

## **New Technologies, New Traditions: Recent Developments in Greenlandic Whaling**

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### **INTRODUCTION**

Throughout history, Greenlandic Inuit hunters have adopted new whaling equipment and practices to meet nutritional and cultural needs and to ensure that hunts are as safe and effective as possible. This flexible, pragmatic approach has long been part of sustainable development strategies in Greenland. It continues today as Greenlanders take minke and fin whales under IWC quotas<sup>1</sup>. Equipment used in whaling today includes harpoon cannons, penthrite (detonating) grenades, fishing vessels, rifles, walkie-talkies, and skiffs equipped with outboard motors. These newer technologies enable hunters and their communities to obtain culturally-valued and nutritious whale meat and *mattak* (whale skin). They contribute to widespread sharing and exchange of whale products that reinforce Inuit identity and promote social cohesion in an unsettled and rapidly changing world. Moreover, these new technologies reduce risks to hunters involved in whaling and the time-to-death for whales.

Use of these new technologies is not without cost, however. Their use places additional demands on hunters and resource managers alike: economic demands from costs of purchasing and maintaining new equipment; demands for additional training, regulation, and monitoring; and cultural demands as older hunting traditions are transformed to incorporate new equipment and practices.

This report highlights recent developments in equipment and hunting practices used in Greenlandic minke and fin whaling. In particular, it focuses on initiatives by Greenland's Home Rule

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<sup>1</sup> For the years 1995-97, IWC quotas allowed hunters to take a total of 465 minke whales (struck or caught), with a maximum of 165 in any one year in West Greenland. Hunters in East Greenland were allowed to take 12 minke. Hunters in West Greenland were allowed to take 19 fin whales annually

Government<sup>2</sup> to improve whaling equipment and practices and to train hunters in the safe and effective use of new technologies. Specifically, the report includes 1) a brief overview of Greenlandic subsistence whaling, 2) a summary of contemporary whaling equipment, practices, and regulations, 3) a description of recent Home Rule initiatives to improve whaling equipment and practices, and 4) a discussion of some issues affecting whaling in Greenland, now and in the future.

## **A BRIEF HISTORY OF GREENLANDIC WHALING**

Whaling in Greenland is part of a pattern of marine resource use extending back at least 4,000 years. For generations, Inuit hunters used skinboats, kayaks, and hand-thrown harpoons to catch bowhead (Greenland right), humpback, and other whales. Products from these whales provided culturally-valued country foods rich in nutrition. Whale meat and mattak, like other local foods, were central to kin-based practices of sharing and exchange that bound hunters, extended families, and communities together. Whales also figured prominently in Greenlandic spiritual life; they were considered a gift from Sassuma Arnaa, the "Woman of the Sea" who rewarded respectful hunters and their families with sustenance for life in a demanding Arctic environment.

With the advent of Danish colonization in the 1700s, Greenlandic whaling practices changed dramatically. As Inuit hunters were hired by Danish authorities to participate in whaling, they gained access to wooden sloops, iron-tipped harpoons, and other European equipment. However, decimation of bowhead stocks by European whalers in 18th and 19th centuries undermined indigenous whaling beliefs and practices. While some hunters continued to catch humpback and other whales in places like Paamiut and Nuuk, Greenlandic whaling languished in the late 19th and early 20th centuries. After World War I, however, Danish authorities initiated whaling in Davis Strait with a 127-ton English-built vessel called

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<sup>2</sup> Home Rule refers to Greenland's political autonomy within the Danish realm. Under the Home Rule Act of 1979, Greenland has its own parliament and premier and it manages most of its own internal affairs.

the Sonja. From 1924 to 1949, the vessel's Danish and Faroese crew caught blue, fin, sperm, and other large whales in Davis Strait using a harpoon cannon. It delivered whales to local communities where the meat and mattak were used for food; oil from the blubber was rendered and sold in Europe to cover operation costs. After World War II, a newer vessel, the Sonja Kaligtoq, was employed until operations ceased in 1958.

However, Greenlanders themselves revitalized community-based whaling in the late 1940s by installing Norwegian-made harpoon cannons on fishing vessels. Hunters took minke, fin, humpback, and other whales and shared them with their extended families; they also sold whale meat and mattak in nearby communities. About 1970, hunters also began using fiberglass skiffs and outboard motors in a collective hunt for minke whales, where the whale was surrounded, shot with rifles, and then harpooned. These two techniques - fishing vessel whaling (for minke and fin whales) and collective whaling (only for minke whaling) - continue to be used today under IWC quotas and Home Rule regulation.

As in the past, Greenlanders today use whales multi-dimensionally<sup>3</sup>. That is, whaling provides hunters and their families both with culturally-valued foods and opportunities for expressing Inuit culture and identity. IWC rules prohibit export of minke and fin whale products from Greenland. However, some hunters sell meat and mattak locally - either at an open-air market or to the local Royal Greenland processing plant. In this way, hunters earn modest amounts of cash necessary to sustain local economies and to cover whaling expenses. Whaling reduces the need to import large quantities of food from elsewhere. Local foods are known to be more nutritious than imported, store-bought foods. Whale mattak, long known to provide excellent protection against scurvy, contains rich sources of vitamins A and C, thiamin, riboflavin, niacin, and selenium. Products from whales and other marine mammals are also low in saturated fats and are high in omega-3 polyunsaturated fatty acids that reduce risk of cardiovascular

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<sup>3</sup> See Caulfield, R. A., 1994 "Whaling and sustainability in Greenland", IWC/46/AS1.

disease. Moreover, whaling continues to be family- and community-based; kinship is the most significant factor in social organization of the hunt. Today, whaling is conducted under an increasingly effective co-management regime designed to ensure biological sustainability over time. Greenland's Home Rule government works closely with the IWC, scientists from a host of countries, and with local hunters to monitor catches and conduct biological research.<sup>4</sup> No one has a greater interest in conserving whales than Greenlanders, who use and appreciate them in so many ways.

## **CONTEMPORARY GREENLANDIC MINKE AND FIN WHALING**

Minke and fin whaling in Greenland today is of two types: fishing vessel whaling using 50mm caliber harpoon cannons, and a collective hunt for minke whales using rifles, skiffs, and outboard motors. Each type has its own hunting technologies, practices, and patterns of social organization. However, it is important to note that whaling in Greenland is but one part of a broader, diversified pattern of marine resource use. Whaling is done opportunistically. Those who hunt whales in Greenland typically do so only for a few days or weeks each year. Otherwise, they are engaged in fishing for species like shrimp or Greenlandic halibut, hunting for seals or other marine mammals, or similar pursuits.

### ***Fishing vessel whaling***

Fishing vessel whaling is conducted primarily in the larger communities of West Greenland. Vessels used range from 25 to 60 feet in length, and may be made of wood, fiberglass, or steel. They are primarily used in shrimp, Greenland halibut or other fisheries. However, they typically engage in whaling for periods from as little as one day to as much as several weeks. Table 1 shows characteristics of an older- and a newer-type fishing vessel used in Greenland today.

Success in fishing vessel whaling is dependent upon many factors,

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<sup>4</sup> See Caulfield, R. A., 1997, "Greenlanders, whales, and whaling: Sustainability and self-determination in the Arctic", Hanover and London: University Press of New England.

including the availability of whales, weather, and whaling quotas and regulations. Whaling is most successful when the weather is clear and the sea is calm. Hunters are generally quite aware of the presence of fin or minke whales near local communities. Typically, the time involved in searching for and catching a whale is only a few hours.<sup>5</sup> Sometimes whales are discovered opportunistically while the vessel is engaged in fishing or other activities. Once the whale is caught, it is towed at high tide to a flensing site near the community (usually well-known to experienced hunters). Flensing a minke whale can take from three to four hours, while the larger fin whale can take as much as six to ten hours or more. Flensers usually use large kitchen knives to remove slabs of meat, blubber, and mattak. Kinship is the most important factor in determining who participates in whaling. The vessel's captain and crewmembers typically

TABLE 1. Characteristics of older and newer type fishing vessels used in contemporary minke and fin whaling, Qeqertarsuaq Municipality<sup>6</sup>

Characteristic	Older-type vessel	Newer-type vessel
Year built	1949	1988
Length	37.6 feet	56 feet
Tonnage	19 BRT	46 BRT
Type of hull	wooden	steel
Engine type	69 hp diesel	367 hp diesel
Normal crew	4 persons	5 persons
Cost to present owner	\$100,000	\$875,000
Est. gross income	\$85,000	\$550,000
Weeks fishing/year	12	36+
Weeks whaling/year	ca. 1	2
Harpoon type	Kongsberg 50mm	Kongsberg 50mm
Principal uses	shrimping; whaling; seal hunting	shrimping; whaling

are part of an extended family, although sometimes local elders with considerable whaling experience are also involved.

All Greenlandic vessels engaged in whaling today use the

<sup>5</sup> However, in some instances it can take considerably longer (e.g., up to several days).

<sup>6</sup> Caulfield, R. A., *Greenlanders, whales and whaling*.

Norwegian-made Kongsberg 50mm caliber harpoon cannon. There are some 64 such cannons in Greenland today - all but one in West Greenland.<sup>7</sup> These harpoon cannons are mounted on the vessel's bow. By law, hunters in Greenland using harpoon cannons must use a detonating grenade approved by the Home Rule government. Hunters today use two versions of a penthrite grenade developed in Norway in the 1980s. They are designed to kill a whale quickly by exploding within the animal at a depth of 70cm (for minke whales) or 120cm (for fin whales). Both types contain 22 grams of explosive.<sup>8</sup> The grenade consists of a steel case (projectile body), a fuse mechanism, and the explosive charge protected by an aluminum jacket. A nylon trigger cord is attached to the fuse and connects it to twin trigger hooks.

The grenade-equipped harpoon is attached to a nylon or polyester line (*siuaa* in Greenlandic; minimum diameter 20mm) about 50 to 75 meters in length, which is itself attached to a heavy wire cable (up to 14mm) that may be as much as 1000 meters in length. A large plastic float is attached to the junction of the nylon line and the wire cable. This serves as a brake on the whale movements and helps in following the animal.

In vessel whaling, the captain maneuvers the vessel into firing distance (25 to 30 meters) of a whale. The harpooner, positioned on the bow, provides direction so that he can get a clear shot. By regulation, all vessels engaged in hunt for fin whales must have a spare penthrite grenade on board should it be needed.

### ***Collective whaling for minke whales***

In collective whaling, hunters in designated communities are given special dispensation by the Home Rule government to use skiffs equipped with outboard motors to surround and shoot minke whales. Hand-thrown harpoons with floats attached are used to secure the catch. This type of whaling is most common in remote settlements where fishing

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<sup>7</sup> One (inoperable) harpoon cannon is located in Tasiilaq, East Greenland.

<sup>8</sup> Øen, Egil Ole, "Killing methods for minke and bowhead whales," IWC/47/WKB

vessels are not available.<sup>9</sup> Not uncommonly, 10 to 15 skiffs - each with one or two hunters on board - take part in a collective hunt; as many as 35 skiffs have reportedly taken part in a single hunt. Regulations stipulate that all participating hunters must be included on the license for the collective hunt. Characteristics of equipment and participants involved in a collective hunt in one West Greenland municipality are shown in Table 2.

TABLE 2. Characteristics of equipment and participants in collective minke whaling, Qeqertarsuaq Municipality <sup>10</sup>

Characteristic	Description
Most common length of skiff	14 foot
Average number of skiffs participating	16
Average number of hunters participating	30
Average number of hunters per skiff	2
Range of skiffs participating	5 to 35
Most common rifle caliber	7.62mm
Average expenses/hunter for fuel & ammo.	\$52.91 (293 DKK)

Skiffs used in the collective hunt usually range from 14 to 18 feet in length. Most are equipped with a 40 to 60 horsepower outboard motor. By regulation, all participating skiffs must have a rifle (minimum caliber, 7.62mm), and a harpoon on board, along with attached line and floats. The total cost of this equipment is estimated to be about \$12,000 (excluding fuel and ammunition).

As in fishing vessel whaling, success in hunting is best with good visibility and calm seas. Once a minke whale is sighted, a collective hunt can commence if all licensed hunters are alerted and sufficient numbers are available to participate (by regulation, there must be at least five skiffs). Hunters maneuver their skiffs alongside the whale and shoot it with rifles, typically aiming for the lungs. Once the whale slows, it is harpooned and killed with shots at close range. Additional lines are then attached to

<sup>9</sup> In some cases, fishing vessels up to 30 feet in length may accompany collective hunters to assist in the catch.

<sup>10</sup> Caulfield, R. A., *Greenlanders, whales and whaling*.

the whale so that it can be towed to a flensing site near the community. Flensing in a collective hunt is virtually the same as in vessel whaling, except that there are often more participants.

### ***Distribution and exchange of whale products***

Inuit customs determine how whale meat and mattak obtained in these hunts are distributed and exchanged in Greenlandic society. Many of these products are used by hunters themselves, by their extended families, or by other community members. Minke and fin whale meat, mattak, qiporaq (skin from the ventral grooves on a whale's underside) are highly desired foods in most Greenlandic households. Sharing the experience of the hunt and the products from it reinforce kinship ties within families and communities. Country foods, including whale products, are called *kalaalimerngit* in the Greenlandic language. These foods are a substantial part of household diets in most communities, and they are integrally linked to Greenlandic identity. As one recent report notes, "eating Greenlandic foods is of great symbolic weight in determining whether a person is a true Greenlander."<sup>11</sup>

Some fin and minke whale products are also sold for local consumption within Greenland. Hunters earn modest amounts of cash by selling products to individuals at the local open-air market (called a *kalaaliaraq*), to institutions like schools or senior citizens' homes, or for wider distribution throughout Greenland through Royal Greenland A/S, a major fish processing company.<sup>12</sup> However, none of these products is exported from Greenland.

### ***Greenlandic whaling regulations***

Fin and minke whales may only be taken in Greenland under IWC quotas and Home Rule regulations. These specify who may be licensed to participate in whaling, conditions under which whaling can take place,

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<sup>11</sup> Larsen, S. E. and Hansen, K. G., "Inuit and whales at Sarfaq" (Greenland). TC/42/SEST 4.

<sup>12</sup> See Caulfield, R. A., *Greenlanders, whales and whaling* and O. M. Marquardt and R. A. Caulfield, "Development of West Greenlandic markets for country foods since the 18th century," *Arctic* 49(2).



TABLE 3. Selected Greenlandic whaling regulations, 1996-97

REGULATION	MINKE WHALING	FIN WHALING
Type of hunt	<ul style="list-style-type: none"> <li>vessel whaling OR</li> <li>collective whaling (only with special dispensation)</li> </ul>	<ul style="list-style-type: none"> <li>vessel whaling only</li> </ul>
Hunter licensing	<ul style="list-style-type: none"> <li>full-time hunting license req'd.</li> <li>must be permanent resident &amp; taxpayer for the last 2 years</li> <li>close affiliation with Greenlandic society</li> <li>hunting &amp; fishing income must be at least 50% of gross income</li> </ul>	<ul style="list-style-type: none"> <li>full-time hunting license req'd.</li> <li>must be permanent resident &amp; taxpayer for the last 2 years</li> <li>close affiliation with Greenlandic society</li> <li>hunting &amp; fishing income must be at least 50% of gross income</li> </ul>
Whaling license	<ul style="list-style-type: none"> <li>required from municipality</li> <li>collective hunt allowed where of major significance to local community and products from vessel whaling not available</li> <li>license used when whale struck or caught (in West Greenland)</li> <li>violation of quota can lead to subsequent reduction of municipal quota</li> </ul>	<ul style="list-style-type: none"> <li>required from municipality</li> <li>can be issued to:                             <ul style="list-style-type: none"> <li>one vessel <math>\geq</math> 36 feet in length</li> <li>two vessels <math>\geq</math> 30 feet in length</li> </ul> </li> <li>violation of quota can lead to subsequent reduction of municipal quota</li> </ul>
Season	<ul style="list-style-type: none"> <li>1 April - 31 December</li> </ul>	<ul style="list-style-type: none"> <li>1 January - 31 December</li> </ul>
Regulations	<ul style="list-style-type: none"> <li>females with young may not be taken</li> <li>whale must be killed as quickly as possible</li> <li>use of vessel with harpoon cannon (<math>\geq</math> 50mm caliber)                             <ul style="list-style-type: none"> <li>harpoon grenade required</li> <li>training for harpooner</li> <li>vessel equipped with winch</li> </ul> </li> <li>vessels <math>\geq</math> 70 feet may not be used</li> <li>all vessel equipment must be approved by KIS (Greenland's vessel inspection service)</li> <li><b>FOR COLLECTIVE HUNT</b> <ul style="list-style-type: none"> <li>minimum of 5 skiffs</li> <li>use <math>\geq</math> 7.62mm/9mm rifles</li> <li>all skiffs equipped w/ hand harpoon, floats and <math>\geq</math> 12mm line</li> <li>designated hunt leader</li> </ul> </li> <li>dispensation given when catch is of great importance for a community or when vessel whaling cannot meet needs</li> <li><b>FOR ALL HUNTS</b> <ul style="list-style-type: none"> <li>all edible meat and <i>mattak</i> must be used</li> <li>catch data must be reported before sale of whale products</li> <li>sample of whale must be provided for research</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>females with young may not be taken</li> <li>whale must be killed as quickly as possible</li> <li>use of vessel with harpoon cannon (<math>\geq</math> 50mm caliber)                             <ul style="list-style-type: none"> <li>harpoon grenade required</li> <li>must have extra grenade</li> <li>training for harpooner</li> <li>vessel equipped with winch</li> <li>must have min. 20mm line and floats on board</li> </ul> </li> <li>all vessel equipment must be approved by KIS (Greenland's vessel inspection service)</li> <li>whale must be <math>&gt;</math> 15.2m</li> <li>all edible meat and <i>mattak</i> must be used</li> <li>catch data must be reported to authorities before any sale of whale products</li> <li>sample of whale meat and <i>mattak</i> must be provided for research</li> <li>add'l license conditions may also apply</li> </ul>

and obligations of hunters for ensuring a safe and efficient hunt. Table 3 presents selected regulations currently applicable to minke and fin whaling.<sup>13</sup>

## RECENT INITIATIVES TO IMPROVE GREENLANDIC WHALING

Greenland's Home Rule government, working in cooperation with hunters and their representatives<sup>14</sup>, regulates the take of minke and fin whales allocated by the IWC. Its co-management regime for whaling includes a research and management program designed to improve scientific knowledge about whales, ensure equitable allocation of whale quotas among communities, build cooperation between hunters and managers, and monitor hunter cooperation and compliance.<sup>15</sup>

As part of this regime, Home Rule officials have worked steadily to improve equipment and practices used in fishing vessel and collective whaling. In recent years, these initiatives have focused on seven areas:

- 1) adoption of the penthrite grenade in fishing vessel whaling, including hunter training for proper use;
- 2) survey and evaluation in 1992 of all harpoon cannons in cooperation with Dr. Egil Øen and the Kongsberg Small Arms factory;
- 3) renovation of harpoon cannons to ensure a safe and effective hunt;
- 4) special training of shipyard personnel in Greenland in renovation procedures and techniques;
- 5) preparation of a maintenance manual for harpoon cannon owners in the Greenlandic Inuit language;
- 6) testing a special flensing knife to improve efficiency;

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<sup>13</sup> See Greenland Home Rule government regulations: "Arfernik angisuunik piniarneq pillugu Namminersornerullutik Oqartussat nalunaarutaat nr. 9, 6. april 1995-imeersoq"; "Namminersornerullutik Oqartussat nalunaarutaat nr. 42 ulloq 18. december 1992-imeersoq arfattat pissatallu nalunaarutigineqartarneranut tunngasoq;" "Inuussutissarsiutigalugu piniarnermut allagartat pillugit, Namminersornerullutik Oqartussat nalunaarutaat nr. 33, 17. december 1996-imeersoq."

<sup>14</sup> including KNAPK, the "Organization of Hunters and Fishers in Greenland."

<sup>15</sup> Caulfield, R. A., Greenlanders, whales and whaling.

- 7) regulatory changes - particularly for the collective hunt - to improve hunt effectiveness

The following describes these initiatives in more detail.

### *Adoption of the penthrite grenade*

Since April 1991, the Home Rule government has required all hunters engaged in fishing vessel whaling to use the detonating grenade. While not formally required to do so by the IWC, Greenland decided to adopt use of the penthrite grenade because of its demonstrated effectiveness in making a quicker kill.<sup>16</sup> Discussions about use of the grenade in Greenland date back to 1987 when a cooperative program for testing this new technology was established by Home Rule officials, Dr. Egil Ole. Øen of Norway, KNAPK, and hunters themselves. In 1990, the Home Rule government purchased one hundred grenades for testing in the field. Seventy of these were designed for use on minke whales and thirty for fin whales. Hunters in Ilulissat, Aasiaat, Maniitsoq, and Nuuk, working with KNAPK, initially tested 15 grenades. KNAPK also prepared a videotape in the Greenlandic language illustrating how to use this equipment safely.

After successful tests, the Home Rule made the remaining grenades available to hunters who had successfully completed a course instructing them in the safe handling and effective use of this new technology. Home Rule regulations were also revised to require that all hunters using vessels participate in such a course before they could purchase grenades.<sup>17</sup> In 1991 and 1992, 120 people completed the course, including hunters, shipyard workers, and those involved in procuring, distributing, and selling the grenades. These courses were sponsored by the Home Rule government, KNAPK, and Greenland shipyards. In spring of 1994, 31 additional people

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<sup>16</sup> See Greenland Home Rule Government, "Greenland action plan on whale hunting methods, 1995," IWC/47/24.

<sup>17</sup> Greenland Home Rule Government, "Implementation of the detonating grenade harpoon in Greenlandic whaling on an experimental basis," TC/40/HK4.

participated in two course offerings. Others will be offered in the future once the renovation program is completed and as funding is available.

Greenland's decision to adopt the penthrite grenade has required considerable sums of money. One grenade for a minke whale costs approximately \$611.00 (about 4,100 DKK), while that for a fin whale costs about \$678.00 (about 4,543 DKK).<sup>18</sup> Greenland's Home Rule government absorbed the cost of purchasing and transporting grenades during the trial period. It has also spent approximately \$150,000 (1 million DKK) in providing the required training courses to hunters and others working with grenades. KNAPK provided funds to enable hunters from remote communities to participate. Moreover, Home Rule officials have spent significant amounts of staff time working to implement this new initiative and to respond to information needs through the IWC.

In spring 1997, rising costs of the penthrite grenade led Greenland's parliament, the Landsting, to implement a partial subsidy enabling hunters to purchase the grenades at lower cost. The subsidy amounts to about \$447.00 (3,000 DKK) per licenseholder in 1997; in 1998 and in subsequent years it will total to about \$531.00 (3,400 DKK).<sup>19</sup> Such subsidies are expected to cost the government about \$60,000 (400,000 DKK) per year. Despite these costs, the Home Rule government believes that its cooperative program to adopt the grenade has been a success. Hunters find that the new technology works effectively and that it can dramatically reduce the time-to-death for whales.

### *Survey and evaluation of harpoon cannons*

In 1992, the Greenland Home Rule Government began a program to survey and evaluate the condition of all harpoon cannons in Greenland in cooperation with Dr. Øen of Norway and the Kongsberg Small Arms Company. The goal was to assess the general condition of all harpoon

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<sup>18</sup> Personal communication, A. Jessen, Greenland Home Rule Government, Department of Fisheries, Hunting, and Agriculture. 8 September 1997. Total price is \$965.00 (about 6,450 DKK) included shipping.

<sup>19</sup> *ibid.*

cannons and the need for renovation. Results of this program led to the conclusion that a major effort was necessary to renovate whaling equipment in order to improve hunt efficiency and safety. A decision was made to obtain the original technical drawings of the harpoon cannons from Kongsberg and to purchase available spare parts. Interestingly, when Greenland approached Kongsberg about this next phase, the factory found that it no longer had some of the drawings. As a result, some had to be redone entirely with costs borne by the Home Rule government.

### *Program for reconditioning harpoon cannons*

A third major Home Rule initiative involves reconditioning existing harpoon cannons and improving systems for their regular maintenance and inspection. As noted above, Greenland has some 64 harpoon cannons in various states of repair. All are Norwegian-made Kongsberg 50mm caliber. Most were built in the 1960s; a few date from the 1950s. A goal of this initiative is to ensure the effectiveness of these harpoon cannons and penthrite grenades in killing whales. In addition, the initiative is designed to reduce risks to hunters using the cannons.<sup>20</sup>

Home Rule regulations adopted in 1995 require that harpoon cannons used in whaling be in good technical and functional condition.<sup>21</sup> Greenland's vessel inspection service (KIS, Greenlandic: angallatinut siunnersuisoqarfik) or another approved institution, must inspect the cannon and its mount. It must also register the cannon and inspect it every two years following reconditioning.

Initial inspections of Greenland's harpoon cannons by KIS's technical supervisor, Mr. Peter Siegstad, revealed that 29 were in good condition, 32 were in fair condition, and 3 were in poor condition. Inspectors created a file on each harpoon cannon and developed a plan for ordering replacement parts and scheduling a full reconditioning. The

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<sup>20</sup> Accidents involving harpoon cannons are not unknown. One hunter in Maniitsoq was killed some years ago when the rear assembly of the cannon blew off, hitting him in the chest.

<sup>21</sup> Greenland Home Rule Government, "Arfernik angisuunik piniarneq pillugu Namminersornerullutik Oqartussat nalunaarutaat nr. 9, 6. april 1995-imeersoq", § 9.

most common problems with harpoon cannons are that the internal leather packing material dries out and must be re-oiled, the barrel or other parts rust, the firing mechanism needs replacement parts, or the swivel mount needs repair. Nine of the cannons inspected had such serious problems that they were sent back to the Kongsberg factory in Norway for repair.

### *Training of Greenland shipyard personnel in renovation of harpoon cannons*

As part of the effort to improve whaling equipment, the Home Rule government worked with Norwegian experts and Greenland shipyards to train 10 technicians in six locations to recondition cannons.<sup>22</sup> After successfully completing six days of training, the technicians earned a special certificate which authorized them to undertake renovation of cannons, including evaluation of their condition, cleaning and repairing all parts, adjusting the firing mechanism, and applying protective paint. Once the renovation is complete, technicians pressure-test the cannons and test-fire them.

Inspecting and reconditioning a harpoon cannon can be a time-consuming process. Initial inspection usually takes only about one hour. However, the average time invested overall in reconditioning a used cannon is about 114 hours.<sup>23</sup> As of the end of 1996, over half of Greenland's cannons have been reconditioned. Technicians initially began reconditioning cannons in southern Greenland, and are now working with cannons owned by hunters living in more northerly communities.

The cost of reconditioning a harpoon cannon varies considerably but it is almost always substantial. One cannon in poor condition sent to Norway cost about \$15,000 (100,000 DKK) to repair. A cannon with less serious problems was repaired in Sisimiut for only about \$5,522 (37,000 DKK). However, these costs are relatively small when compared with the

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<sup>22</sup> The six locations are Sisimiut, Maniitsoq, Aasiaat, Nuuk, Paamiut, and Qaqortoq.

<sup>23</sup> Peter Siegstad, KIS, personal communication, January 1997.

cost of a new cannon, which can be nearly \$45,000 (300,000 DKK) or more. Even a used cannon in Greenland today may cost over \$9,000 (60,000 DKK or more).

The Home Rule government pays two-thirds of all reconditioning costs if the harpoon cannon owner agrees to pay the remaining one-third. In 1995 and 1996, the Home Rule government spent nearly \$450,000 (3 million DKK) for this purpose, and more work has yet to be done. In a few municipalities, hunters have also obtained bank loans or local subsidies to cover their share of the costs.

As with introduction of the penthrite grenade, this reconditioning program has had substantial costs. Initially, not all hunters accepted the necessity of spending money to recondition their cannons. However, virtually all hunters now recognize that the procedure has enhanced the power and accuracy of the cannons, contributing to improved safety and efficiency in the hunt.

#### ***Preparation of maintenance manual for hunters and development of new flensing tool***

The Home Rule government continues to seek other ways of improving whaling equipment and sharing information with hunters. In recent years, the Home Rule paid for preparation of an instruction manual in *Kalaallisut* (the Greenlandic language) about proper maintenance and use of harpoon cannons. While major reconditioning of the cannons must be done by trained technicians, hunters themselves can prolong the life of the cannons by cleaning, storing, and using them properly. This maintenance manual, written in the language common to all hunters, thus encourages those using the cannons to do so in a safe and cost-effective manner.

Moreover, Home Rule officials have also been working with Kongsberg to develop and test a special flensing knife for use in whaling, based on an Icelandic design. Kongsberg recently made a prototype of this knife, which was then tested by several Greenlandic hunting families. The

hunters reported such satisfaction with the new design that they asked to hold on to the prototypes for future use. Given this apparent success, production of these special tools in Greenland may be a next step in improved hunt efficiency.

### ***Improving hunt regulation and monitoring***

In addition to changes in technologies, authorities in Greenland have also made substantial improvements to whaling regulations and to monitoring and enforcement efforts. As described above, new regulations require that hunters have a well-maintained harpoon cannon and that they use the penthrite grenade. Moreover, the Home Rule government has made significant changes to whaling regulations over the past decade. Among these are the requirement that an individual involved in whaling obtain a special license, and that renewal will be based upon the hunter's compliance with regulations. New regulations also specify the caliber and type of rifle allowed in collective minke whaling, with a view to increasing caliber size and hunt effectiveness. Related to this is the requirement that a hunt captain - typically an experienced, respected hunter - be designated in the collective hunt to promote good hunting practices and compliance with regulations. Regulations also require that - in accordance with IWC requirements - minke whales struck but not caught in West Greenland be included within quotas.

Improvements have also been made in monitoring and enforcement of whaling regulations. Experience has shown that close cooperation between Home Rule authorities, Greenland's municipal governments, and local hunters' and fishers' associations provides the most effective system to achieve this. Local (municipal) involvement enhances the legitimacy of quota allocations and regulations, because hunters feel that they have more of a voice in shaping conditions of the hunt. Moreover, local decisionmaking reinforces the collective responsibility of hunters for compliance. Regulations now state that violations of quotas by individual hunters in a given municipality can lead to a significant reduction in quotas for the municipality as a whole in



subsequent years. In short, the unthinking actions of a few can impact all. This provision - though not universally popular - has already been imposed in one recent case. Cooperation between Home Rule and municipal authorities is also reflected in the decision to hire fish and wildlife officers in some municipalities.<sup>24</sup> While these officers do not focus solely on whaling, nor do they have enforcement power as such<sup>25</sup>, their presence reflects awareness of changing needs for effective resource management in Greenland.

### **CONCLUSION**

The efforts described above are part of a continuing program by the Home Rule government to improve whaling technologies and practices. Greenlandic hunters and Home Rule officials are pleased with recent developments in whaling technology - particularly with the penthrite grenade - and look forward to further improvements in this area. The cost of implementing these initiatives - adopting the penthrite grenade, reconditioning harpoon cannons, and expanding involvement of hunters and officials in co-management - are not insignificant to a small society. However, Greenland's government has borne these expenses because of the important role that whaling plays in sustainable livelihoods and because of a recognized responsibility for stewardship of marine living resources. Greenlanders firmly believe that whaling can be an important part of indigenous community development in the Arctic: whaling that meets nutritional and cultural needs, that is biologically sustainable, and that flexibly incorporates new technologies and practices in a pragmatic way.

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<sup>24</sup> Officers have been hired in Uummannaq, Ilulissat, Sisimiut, Maniitsoq, and Nuuk.

<sup>25</sup> Officers work in cooperation with the police, who have enforcement power in Greenlandic municipalities.

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