from Yankee whalers. The boat (umiaq) has a skin-covered frame traditionally made of driftwood lashed with baleen, now of prepared lumber. The cover is made from the skins of bearded seals (*Erignathus barbatus*) or walrus sewn together using a special waterproof stitch. In areas with heavy ice, umiat are still used because they are lighter than other boat types, and hence easier to move over and around ice. During fall whaling, and during spring whaling in areas where leads are wide and whales travel farther from the ice edge, aluminum or fiberglass boats with outboard motors are used. Weapons used for hunting are essentially the same equipment used by commercial whalers at the end of the 19th century. The darting gun and shoulder guns, introduced by Yankee whalers soon after the Civil War, were adopted by Inupiat hunters in the late 19th century (Brower, 1942; Bockstoce, 1986). The brass bombs are charged with penthrite for quicker kills.

Inuit believed, and many still believe, that whales give themselves willingly to hunters worthy of their sacrifice. Traditionally, many rules governed activities in whaling camps, and were strictly followed to ensure a successful hunt. Most rules have been relaxed, but traditions still govern camp activities.

When a suitable whale comes within range, the umiaq is launched. The harpooner strikes from as close as possible. As soon as the whale is struck, the float is thrown overboard. If possible, the shoulder gun is used to place another bomb. Other crews converge on the site of the strike in the faster aluminum boats to ensure that a struck whale will not be lost.

After the whale is killed, the captain of the crew that first struck the whale says a prayer (to the Christian God). All available boats tow the whale tail-first to the butchering site. Word of the success is sent to the village, where the flag of the successful crew is raised over the captain's home. Villagers then travel to the butchering site to assist. A large block and tackle attached to the ice is used to haul up the whale. If the whale is very large, butchering may commence in the water. The tongue or skull may be removed to ease the task of hauling the carcass onto the ice. Butchering begins quickly because the thick blubber layer retards heat loss and the meat in an unbutchered whale quickly spoils. The whale is divided within the community according to strict customs (Fig. 1).

The next day, the captain of the successful crew opens his home to the community, sharing whale and other food and drink. In early June, the umiat of successful whaling crews are hauled off the ice in ceremonies (apugauti). Again, the captain feeds all in attendance. Nalukataq, the formal whaling festival, takes place in June. Members of successful crews distribute the majority of the meat and maktak reserved for the community as well as caribou meat and soup, duck soup, goose soup, and other traditional foods. After that, the blanket toss begins, usually followed by a traditional dance.

Bowhead maktak is the most prized food in the Arctic. Shares of meat and maktak are widely distributed among family and neighbors, often to family members living in cities who would not receive traditional foods otherwise. Baleen, traditionally used to make toboggans, snares, and nets is now crafted into artwork and sold.

B. Gray Whale (*Eschrichtius robustus*), agvigluaq

Only the Chukotkan Inuit of the Russian far-east regularly hunt gray whales. Historically, Chukotkans whaled from shore-based stations. After the Soviets banned the traditional hunt and instituted a catcher boat-based hunt (Freeman et al., 1998), few people remembered traditional hunting methods. After the catcher boat stopped whaling in 1992 (Freeman et al., 1998), villagers hunted marine mammals again to supplement dwindling food supplies.

The return to traditional, shore-based whaling was difficult and costly. Lack of equipment and knowledge had serious, even fatal, consequences in several villages. Assistance from the AEWC and the North Slope Borough (NSB) helped ease the transition. In Lorino, some experienced hunters taught younger hunters from several villages and the hunt for gray whales resumed. This harvest is now sanctioned by the IWC, with a quota of 744 gray whales in Chukotkan villages for 2013–18. Gray whale hunting is again an important part of Chukotkan culture and diet.

Gray whales are hunted in summer when they move into the Bering Sea from wintering grounds. Whalers from shore stations use skin boats (baidara) or wooden whaling boats. The traditional harpoon-spear is used (Freeman et al., 1998), consisting of a wooden shaft with a detachable metal spear attached to a line with a float. Once harpoons are set, whales are shot with rifles and darting guns. This form of hunting is often dangerous. Gray whales can fight aggressively. Two boats are used to ensure the hunters' safety. The hunters also try to take small- or medium-sized whales.

C. Humpback Whale (*Megaptera novaeangliae*) and Fin Whales (*Balaenoptera physalus*)

Greenlandic Inuit hunted humpback whales from skin boats. Humpback whales are slow-swimming whales. Techniques used for bowhead whales were successful for humpbacks as well. Although Greenlandic bowhead hunting ceased in the mid-19th century, humpback whaling continued.

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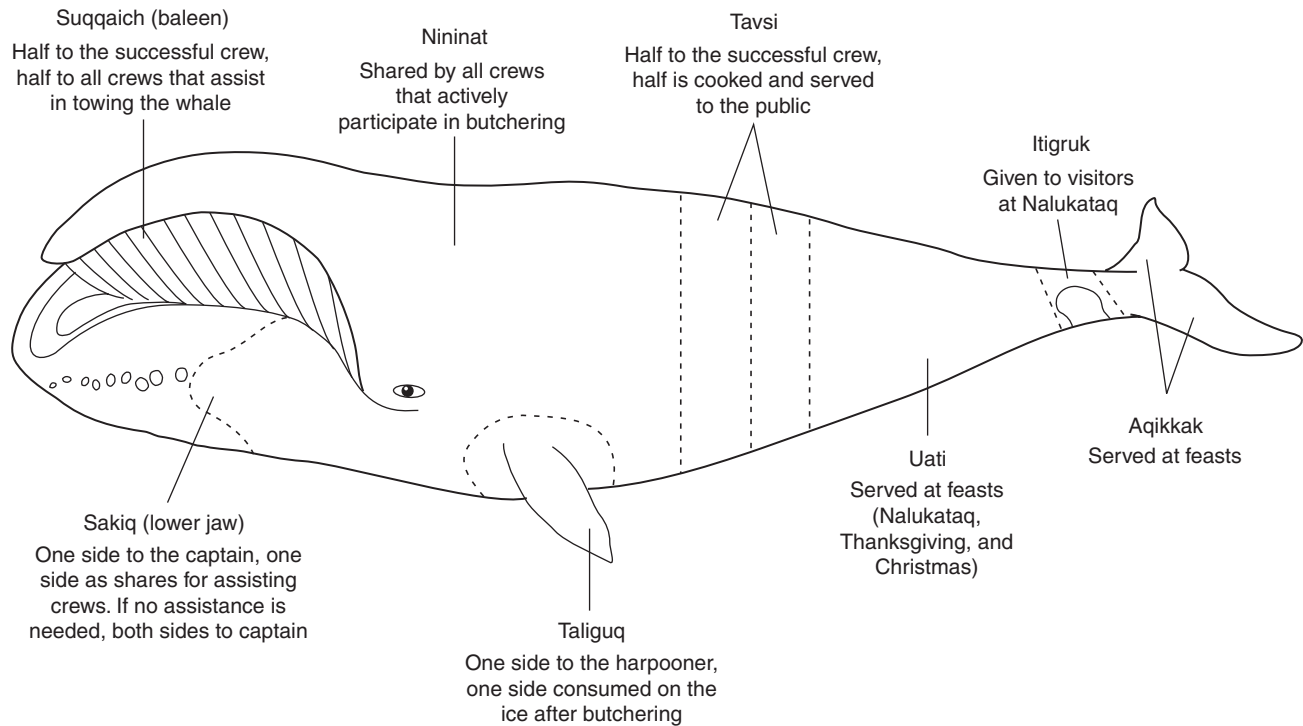


Figure 1 Division of bowhead whale (*B. mysticetus*) shares in Barrow, Alaska. From Harry Brower, Jr.

In the 1920s, changing ice conditions caused food shortages among the Greenlandic Inuit who could no longer catch seals or humpback whales using traditional means. Steel catcher boats, which could also take fin whales, were used from 1924 to 1960. The meat was consumed locally and the blubber was shipped to Denmark for rendering and sale. Some local fishermen installed harpoon cannons on their boats for hunting whales. The whales are towed to the community where meat and maktak are sold. The annual quota is 19 fin and 10 humpbacks for West Greenland.

D. Minke Whale (*B. acutorostrata*)

Greenlanders have hunted minke whales since 1948. The hunt is controlled by quotas set by the IWC and administered by the Greenland Home Rule Authority. The 2015–18 annual quotas are 164 minkes for West Greenland and 12 for East Greenland. Minke whales are hunted in summer and fall, ice conditions permitting.

Hunts from fishing boats and skiffs are opportunistic. Whalers on fishing boats use deck-mounted harpoon cannons, whereas skiff hunters use handthrown harpoons and rifles. Whales are towed back to the community for flensing and distribution.

IV. Odontocetes

A. Beluga Whale (*Delphinapterus leucas*), qilalugaq

Beluga whales are hunted across their range. This species was a focal resource for precontact Inuit of the Mackenzie Delta, constituting up to 66% of their meat (Friesen and Arnold, 1995). Ancestral Inuit techniques were used until commercial whalers arrived. Entire communities participated in a collective whale hunt. In some locations, hunters in kayaks cooperated to drive belugas into shallow water where they were killed. In northern Greenland,

and possibly elsewhere, belugas were hunted at ice leads where belugas congregated to breathe.

Methods changed with the introduction of rifles, fiberglass and aluminum boats, and outboard motors. Today, hunters in Alaska use four methods to hunt belugas: Harpooning or shooting from the ice edge or shore in spring, shooting from motorized boats in open water, netting, or driving the whales into shallow water. Shallow water drives are most common in bays and estuaries.

Belugas are the most widely taken whale species in Canada (Freeman et al., 1998). Hunters in northern Quebec and the Belcher Islands use skiffs or freighter canoes powered with outboard motors. Harpoons are still used, although rifles are used to kill the harpooned whales. After a successful hunt the meat and maktak are distributed to family members and neighbors according to traditional customs.

Beluga hunting in Greenland has followed a history similar to hunting of other larger whale species. Typically, kayaks and motorized skiffs are used to hunt belugas, often singly or in pairs, but sometimes many small boats cooperate to hunt belugas swimming together. Meat and maktak are distributed throughout the community, including sale at local markets, and in retail stores throughout Greenland.

Beluga hunting in Russia occurs in a few villages in Chukotka, and numbers taken are small. Hunting occurs opportunistically when belugas are encountered during other activities. Hunters shoot the whales with rifles. Meat, maktak, and oil are consumed. The skin is used for boot soles, belts, and lines.

B. Narwhal (*Monodon monoceros*), qilalugaq tuugaalik

Narwhals have been hunted in Greenland and eastern Canada for centuries. Narwhal ivory was bartered among Inuit long before

European contact. Narwhal tusks were highly valued by European traders in the Middle Ages, who sold the tusks mislabeled as unicorn horn. They were traded between Greenlandic Inuit and Europeans up through the 19th century, and were important to Canadian Inuit after the collapse of commercial bowhead whaling. Inuit in Greenland and Canada used the tusks to create durable and functional tools, especially harpoon foreshafts.

Narwhals were hunted like belugas, from kayaks along the flow edge, in leads, or in open water. Hunting in Canada now uses skiffs, rifles, and harpoons with floats. Hunters in northern Greenland use kayaks. Skiffs or small cutters are used in southern Greenland, although occasionally narwhals are shot from shore or netted.

Maktak from narwhals is prized. Narwhal oil is of higher quality than seal oil and was used in lamps for heat and light. The tusk remains the most highly prized product. Today tusks are used for artwork or sold. Narwhal meat was used to feed dog teams.

V. Pinnipeds and Polar Bears

A. Ringed Seal (*Pusa hispida*), natchiq; Bearded Seal, ugruk; and Harp Seal (*Pagophilus groenlandicus*)

Seals are the most widely distributed, abundant, and reliable food resource available to coastal Inuit populations. Ringed seals (natchiq) are available nearshore for much of the year. Bearded seals are also important, although less abundant and less widely available. Both of these species provide meat and raw materials, particularly hides (Jensen, 1987). Harp seals are seasonally very abundant in certain areas of Greenland and eastern Canada, and are taken when present. Ribbon seals (*Histiophoca fasciata*), larga seals (*Phoca largha*), and harbor seals (*P. vitulina*) are only occasionally encountered. All of these pinnipeds are hunted in similar ways and have been combined for the following discussion. Boas (1964) presented an excellent description of prerifle seal hunting methods and equipment.

Traditionally, breathing-hole hunting was most common, as ice covered the ocean much of the year. Breathing-hole hunting was a difficult and cold endeavor, and is no longer practiced to any great extent. Now, more efficient and less strenuous methods are preferred. In spring, pregnant ringed seals hollow a natal den in the snow covering one of their breathing holes. Hunters often used dogs to find the dens. Prior to the introduction of rifles, the seals were killed with a spear or club; later they were shot through the wall of the den. After the breeding season, seals enlarge their breathing holes located on large areas of flat ice so that they can climb out and bask in the sunshine. Traditionally, Inuit had several methods for hunting seals at this time, these are described in detail in Nelson (1969) and Boas (1964).

One traditional technique required stealth and skill. The hunter emulated a seal's behavior, sliding along the ice on his side. A skilled hunter could approach a seal basking in the sun very closely, and might kill 10–15 seals in a day. In a variant of this method, the hunter pushed a small sled with a white shield that hid him from the seals.

Seals could also be netted at breathing holes. Netting was done at night to prevent the seal from seeing and avoiding the net. This also reduced the hunters' vision and exposed the hunter to many dangers. Seal netting was discontinued in some areas in the 1960s, but is still practiced in Greenland and Quebec.

Traditionally, ice-edge hunting used a small harpoon thrown at seals swimming nearby. Hunters were limited by how far they could accurately throw the harpoons (Foote, 1992). The rifle's introduction changed the nature of seal hunting. Hunting from the ice edge using rifles is easier and more efficient than breathing-hole hunting, and the hunters' range has been increased greatly.

Open-water hunting and hunting of seals basking on drift ice became popular after the introduction of rifles. Before that, hunters occasionally harpooned seals from kayaks, but only in calm water. After rifles and outboard motors became available, several men would hunt together from a single umiaq. Seals were shot with rifles and harpooned. Now, aluminum boats have replaced skin boats, but the same methods are used. This is the most popular way to hunt ringed and bearded seals in northern Alaska. Harpoons are still used in the Yukon-Kuskokwim Delta because shot seals sink too quickly. In Greenland, certain areas forbid motorized boats in the hunt, although they may be used for access.

B. Walrus, aiviq

Walrus are often associated with pack ice and hunted when the ice is close to shore. They do haul out on shore in certain locations. This may become more common as climate change diminishes sea ice. Distances traveled depend on the proximity of pack ice and undoubtedly changed with the introduction of outboard motors and GPS.

Hunting walrus was, and remains, a collective hunt. The size of the walrus and logistics of butchering and transporting the meat to the village requires several hunters to work cooperatively. Traditionally, hunters used large harpoons like the harpoons used for bowheads. Walrus were harpooned while they were lying on the ice. The line prevented escape. When the walrus tired, it was killed with a lance. Occasionally, walrus were hunted from umiaqs when they were encountered away from pack ice. An elder recounted one method of hunting walrus in which two hunters harpooned two walrus facing opposite directions (Nelson, 1969). The lines from the harpoons were tied together, and the walrus pulled against each other until they tired enough to be approached and killed. Now, large rifles are used instead of harpoons, but the same methods are used to approach them. When a herd is sighted, the surrounding ice is evaluated. There must be enough ice-free water to allow approach and to allow sufficient time for the walrus to be butchered before ice closes in.

Generally, walrus are approached to within a few meters before they are shot. All hunters shoot at the same time and continue the volley until enough have been taken or the herd escapes into the water. Dead walrus will not float, so any that fall into the water are considered struck and lost. Wounded walrus are often dangerous, and Nelson (1969) recounts several instances in which wounded walrus damaged boats. In fact, walrus can be so aggressive that they have disrupted mail delivery by kayak and even forced the abandonment of a settlement in Greenland.

Walrus flippers "ripened" in seal oil are a delicacy in much of the Arctic. Select portions of meat are eaten, but most was used as dog food. Skin, bones, and especially tusks were the most valuable parts. Walrus skins replace bearded seal skins on umiaqs where bearded seals are not abundant. They were used to create strong lines that were attached to harpoons. Bones were used to make tools and as chocks in house construction. Ivory tusks were often used to make harpoon points and foreshafts. Now, ivory is used in artwork, much of it sold to generate cash income.

C. Polar Bear, nanuq

Polar bears occur throughout the Arctic, and are hunted throughout their range. Polar bear hunting is considered one of the most dangerous hunting activities. Successful hunters often enjoy high status in villages. Traditionally, single hunters using spears, lances, or knives hunted polar bears (Boas, 1964; Nelson, 1969). In the Canadian and Greenlandic Arctic, dogs were used to chase the bears. Once the bears stopped, they were approached on foot and killed with lances or spears, which were quickly abandoned once rifles became available.

IRRAWADDY DOLPHIN

Hunting for polar bears is now nearly always done on the ice, and hunters often travel far offshore to find bears. Walking was preferred because it offered a silent approach and the ability to hide. Now, with snowmobiles, hunters can pull sleds to transport the meat and hide home. When bears venture close to villages or whaling camps they are often shot.

Polar bears are hunted for their meat and hides, which are divided among villagers according to local tradition. The successful hunter usually keeps the hide.

Polar bear meat is prized by many people in the Arctic. Meat is always well cooked to prevent trichinosis, and the liver is never eaten due to high vitamin A concentrations. Hides are used for clothing, such as boots, mittens, or trim for parkas, and for sleeping mats when camping on the ice.

VI. Conclusion

Inuit and their ancestors have hunted marine mammals for thousands of years. The technology and techniques of hunting marine mammals evolved in a culture intimately associated with the sea and its creatures. In modern times, the technology and techniques of hunting marine mammals have changed, but the cultural importance remains, backed up by tradition, beliefs and a web of interlocking obligations. Marine mammal hunting provides access to status within the community and a sense of self-worth for a generation of Inuit struggling to cope with the burdens of cultural assimilation. The products provide a sustainable healthy diet. There is every reason to believe that as circumstances continue to change, these subsistence and cultural practices will continue to thrive.

See Also the Following Articles

Arctic Marine Mammals ■ Whaling, Aboriginal and Western Traditional

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IRRAWADDY DOLPHIN

Orcaella brevirostris

BRIAN D. SMITH

I. Characteristics and Taxonomy

A. Vernacular Names

Vernacular names used for Irrawaddy dolphins include *iraboti* in Bangladesh, *phisout* in Cambodia, *ikan pesut* in Indonesia; *lumba lumba* in Malaysia; *pa kha* in Laos; *Lampasut* in the Philippines; *pla lomahooa baht* in Thailand; and *Labai* in Myanmar.

B. Taxonomic Relationships

Orcaella has historically been placed in the families Orcellidae, Delphinapteridae, and Monodontidae before concordant morphologic and genetic evidenced placed the genus decisively in the family Delphinidae.

Orcaella brevirostris was recently split into two species based on differences in external characters, osteology, and genetics, with the Irrawaddy dolphin *O. brevirostris* occurring in nearshore marine waters and three large rivers in South and Southeast Asia, and the Australian snub-fin dolphin *O. heinsohni* in the coastal waters of northern Australia and southern Papua New Guinea (Beasley et al., 2002, 2005). This account addresses *O. brevirostris*. Caution should be exercised when referring to earlier reviews of the "species" because the information may pertain to *O. heinsohni*.

C. External Appearance

The Irrawaddy dolphin has a rounded head that overhangs the mouth and a crescent-shaped blowhole positioned to the left of mid-line (Fig. 1). A posterior neck crease is visible in some individuals and a shallow dorsal groove runs from the neck crease to the dorsal fin, a feature absent in the snub-fin dolphin. The dorsal fin is small, triangular, slightly falcate with a blunt tip, and located about 60% of the body length posterior to the tip of the upper jaw (Fig. 2). The flippers have a convex leading edge and are relatively large, about one-sixth of the total body length long and about half this length for the width. Span of the flukes is more than one-fourth the total body length, with a concave leading edge and median notch. The species is uniformly dark gray on the dorsal and lateral fields, and lighter on the ventral field, giving the animals a two-toned appearance. This is in contrast to the tripartite coloration of the snub-fin dolphin.

Body lengths of sexually mature Irrawaddy dolphins have been measured at 2.1–2.2 m for females and as large as 2.8 m for males. Compared to the Australian snub-fin dolphin, the Irrawaddy dolphin has a shorter total length and dorsal fin height, and longer