

Walrus Harvest Monitoring On Chukotka in 2001

TECHNICAL REPORT

Prepared for

The U.S. Fish and Wildlife Service
Marine Mammals Management
1011 E. Tudor Road
Anchorage, AK 99503

&

Kawerak Incorporated
P.O. Box 948
Nome, AK 99762

Authors:

Gennadii Smirnov
Vladimir Rinteimit
Maksim Agnakisyak
Maksim Litovka

Chukotka Branch of the Pacific Fisheries Research Center

Otke, 56, Anadyr, P.O. Box 29
Chukotka, Russia 689000

Naukan Production Cooperative

Lavrentiya
Chukotka, Russia 689400

Yupik Society of Eskimos of Chukotka

Provideniya
Chukotka, Russia 689350

April 2002

CONTENTS

PARTICIPANT LIST	2
INTRODUCTION	4
1. ORGANIZATION OF WORK	8
2. BRIEF DESCRIPTION OF MODEL VILLAGES	10
3. COMMENTS BY VLADIMIR RINTEIMIT (REGIONAL COORDINATOR FOR CHUKOTSKII DISTRICT)	13
3.1. Comparative analysis of observers' performance	14
3.2. Development of the project	14
3.3. Regarding provisioning for the project	14
3.4. Regarding training for the observers and meetings with participants in the Russian-American project	15
3.5. Criteria for evaluating the observers' performance	15
3.6. Significance of the walrus for Native peoples of Chukotskii District	15
3.7. Methods of harvesting walruses	16
3.8. Storage, distribution and use of walrus products	17
3.9. Current state of walrus harvest in Chukotskii District	18
4. COMMENTS BY MAKSIM AGNAGISYA,(REGIONAL COORDINATOR FOR THE PROVIDENIYA DISTRICT)	20
5. RESULTS OF THE HARVEST MONITORING	24
5.1. Seasonal Dynamic of the Harvest	24
May	24
June	25
July	25
August	26
September	27
October	28
5.2. Age-Sex Composition of the Kill	29
5.3. Analysis of Harvest Losses	30
5.4. Evaluation of Objectivity of Officially Reported Data and Calculation of Actual Take	31
6. CONCLUSION	33
ACKNOWLEDGEMENTS	35
BIBLIOGRAPHY	36
APPENDICES	38

PARTICIPANT LIST

Vladimir Rinteimit, Project Coordinator for Chukotskii District, Deputy Chairman of Naukan Production Cooperative (Lavrentiya)	Organization of field research and co-management of project; recruitment and training of observers (monitors); collection of monthly and final reports from observers; preparation of summary monthly and final reports for Chukotskii District, and presentation of the reports to the scientific director.
Maksim Agnakisyak, Project Coordinator for Provideniya District, Deputy Chairman of Yupik Society of Eskimos of Chukotka	Organization of field research and co-management of project; recruitment and training of observers (monitors); collection of monthly and final reports from observers; preparation of summary monthly and final reports for Provideniya District, and presentation of the reports to the scientific director.
Gennadii Smirnov, Project Scientific Director, Head of Marine Mammals Study Group at Chukotka Branch of TINRO	Scientific leadership; development of research methods and programs; creation of database; laboratory research; preparation of scientific report.
Aleksei Ottoi, Observer, foreman on hunting team, village of Lorino, Chukotskii District	Field monitoring and collection of primary information in the village of Lorino; preparation of monthly and final reports, and presentation of reports to district coordinator.
Dmitrii Kymyrovty, Observer, sea hunter, village of Inchoun, Chukotskii District	Field monitoring and collection of primary information in the village of Inchoun; preparation of monthly and final reports, and presentation of reports to district coordinator.
Yurii Klimakov, Observer, sea hunter, village of Uelen, Chukotskii District	Field monitoring and collection of primary information in the village of Uelen; preparation of monthly and final reports, and presentation of reports to district coordinator.
Igor Makotrik, Observer, sea hunter, village of Novo-Chaplino, Provideniya District	Field monitoring and collection of primary information in the village of Novo-Chaplino; preparation of monthly and final reports, and presentation of reports to district coordinator.

PARTICIPANT LIST (continued)

Sergei Skhaugye, Observer, village of Sireniki, Provideniya District	Field monitoring and collection of primary information in the village of Sireniki; preparation of monthly and final reports, and presentation of reports to district coordinator.
Nikolai Rultintigreu, Observer, sea hunter, village of Enmelen, Provideniya District	Field monitoring and collection of primary information in the village of Enmelen; preparation of monthly and final reports, and presentation of reports to district coordinator.
Sergei Ashkamakin, Observer, sea hunter, village of Yanrakynnot, Provideniya District	Field monitoring and collection of primary information in the village of Yanrakynnot; preparation of monthly and final reports, and presentation of reports to district coordinator.
Andrian Omrukvnun, Observer, sea hunter, village of Enurmino, Chukotskii District	Field monitoring and collection of primary information in the village of Enurmino; preparation of monthly and final reports, and presentation of reports to district coordinator.
Maksim Litovka, Assistant to the Scientific Director, junior researcher on the Marine Mammals Study Group at Chukotka Branch of TINRO	Creation of database; laboratory work on biological samples; preparation of scientific report; translation work.

INTRODUCTION

The Pacific walrus remains to this day the most important harvested species for the Native peoples of Chukotka and Alaska, having constituted the foundation of their material and spiritual culture for thousands of years. For this reason, the annual harvest of this species by Bering Sea hunters numbers in the thousands, which could have a significant impact on the state of the population as a whole, as well as on individual groups within the greater population. However, the Pacific walrus population suffered the greatest harm during the days of commercial harvesting. For example, for the entire period of recorded history, researchers have identified at least three catastrophic declines in Pacific walrus numbers caused by the combined impact of commercial and Native hunting within the walrus' entire geographic range (Fay, 1982).

Various direct and indirect indicators point to the beginning of a decline in the population's number in recent years, and this has prompted Russian and American specialists to initiate joint projects to study the Pacific walrus for the purpose of subsequently taking practical steps to protect and manage this unique animal.

The most effective means of addressing this issue is monitoring the harvesting of Pacific walruses in the harvesting areas throughout the walrus' entire geographic range. The Alaskan office of the U.S. Fish and Wildlife Service (USFWS) has long experience in monitoring Pacific walrus harvests. Prior to the end of the 1980s, Russian research surrounding the walrus harvests, despite its intermittent nature, also focused on monitoring and, together with similar research by American scientists, allowed for an analysis of trends across the entire Pacific walrus population.

Russia's deep economic crisis led to an almost complete end to harvest research in Russia during the 1990s. This work began to be revived in September 1998 when, in Nome, Alaska, at the initiative of the Alaskan office of the U.S. Fish and Wildlife Service and the Chukotka Branch of the Pacific Fisheries Research Center (ChukotTINRO), the first Russian-American Conference on Pacific Walrus Harvest Monitoring was held. The conference addressed the problems and prospects for walrus harvest monitoring on Chukotka. Participants in this conference included representatives of Native peoples' organizations from Alaska and Chukotka, as well as specialists from the Fish and Wildlife Service, ChukotTINRO and the Chukotka Region Fisheries Inspectorate. Chukotka is the only region in Russia where walruses are harvested for the personal needs of the Native peoples (Native harvesting). Settlements of Native peoples actively engaged in walrus harvesting are located along the coastline of the Chukotka Peninsula and in the Gulf of Anadyr. In recent years a large percentage of walruses (more than 80 percent of the total harvest) have been taken in eight villages: Enurmino, Inchoun, Uelen, Lorino, Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen (Illustration 1). The conference participants recognized that research into the Pacific walrus harvest on Chukotka was very important for conserving the Pacific walrus as an integral part of the region's marine ecosystem, and that this research was equally important for protecting the ethnic culture of the sea hunters. For this reason, it was extremely important that the Native peoples of Chukotka participate in the monitoring of the walrus harvest.

In March 1999, in Barrow, Alaska, as part of the Russian-American Agreement on Cooperation in Environmental Protection (Project No. 02.05-61, "Marine Mammals"), an official agreement was signed between the USFWS, the Naukan Production Cooperative (Lavrentiya,

Russia) and the Yupik Society of Eskimos of Chukotka (Provideniya, Russia) regarding walrus harvest monitoring on Chukotka. Monitoring of the Pacific walrus harvest on Chukotka began in May 1999 with the following objectives:

Objective 1: "Include coastal walrus hunters in the resource management program and provide opportunities for training to hunters in the rural settlements of the Chukotskii and Provideniya districts."

Objective 2: "Document the number of harvested walruses in coastal villages in the Chukotskii and Provideniya districts (Lorino, Uelen, Inchoun, Novo-Chaplino, Sireniki and Enmelen)."

Objective 3. "Document the age structure (calves, yearlings, adolescents, adults, unidentified) and sex structure (male, female, unidentified) of harvested walruses in the coastal villages of the Chukotskii and Provideniya districts (Lorino, Uelen, Inchoun, Novo-Chaplino, Sireniki and Enmelen)."

Objective 4: "Document the number of walruses that were struck and lost in coastal villages of the Chukotskii and Provideniya districts (Lorino, Uelen, Inchoun, Novo-Chaplino, Sireniki and Enmelen)."

A training session was held in May 1999 in Gambell, Alaska, to provide an introduction to walrus harvest monitoring in Alaska and to give the regional coordinators practical training in field research methods and record keeping. Participants in the session included specialists from the USFWS, the regional coordinators for the Chukotskii and Provideniya districts, and the Russian scientific director for the project.

Starting in 2000, one additional village in each region was added in order to expand walrus harvest monitoring on Chukotka, and plans called for adding monitors in villages with high harvest numbers (greater than 300 animals). To improve the quality of the work, an additional objective was added:

Objective 5: "Collect biological samples (two front teeth from the lower jaw of harvested walruses) to determine the exact age of harvested walruses."

The 1999-2000 research provided important biological information about the portion of the Pacific walrus population harvested in Chukotka's coastal waters. The research established that, on the whole, males predominate among the harvested walruses. Substantial differences were found in the sex composition of the kills in geographically separated harvesting regions. While males consistently predominated in the harvest in the northern part of the Bering Strait and in the Chukchii Sea (Lorino, Inchoun and Uelen), females predominated throughout the harvesting season, with the exception of October, in the Gulf of Anadyr (Sireniki and Enmelen). Females were seen to predominate in kills in the southern part of the Bering Strait (Novo-Chaplino) only during the spring migration, while males made up to bulk of the harvest in the summer and autumn. The resultant data show the dynamic changes in the sex composition of the local walrus communities inhabiting Chukotka's coasts at different times of the year.

The age composition of the kills showed insignificant numbers of calves and yearlings throughout both harvesting seasons, with mature animals predominating from May through September.

It was established that the official counts of harvesting enterprises in the monitored villages did not include about 20 percent (1999) and about 18 percent (2000) of the walrus actually harvested. Taking this difference into account, the estimated number of walrus harvested on Chukotka by all hunting groups was equal to 1,670 animals, and in 2000, 1,212.

Calculations showed that the number of walrus taken out of the natural population in Chukotka's coastal waters during the harvest, including the actual kill and struck-and-lost animals, to be 2,080 in 1999, and 1,562 in 2000.

The biological analysis of age-related samples collected in 2000 showed that walrus aged eight to 16 years predominated in the overall harvest. The research uncovered a "demographic gap" between cohorts of 14- and 27-year-old walrus, which might reflect the particular nature of the summer distribution of walrus within their feeding grounds. It is also possible that this demographic gap corresponds to fluctuations in reproduction rates among Pacific walrus, since the increase in the demographic curve from 18-year-old cohort (born 1982) to the 14-year-old cohort (born 1986) generally corresponds to the most recent period of growth in the population.

The regional coordinators and scientific director of the project constantly worked to publicize the goals and objectives of walrus harvest monitoring on Chukotka. Articles on the project's progress were published in the regional media on Chukotka.

In 2000 and 2001, at meetings of the Science Council of Chukotka, Gennadii Smirnov, scientific director of the project, presented reports on the results of the walrus harvest monitoring on Chukotka. The reports were received positively.

In May 1999 and in July 2000, Nome, Alaska, hosted, respectively, the second and third Russian-American working meetings to summarize the results of monitoring of the Pacific walrus harvest on Chukotka and in Alaska. Russian participants in the meetings included the regional coordinators for the project, Vladimir Rinteimit (1999, 2000) and Maksim Agnakisyak (1999, 2000); observers (monitors) Igor Makotrik (1999), Aleksei Ottoi (1999), Dmitrii Kymyrovty (2000) and Sergei Skhaugye (2000); and the scientific director, Gennadii Smirnov (1999, 2000).

Participants in the meetings agreed that the methodology for collecting information on harvest losses required improvement. Representatives of the company Kawerak expressed interest in receiving information on the cultural traditions of the Native peoples of Chukotka with regard to walrus harvesting. Participants in the meetings emphasized that it is necessary to provide constant training to the staff of the monitoring program and to work actively to educate people about the project in the villages and regional and district seats in Chukotka, as well as in Alaska. This will promote the rapid achievement of the project's goals regarding the rational use of the Pacific walrus population by people living on both sides of the Bering Strait. For these purposes, interactive training sessions were conducted at the meetings, with the project participants role-playing potential situations that could arise as the monitors go about collecting primary data.

Beginning in 2001, it was decided to start genetic research, for the purposes of which the following additional objective was set:

Objective 6: "Collect samples of muscle tissues from harvested animals for genetic research on the Pacific walrus population."

The initiative for the genetic research came from biologists with the Alaskan Biological Center of the U.S. Geological Survey (USGS). Chad Jay and David Tessler trained the regional coordinators and monitors in methods for collecting and storing muscle tissue samples.

Thus, monitoring of the walrus harvest on Chukotka continued in 2001. Observers (monitors) from among the sea hunters documented the sex and age class for harvested walrus and collected biological samples in each of the eight villages mentioned above. Their work was supervised by the regional coordinators, who, on a monthly basis, processed the information they received from the monitors and sent summary reports by fax to the scientific director of the project. The regional coordinators also were responsible for collecting and storing biological samples, and for delivering the samples to Anadyr. The organization of the fieldwork is described in more detail in the next chapter of this report.

The Naukan Production Cooperative and Yupik Society of Eskimos of Chukotka have experience with long-term cooperation with organizations of Native peoples of the United States for the purpose of studying marine mammals. At the same time, these organizations are members of the Chukotka Union of Sea Hunters, which significantly increases the social acceptance of walrus harvest monitoring among the Native peoples of Chukotka.

For the past six years the Chukotka Branch of the Pacific Fisheries Research Center (ChukotTINRO) has been conducting research into marine mammals for the purpose of supporting marine mammal harvesting as a traditional, necessary activity of Chukotka's Native peoples. The scale and focuses of ChukotTINRO's work have constantly expanded thanks to active collaboration with Russian and foreign partners.

Financial support for the walrus harvest monitoring on Chukotka in 2001 was provided by the Kawerak Incorporated and the U.S. National Park Service (Alaska).

The following people participated in the preparation of this report: Gennadii Smirnov, scientific director (Introduction, Results of Walrus Harvest Monitoring on Chukotka in 2001, Conclusion); Vladimir Rinteimit, project coordinator for the Chukotskii District (Organization of Work, Brief Description of Model Villages, Regional Coordinator's Notes); and Maksim Litovka, assistant to the scientific director (Organization of Work, Brief Description of Model Villages, Results of Walrus Harvest Monitoring on Chukotka in 2001).

1. ORGANIZATION OF WORK

The fieldwork was conducted from May 1 through October 31, 2001, in coastal villages of the Chukotskii and Provideniya districts, including Enurmino, Inchoun, Uelen, Lorino, Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen (Illustration 1). Unlike the previous year, in 2001 the Russian-American working meeting on harvest monitoring was held only in July, so the observers and regional coordinators had to use reports and materials left over from 2000 to record field data. Then, in August 2001, after the regional coordinators received the materials, equipment and special clothing from Nome, these goods were distributed to the observers (monitors) in the model villages as well.

The field collection of data was conducted using the walrus harvest monitoring methodology employed by the Walrus Harvest Monitoring Program (Marine Mammals Management, USFWS), adapted to the conditions of the Chukotka project. Most of the observers (monitors) had experience working on the project in 1999 and 2000. They were given detailed explanations regarding the methodology for collecting information, the correct method for filling out the working tables and journals (Appendix 1) and the procedure for reporting to the regional coordinators. On a monthly basis, the observers provided reports (Appendix 2) to the regional coordinators, who in turn sent summary reports (Appendix 3) to the scientific director. In addition, the observers and coordinators were issued special instructions for collecting and storing biological samples (Appendices 3-1 to 3-4).

At the third working meeting, in July 2001, detailed discussions were held with the regional coordinators and monitors from the villages of Inchoun and Sireniki regarding the results of the 2000 work, and they were given training in field data collection methods in Nome, Alaska, organized by the USFWS' Marine Mammals Management monitoring service, with the participation of specialists from ChukotTINRO. The working meeting resulted in the development of a working plan for the Walrus Harvest Monitoring on Chukotka in 2001 Project (Appendix 4). All participants in the meeting were provided with the Walrus Harvest Monitoring on Chukotka in 2000 report. The regional coordinators also brought several dozen copies of the report from Nome to Chukotka for distribution in the region.

Observers for the monitoring program used visual inspection to classify all harvested walrus based on their sex and age: mature, adolescents (two years old or older), yearlings and newborns (those born that year). Information was collected on "struck-and-lost" walrus and on the number of hunting forays. In order to make a precise determination of the age composition of the harvested walrus, the observers collected two front lower teeth. The collected teeth were packed in special envelopes (Appendix 3-2), with detailed information on the harvested walrus written on the outside on the envelope. The collected teeth were sent to the scientific director, Gennadii Smirnov, for analysis and age determination at ChukotTINRO (Anadyr). The total number of harvested and studied walrus was 936 (Table 1). Age samples were collected from 278 walrus, or about 30 percent of all those in the harvested sample.

The analysis of the teeth and the determination of the age of the walrus harvested in 2001 were performed in the marine mammals research laboratory at ChukotTINRO. Lengthwise sections of the teeth, 0.5 to 1.0 mm thick, were cut from the teeth along the axial line of the tooth using a specially prepared lathe. After the sections were polished and buffed, they were examined at a magnification of 20-40 times. Determination of age was performed in accordance with the standard methodology (S. Ye. Keleninberg, G.A. Klevezal, 1967). Due to the late delivery

of collected teeth from Provideniya District, not all the teeth could be analyzed prior to the preparation of this report. For this reason, the Russian scientific director, Gennadii Smirnov, and the American scientific director, Joel Garlich-Miller, agreed to include a chapter in the 2002 report describing the age composition of walrus harvested in 2001. This chapter has been left out of this, the 2001 report.

The equipment for processing the teeth was provided by the U.S. Fish & Wildlife Service and ChukotTINRO.

A total of 178 muscle tissue samples were collected, including 25 samples from Iultinskii District.

At the end of the field season, the field journals were sent to Anadyr, to the scientific director, Gennadii Smirnov, who, with his assistant, Maksim Litovka, a staff member on the marine mammal research group, created a computerized database, statistically processed the data using Microsoft Excel 97 and put together the technical report. Because the primary documents were late in arriving from the Provideniya District, the deadline for completing the report was moved to the beginning of April.

The regional coordinators were assigned the task of visiting each village and presenting the project's program to hunters, local agricultural enterprises and the administrations of the villages. This portion of the work is described in detail in the regional coordinator's notes section prepared by Vladimir Rinteimit. (Maksim Agnakisyak did not provide comments for inclusion in this report.) In addition, in July and August, the scientific director of the project, Gennadii Smirnov, visited the villages of Uelkal, Enmelen and Provideniya, where he conducted a series of introductory meetings with the public and officials of different levels to discuss the objectives of the monitoring program. Gennadii Smirnov co-authored, along with Vladimir Rinteimit and Maksim Agnakisyak, a scientific article on the results of the 1999 walrus harvest monitoring (Research Works on Marine Mammals of the Northern Pacific Ocean. Moscow, VNIRO, 2001).

In October 2001 the chairman of the Alaskan Eskimo Walrus Commission, Carl Kava, and the scientific director, Gennadii Smirnov, presented a joint report on the results of the 2000 walrus harvest monitoring at the Beringia Days international conference in Anchorage (Alaska).

Kawerak Incorporated and the National Park Service (Alaska) provided material and financial support for the field research through the regional coordinators, Vladimir Rinteimit and Maksim Agnakisyak. The regional coordinators handled the payments to the observers in the villages. The laboratory research was financed through the scientific director, Gennadii Smirnov.

In accordance with the established procedure, the monthly financial reports were sent by the regional coordinators and the scientific director by fax to Kawerak.

Payments were made to the regional coordinators and the observers on a monthly basis. The only delays experienced were in delivering funds to the observers due to the absence of transportation between villages.

At the conclusion of the project, the regional coordinator for the Chukotskii District, Vladimir Rinteimit, turned in his comments (11 pages of text) for inclusion in this report.

In August 2001, the regional coordinators received packages from Nome, Alaska, with equipment and consumables for the observers under the Chukotka Walrus Harvest Monitoring Program. The equipment was divided proportionally among the observers.

2. BRIEF DESCRIPTION OF MODEL VILLAGES

Lorino: This is the largest village of Native peoples in the Chukotskii District and in the Chukotka Autonomous Region. Population: 1,381, including 1,250 Chukchis and Eskimos. Residents of villages that have been closed (Nunyamo, Pinakul, Akkani, Yandogai and others) have come to Lorino at various times. Forty hunters from the Keper agricultural enterprise work in five teams to harvest walrus. Walrus harvesting is conducted over a large area: from Cape Khalyuskin in the southwest to Cape Nunyamo in the east, comprising almost 100 kilometers of harvest waters along the Bering Strait. To make it easier to carry out the harvest, the agricultural enterprise maintains harvest bases at the closed villages of Akkani and Pinakul, as well as at several temporary huts on the Mechigmenskaya Inlet. The hunters conduct the harvest from these sites and from Lorino, with one or two teams harvesting from each base. In 2001, 39 hunters from Keper (which means "wolverine"), working in five teams, conducted the harvest. They had at their disposal four whaleboats, four large canoes, one towing launch and about 30 one-man canoes. The hunters made all the canoes themselves. Twenty service rifles (7.62 mm) were used in the harvesting. The agricultural enterprise has its own refrigerator with a capacity of 300 tons for storing the sea hunters' kills and fish.

The monitor in Lorino was, for the third year in a row, Aleksei Ottoi, who was born in 1962 in the village of Akkani into a family of traditional hunters. From his childhood, he has joined his father and brothers in hunting marine animals. He has been harvesting marine animals professionally for 17 years, and he has been a foreman on a sea hunting team, organizing the harvest, since 1993.

In order to provide monitoring over the 100-kilometer harvesting zone, additional monitors were selected lest part of the harvest go uncounted. Two to three additional people were selected from Lorino to assist in the walrus harvest monitoring. Aleksei Ottoi is himself a foreman, and his two brothers hunted on different teams. This facilitated the collection of information. With regard to the number of observers for Lorino, Aleksei Ottoi believes that assistants are needed to collect information on the walrus harvest, otherwise the data could prove incomplete.

Walrus harvest monitoring in Lorino began in May and concluded in November 2001.

All the collected information was provided in a timely manner either by telephone or personally to the regional coordinator in Lavrentiya (at the end of each month).

Uelen: This is the northeastern-most settlement in Russia. Population: 776, including 690 Chukchis and Eskimos. Fifty-six hunters from the Uelen branch of the Poluostrov Daurkin agricultural enterprise take part in the harvest, working in five teams and two units. This group has four whaleboats, one motorboat and seven large, handmade canoes, and they use 20 rifles (7.62 mm) for the harvest. Walrus harvesting is done both in the Bering Strait and in the Chukotka Sea. A walrus haul-out is located not far from Cape Dezhnevo, and this haul-out is used in the autumn. The hunters maintain a base here, too. The sea here becomes free of ice earlier in the spring and becomes covered with ice later in the autumn. Walrus occupy the haul-out in the second half of August. In the early autumn period, the Uelen hunters also harvest walrus near this haul-out. Thus, the harvest zone comprises approximately 60 kilometers along the Bering and Chukotka seas, from the old Dezhnevo settlement to the Inchoun haul-out.

Yurii Klimakov, the observer for Uelen, collects data on harvested walrus by surveying the foremen and hunters. In addition, he spends some time hunting himself. Walrus harvest monitoring began in June and concluded in October 2001. He provided all reports in a timely manner.

Inchoun: This village is located 30 kilometers north of Uelen. Population: 365 people, including 362 Native inhabitants, primarily Chukchis. Forty-five hunters from the Inchoun branch of the Poluostrov Daurkin agricultural enterprise take part in the harvest, working in five teams. Harvesting is conducted in the area from Cape Ivantsov, where there is a walrus haul-out, to Chegitun. In the early summer, harvesting is conducted as far as Cape Seshan, which is near the village of Enurmino. In the autumn, hunting is conducted near the walrus haul-out on Cape Ivantsov. Thus, the harvest area comprises about 100 kilometers along the Chukotka Sea coastline. Monitoring program observer Dmitrii Kymyrovtyyn collects information by surveying the hunters and is himself a hunter. To ensure accurate information on harvested walrus over such a large area, Dmitrii Kymyrovtyyn selects two or three assistants from among the hunters. Walrus harvest monitoring began in June and concluded in October 2001.

Information on the walrus harvest was provided in a timely manner.

Enurmino: This village is located about 130 kilometers from Inchoun. Population: 304 people, of whom 301 are Native residents. Thirty hunters from the Enurmino branch of the Zapolyarye agricultural enterprise, working in three teams, conduct the harvest. The hunters use three whaleboats and 15 rifles (7.62 mm). Harvesting is conducted along the Chukotka Sea coast from Chegitun almost to Neshkan, over about 90 kilometers. Andrian Omrukvun conducts the walrus harvest monitoring, with the help of two assistants from different teams. Walrus harvest monitoring began in June and concluded in October 2001.

Information on the walrus harvest was provided in a timely manner.

The regional coordinator used the information that he received from the observers to prepare a summary table on the walrus harvest for each month, covering the entire region.

Each month, by the tenth of the month, summary reports on harvested walrus for the Chukotskii District were sent to the scientific director, Gennadii Smirnov, in Anadyr and to the Provideniya Regional Studies Museum by fax for transmission to the Alaskan Eskimo Walrus Commission in Nome.

Novo-Chaplino: This village, located in Tkachen Bay, is 18 kilometers northeast of Provideniya. The population is primarily Eskimo. Two teams, with 12 sea hunters, harvest marine animals. During spring and summer, walrus harvests are conducted primarily around capes Sivolkut and Chaplino. In the second half of summer and in the autumn, harvesting moves to the waters around Arakamchechen Island.

Igor Makotrik, 41 years old, is the observer for Novo-Chaplino. He has worked as a professional sea hunter and team leader since 1976. He sailed to St. Lawrence Island on a Lund-type boat. He is quite familiar with the habits of marine mammals and weather conditions in the North.

Sireniki: This village is 35 kilometers west of Provideniya, on the northeast shore of the Gulf of Anadyr. Populated primarily by Native peoples (Chukchis and Eskimos). Sixteen hunters

work in two teams to hunt marine animals. Main hunting areas: coastal waters from Cape Shpanberg in the west to Cape Lesovskii in the east. Thanks to unique hydrological and climatic conditions, hunters from Sireniki frequently venture out to harvest walruses in the winter, too, using skin canoes.

Sergei Skhaugye worked as monitor in Sireniki in 2001.

Enmelen: This village is located on the northeastern shore of the Gulf of Anadyr, not far from Cape Bering. Population mostly Chukchis. Eighteen hunters working in three teams harvest marine animals. The primary areas for harvesting walruses are in coastal waters from Rudder Bay to Cape Bering. In some years, hunters from Enmelen, like those in Sireniki, harvest walruses during the winter at the unfrozen Sireniki polynya [an open space of water amidst the sea ice].

Nikolai Rultintigreu, the observer in Enmelen, is 35 years old. He has worked as a rifleman on a sea hunting team since 1980.

Yanrakynnot: This village is located in Sevyavina Strait, not far from the island of Arakamchechen, where a major walrus haul-out forms during the summer. The population is primarily Chukchis. Most of the walruses are harvested around the Arakamchechen haul-out.

Sergei Ashkamakin, a professional sea hunter, was the observer for the monitoring program in Yanrakynnot.

3. COMMENTS BY VLADIMIR RINTEIMIT (REGIONAL COORDINATOR FOR CHUKOTSKII DISTRICT)

In the Chukotskii District, all the observers working on the program were informed of the start of the walrus harvest monitoring season in 2001. The monitors were already well acquainted with objectives one through five (see Introduction), which had been set forth in the documents approved at the meetings in Gambell, in 1999, and Nome, in 2000. In April the monitors were given additional oral instruction on the methodology for carrying out objectives one through five, and they were provided with all the necessary materials for conducting walrus harvest monitoring in the villages: observer journals and packets for collecting the teeth from harvested walruses. Detailed explanations were given on the methods for collecting information, summarizing the information for the month and relating the data to the regional coordinator. Particular emphasis was placed on the collection of teeth from harvested walruses. It helped that in 2000 Anatolii Kochnev, a staff member at ChukotTINRO, had instructed all the monitors on how to collect teeth. The monitors also had written instructions on how to collect the teeth.

The 2001 season saw the addition of a sixth objective: the collection, through a biopsy, of tissue samples from walruses for subsequent genetic analysis. For this purpose, the monitors were sent all the necessary materials for collecting, preparing and storing the samples: a knife for cutting out the samples, wipes for cleaning the hands, bottles with solution and containers for storing the samples. The monitors received written and oral instruction in collecting, preparing and storing the samples. All the materials necessary for collecting and storing the samples were received from the United States.

The system for providing the monthly reports to the regional coordinator remained the same: the monitor provides, by telephone, an oral report on the walrus harvest by the fifth day of the month and confirms the information in writing using the appropriate form. Monitors are to send the collected teeth and tissue samples periodically. The monitors' journals were turned in at the end of the season.

The observers were provided with additional oral instruction on collecting and preparing information at face-to-face meetings during the preparation period for the monitoring season, including in February at meetings with Yurii Klimakov, in Uelen, and with Dmitrii Kymyrovtyin, in Inchoun, and in April at a meeting with Aleksei Ottoi, in Lorino. Unfortunately, due to the absence of regular transportation, we were unable to meet with Andriyan Omrukvun, the monitor in Enurmino. All the necessary information was provided to him by telephone prior to the start of the season.

At the beginning of August 2001, a shipment arrived from Nome, Alaska, with equipment and consumable materials for the observers. This equipment included:

- A personal computer for the regional coordinator.
- Equipment for monitoring the walrus harvest and collecting samples (journals, pens, markers, pencils, sample containers).
- Clothing for observers (cotton suits, rubber boots, rubberized and cotton camouflage suits).

I also acquired work gloves, mugs and sewing kits for the monitors.

This equipment was proportionally divided up among the observers and the coordinator. Each observer received the allotted equipment and signed to confirm receipt of the equipment.

3.1. Comparative analysis of observers' performance

All the monitors were in their third year of working on the program, with the exception of Andriyan Omrukvun, who was in his second year. The monitors had good experience in documenting harvested walrus and in collecting biological samples. They all have a very responsible attitude toward carrying out their work. There were almost no hold-ups in providing reports on the part of the monitors.

The scientific leader of the project, Gennadii Smirnov, of ChukotTINRO, will provide an evaluation of the quality and completeness of the observers' harvest monitoring journals.

3.2. Development of the project

Begun in 1999, the monitoring project has expanded in each subsequent year, increasing the amount of work for the monitors from the Chukotskii District. In 2000 the village of Enurmino was added, and the monitors' workload increased because they began collecting walrus teeth. In 2001, the monitors began collecting tissue samples, which also increased the Chukotskii District monitors' workload. Therefore, the monitors required assistants not only due to the large harvest area they had to cover but also because their workload had increased. The walrus harvest monitoring project on Chukotka is necessary because:

- it most accurately reflects the true number of this species killed (harvested and "struck-and-lost") in the four villages of the Chukotskii District (Lorino, Uelen, Inchoun and Enurmino). To verify this, one need only examine the harvest data provided by the fisheries inspectorate for these villages during the period in question;
- the hunters acquire good skills in terms of documenting the walrus harvest;
- the hunters can see the true extent of the walrus harvest, not only in terms of the numbers but also in terms of the age-sex composition;
- Native hunters from both sides (Chukotka and Alaska) are afforded the opportunity to interact with each other.

The walrus harvest monitoring program should be expanded to encompass the remaining villages in the Chukotskii District, Lavrentiya and Neshkan. This would provide a complete picture of the walrus harvest for the entire district. Just one observer would be required for each of these villages. Regarding Lorino, we propose adding a second observer to ensure precise data on the harvest and stuck-and-lost walrus, as well as to facilitate the full collection of biological samples.

3.3. Regarding provisioning for the project

The hunters who participate in the harvest, including almost all our observers, work for agricultural enterprises. Marine hunting and fishing frequently are for them their only means of existence. They are poorly equipped with materials for hunting and fishing. The equipment that the monitors received (rubberized, camouflage cotton suits) are needed not just for monitoring but also for hunting. The monitors share this equipment with their assistants and with their fellow hunters. All the monitors and the regional coordinator receive the equipment and materials for monitoring the walrus harvest.

Since the observers are engaged in traditional hunting, the requests that they included in the 1999 report stemmed from requirements not just for carrying out the program but also for hunting and fishing.

For the walrus harvest program to function independently, in the long run it must have its own operational equipment. For example, for purposes of communications, it would be possible to acquire Russian Karat-type radio transmitters, which work well in situations requiring mobility. They can be purchased at a price of \$200 to \$300. The only problem would be in providing a good power source, that is, batteries for mobile radio transmitters of this type. In addition, the regional coordinators need copying equipment.

3.4. Regarding training for the observers and meetings with participants in the Russian-American project

Since the beginning of the project, our observers have visited Gambell and Nome. These visits are very important because they reinforce the significance of the project and of the monitors' participation in such activities as providing reports and meeting with specialists working in traditional harvesting in Alaska.

It is clear that the regional coordinators and observers should meet annually to discuss the results of their work and the further development of the program. Each observer should have the opportunity to see how his colleagues in the United States perform their work. Of course, not all the observers at once need visit the United States, given the funding. But while there are just a few of us in the district, it makes sense to hold, prior to the start of the season, meetings of the observers, regional coordinators and scientific directors in Nome, where the Alaskan Eskimo Walrus Commission operates.

3.5. Criteria for evaluating the observers' performance

The Chukotskii District monitors work more intensively than the monitors in the Provideniya District do. A larger proportion of harvested marine mammals, including walruses, are taken in the Chukotskii District.

Another criterion for evaluating the observers' work is the quality with which they fill out the journals and collect the teeth and tissue samples.

At the end of the monitoring season, the scientific director must evaluate the quality of work for each observer. An additional qualitative criterion could be the number of biological samples collected by an observer as a percentage of the total number of walruses killed for each village.

I believe that the observers who work better and more intensively deserve greater attention and compensation compared to the others.

3.6. Significance of the walrus for Native peoples of Chukotskii District

For the Native peoples of Chukotka, the walrus has been, and continues to be, more important than other marine mammals. This is particularly clear in the Chukotskii District because:

1. Of all the large marine mammals, the walrus is easier to kill, and the walrus can be taken on ice, water and dry land.

2. The Native settlements in the Chukotskii District are typically situated near walrus haul-outs or walrus migration routes. This speaks to the fact that even in the past the walrus has been highly important for the Native peoples. The walrus has provided warmth and food for the long winter.
2. The Native settlements in the Chukotskii District are typically situated near walrus haul-outs or walrus migration routes. This speaks to the fact that even in the past the walrus has been highly important for the Native peoples. The walrus has provided warmth and food for the long winter.
3. Even lacking fuel, firearms or ammunition, walruses can be harvested by hunters in canoes using harpoons and spears. This is how the hunt is carried out near haul-outs.
4. Products from the walrus are used to a greater extent than those from other large marine mammals. Walruses yield the greatest amount of food, and part of it can be used to feed dog teams. The hides are used to sew walrus-skin boats, and the teeth and tusks are used to make products for sale.
5. Walrus meat, better than that of other marine mammals, can be stored for long periods without refrigeration equipment as meat loafs in meat stores and natural ice stores.
5. The Chukotskii District is located in a high-risk area for caribou herding. This means that the pasturing lands for caribou can be covered by ice due to precipitation during the autumn and winter, which is fatal for the caribou. Over the past ten years, the caribou herd has declined sharply, and already the local people are not slaughtering caribou for food. Therefore, marine mammals represent the most available food source for the majority of the Native population and are also used by visiting peoples.

3.7. Methods of harvesting walruses

The methods of harvesting walrus have remained the same for many years and are practically identical throughout all the villages. Walrus harvest methods differ only by the season.

At the start and end of the season, walruses migrate on passing ice. They frequently can be seen hauled out and sleeping on the ice. The hunters carefully approach a herd of walruses hauled out on ice, keeping any noise from paddles or motors to a minimum. The hunters attempt to get as close as possible so as to kill the walrus with a single shot. They aim for the walrus' vital organs in order to cause immediate death. Otherwise the walrus could slip into the water and drown. However, the hunters will try to finish off a wounded walrus that gets into the water. To do this, the hunters harpoon the walrus as soon as it appears near the whaleboat or motorboat. After harpooning the walrus, the hunters can shoot the animal with their rifles. Two riflemen (or, rarely, three) will be in one whaleboat and can shoot at the walrus at once, which can usually kill the walrus or immobilize it so that it can be finished off. Motorboats usually carry one rifleman (or, rarely, two). In addition, motorboats usually cannot carry a large number of walruses because of their small load capacity.

Walruses are also killed on the water. The hunters approach the walrus carefully, at a low speed, or at full speed so that the hunters can harpoon the walrus before it can slip below the water. After harpooning, the walrus can be killed using rifles. If a walrus cannot be

harpooned immediately, then the hunters sometimes shoot it with their rifles, only in such a way that it does not die immediately, in which case it would sink. It is easier to find and follow a wounded walrus for harpooning so that it can be finished off with a rifle.

Walrus haul-outs begin to fill up closer to autumn. The first walruses arrive at the Inchoun haul-out in mid-August. The rest of the haul-outs fill up in September and October. The hunters treat the haul-outs near settlements with great care, and they observe different rules for hunting walruses near haul-outs, rules that have evolved over centuries in line with traditions. The hunt begins very early, at dawn. During this time, some of the walruses sleep on the water near the haul-out. The hunters paddle up close to the walruses, with motors shut off, so as not to wake the animals or frighten other walruses. The sleeping walrus is harpooned using a longer line than usual since the harpooned walrus moves in different directions, and the hunters let out line over a greater distance for ease and safety in following the walrus. The hunters will spear the harpooned walrus using a long spear, not using firearms so as not to frighten the remaining walruses. Then the walrus is towed away from the haul-out using the lowest motor speed possible. When these rules are observed, most of the walruses will not be frightened. Those walruses closest to the hunters may crawl into the water, but their numbers will not be great.

Hunting near haul-outs takes place during the autumn harvest season. Almost all settlements in the Chukotskii District are located near walrus haul-outs.

During the second half of the 1990s, walruses began to appear at previously abandoned haul-outs. There were fewer disturbances from passing boats or planes flying overhead.

Walruses killed on the ice are cut up so as to take as much meat as possible. The bones and other scraps are dumped into the water. Walruses killed on the water are brought to the beach to be cut up.

3.8. Storage, distribution and use of walrus products

Currently almost all the harvest goes to meet the needs of the district's population. Animal farms continue to operate only in Lorino (about 250 head) and Inchoun (40 head in the primary herd). A certain portion of the walrus products goes to the animal farms, primarily the non-food products, such as the scraps, bones and internal organs.

The harvest is divided up as follows: all the internal organs are divided up only among the hunters who killed a particular walrus. The walrus meat is divided up among the hunters. But, as a rule, several walruses are usually killed at once, so part of the meat goes to the local people, unless it goes to make meat loafs. The meat can be given away right on the beach or through one of the agricultural enterprises. The bones are also used. Ribs with the remains of meat are dried and consumed with oil. The rest of the bones go for dog food. The fat, if necessary, can be rendered into small fat jars and used for various household purposes. The fat can also be traded for meat with the caribou herders. Previously the intestines were used to make raincoats, but then rubberized gear replaced the coats made from whale intestines for the hunters. There are almost no products left that were made from walrus intestines, and examples survive only in museums.

Walrus meat taken in the spring or early summer goes immediately for consumption.

During the second half of summer, walrus meat is prepared for the winter. For this purpose, the walruses are cut up so as to leave as little meat on the bones as possible. The walrus carcass is divided into eight to ten chunks weighing from 50 to 100 kilograms. Each chunk

consists of walrus skin, fat and meat. A strip of walrus skin about one centimeter in diameter is cut round the perimeter of the chunk, and then loops about five centimeters long are made around the perimeter of the chunk. The strip of skin is passed through these loops in such a way as to tightly seal the ends of the chunk. Pieces of intestine, liver, heart or kidney may be placed inside this chunk of meat. The chunks of meat are placed in meat stores for keeping. Meat can be stored in this way until the beginning of the next hunting season.

In recent years people have begun building canoes in the Chukotskii District. Only skins from female walruses are used for the skin of the canoe. In this area, these canoes are built in Lorino, Uelen and Lavrentiya. Canoes were built in Inchoun in 1995, but due a lack of experience, the canoes did not turn out.

3.9. Current state of walrus harvest in Chukotskii District

Staffing and equipment levels for the harvest.

For the people of Chukotskii District, the walrus is just as important now as it was in previous times. At the beginning of the 1990s, when virtually no food products were delivered to the villages, people again began turning to traditional methods of producing food. People spent a great deal of time preserving wild foods and fishing. But sea hunting became the guarantee of survival. And among the sea animals harvested by the hunters, the walrus was the most productive. Chukotka's political leaders, understanding the important role that the marine harvest played in providing food for the people, began to promote the development of the harvest. Substantial investments were made to acquire firearms and ammunition. New, Tigr brand 7.62-mm rifles were purchased, and wooden whaleboats were built and delivered, followed by metal hunting boats that were supposed to replace the wooden whaleboats. The hunters were given new Yamaha 115 and Yamaha 40 outboard motors. All this helped the people survive very difficult conditions and develop the sea hunting industry.

Staffing and equipment levels for the harvest:

	Lorino	Uelen	Inchoun	Enurmino
Number of sea hunting teams	5	5	5	3
Number of hunters	40	48	42	30
Number used in harvest:				
Whaleboats	4	3	5	3
Sea hunting boats (new)	4	2	3	2
Motorboats	9	1		
Hide canoes	7	5	7	-
Motorized towing launches and powerboats	1	1	28	7
Outboard motors (primarily foreign)	15	6		6
Carbines and rifles	15	19		23
Number of refrigerators-freezers (ice boxes)	1			1
Total capacity (of the ice boxes), tons	100		100	50
Number of meat holes used				

Regulation of the walrus harvest.

The walrus, as any other animal, is a state resource and is not subject to harvesting without the appropriate permits.

In order to harvest walruses, individuals and corporate entities must apply at the end of the year to Chukotka's Department of Agriculture, indicating how many walruses they want to harvest and what harvesting equipment they have for this purpose (rifles, motor boats). The agriculture department allocates among the agricultural enterprises the number of walruses that each may harvest (the limit). Based on these data, the Marine Mammal Protection Inspectorate issues permits to the team or hunter. At the end of the harvest season, the permit is turned in to the inspectorate along with a record of the number of harvested walruses. Individuals are issued permits to harvest walruses without the right to sell them, since people are allowed to harvest walruses only for their own use. Agricultural enterprises have the right to sell products from harvested marine animals, but only with permission from the appropriate regulatory agency. To sell meat from marine animals, the enterprise must receive a veterinary certification from the Veterinary Service, showing that the meat is free of trichinosis or any other possible disease that an animal might be carrying. To receive this certificate, small pieces of meat are provided to a veterinary station for testing. To sell the tusks, the enterprise must have, in addition to the veterinary certificate, a certificate from the fisheries inspectorate showing that the tusks were obtained legally, that is, harvested by the agricultural enterprise under the proper license. If the food materials are processed (which occurs very rarely) into another product, it must be certified, that is, it must meet the appropriate standard. Permission must be obtained from the health inspectorate to sell such a product.

4. COMMENTS BY MAKSIM AGNAGISYAK, REGIONAL COORDINATOR FOR THE PROVIDENIYA DISTRICT

Maksim Agnagisyak, regional coordinator for the Provideniya District, met with Sergei Skhaugye, monitor for the village of Sireniki, in February. We worked on the continued monitoring of the walrus harvest in 2001 in Sireniki, on filling out the monitoring journals and collecting the teeth, and on additional changes to the project. The regional coordinator also visited Yanrakynnot, where Artur Appalyu replaced Sergei Ashkamakin as monitor. I trained him in filling out the monitoring journal, collecting teeth and numbering the packets with the teeth. The deadline for providing monitoring information for the month remained the fifth day of the following month, to be followed by subsequent submission of the written reports. I also discussed with all the monitors the problems that had arisen in the previous season or that could arise in the new season. This concerned gathering information from the foremen of harvesting teams and a possible increase the information collected on the walrus harvest. The results of the 2000 walrus harvest monitoring and the goals for the new season were discussed at the July 2001 meeting in Nome. Participants in the meeting from Provideniya District included the regional coordinator, Maksim Agnagisyak, and Sergei Skhaugye, monitor for Sireniki.

The goals for the new season included:

- Bringing walrus hunters into the resource management program and providing training opportunities for hunters from the villages of Provideniya District.
- Documenting the number of harvested walruses in the coastal villages of Provideniya District: Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen.
- Documenting the age and sex (newborns, yearlings, adolescents, adults, females, males and unidentified) of each harvested walrus in the coastal villages of Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen.
- Documenting the number of struck-and-lost walruses in Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen.
- Collecting the teeth from harvested walruses to determine their precise age.
- Collecting tissue samples from harvested walruses for DNA testing.

In the Provideniya District, walrus harvesting is conducted primarily by agricultural and municipal enterprises.

The hunting grounds are often far from the villages, so the harvesting in the district is done using temporary bases. For example, the hunters from Yanrakynnot have bases 20 kilometers to the east, at Alayan, and on the northern coast of Arakamchechen Island. The two teams from Novo-Chaplino also have two bases, one on Cape Skobeleva and one in Chechekuiyum Strait on Inakhpak during the summer-autumn period. The collection of tissue samples is problematic here because meat from the walruses is mixed together, and it will be impossible for the researchers to determine the precise DNA.

During the period of ice drift, walruses are harvested on ice (in Sireniki, the walrus harvest continues year-round). During this time, the hunters take most of the meat from the walruses for food, while the bones, including the jaws (without the tusks), are thrown into the water.

The Nome meeting produced the Working Plan for the 2001 Walrus Harvest Monitoring on Chukotka, and the monitors in Provideniya District worked to fulfill this plan throughout the season. The process for taking the reports from the monitors was refined over the past year and worked without disruption. The monitors provided the information in the required form by telephone. The regional coordinator put together the summary table for the district as a whole and, by the tenth of each month, provided the report to the scientific leader, Gennadii Smirnov, in Anadyr. As the opportunity presented itself, the monitors provided the regional coordinator with the teeth that they had collected, along with the tissue samples from harvested walruses, which were then sent on to the scientific leader. The monitor from Yanrakynnot personally provided the coordinator with a monthly observation chart and the collected teeth and walrus tissue samples.

The 2001 walrus harvest monitoring concluded in October. At the end of the season, the monitors provided their observation journals. There were some delays in getting the journals due to the absence of regular transportation between the villages and Provideniya, the district seat.

The Americans provided technical and financial support for the project: the US Fish and Wildlife Service provided the monitoring journals and office supplies (pens, pencils, markers, notebooks). The service provided all the materials needed to collect, package and study the teeth, as well as containers for the walrus tissue samples. This included envelopes, packages and sets of instruments to collect the samples. All these materials were used in the process of collecting information on harvested walruses.

The Fish and Wildlife Service purchased equipment for the monitors. Each monitor received a set of clothing and boots. The monitors used all this equipment as they worked to collect the information. For the summer period, each of them received waterproof and cotton suits).

Hunters from Sireniki and Novo-Chaplino harvested the first walruses. At the beginning of May, the hunters headed out from Novo-Chaplino on Buran snowmobiles — taking with them, on sleds, motorboats with their equipment — and harvested walruses. The harvest began in Yanrakynnot in July because the Senyavina Strait was iced up and the hunters were unable to get to sea. In June almost no harvesting took place due to the absence of pack ice, because of which there were no walruses. Just one walrus was taken during this month, in Novo-Chaplino. Intensive hunting for walruses, to get meat to prepare meat rolls for the winter, began only in August.

The season ended in October. The walruses left the haul-outs early. At the beginning of September, about 50 walruses were recorded at the haul-out on Arakamchechen Island. Apparently the eastern winds and waves chased the walruses from the haul-outs. On the whole, fewer walruses were seen during this season than in the previous year.

Of the five villages in the district, the monitoring project has not encompassed only one, Nunligran. Here, the walrus harvest begins in May and ends in October or November. Given favorable ice conditions, the harvest may begin in May and end in December.

The joint meetings between the monitors and marine mammal hunters from both sides of the Bering and Chukotka seas should continue and be expanded. This would help the monitors from Provideniya District better understand the necessity of, and process for, walrus harvest monitoring.

Because of the reasons I related above, the 2001 walrus harvest cannot be considered successful. Therefore, we can assume that the 2002 harvest season will be more intensive.

It is difficult to predict how early the ice conditions will allow hunters to begin the harvest and when the harvest will end. For the new harvest season the Providenskoye agricultural enterprise received and provided to the hunters a sufficient amount of weapons and ammunition to harvest walruses and other pinnipeds. They received a large boat with a Yamaha 150 outboard motor and a separate Yamaha 4 kerosene-powered outboard motor. They also have a full supply of fuel and lubricants.

The Chukotka Walrus Harvest Monitoring Project is extremely important for all the participants in Provideniya District. The participants' material interest in the project plays a significant role. Such projects offer the opportunity to receive equipment for harvesting, and this prompts other Native people to want to participate in the project. Besides the material interest, there is also the moral aspect of the project. The inclusion of the Native people and monitoring assistants in this project creates interest in the knowledge and experience of the sea hunters for the purpose of learning about traditional harvesting.

Of course, each hunter who participates in the harvest knows and can report on the total harvest of his team and perhaps even his entire company. He can go to his company's head office to see the official data presented to the regulatory agencies. But those are just pure numbers, without any of the additional information that is collected for this monitoring project. But if they can see the monitoring data in this technical report, they can find food for thought. The monitoring data show not only harvested walruses but also struck-and-lost animals. These materials provide a real picture of how many walruses are being killed and a sense of how successfully the walrus harvest is being conducted in each village and in each team where monitoring is being conducted. The hunters can compare the effectiveness of one or another group of hunters: how many walruses were killed, how many were lost and so on. Some can even improve on certain professional weak points, with the comparisons resulting in more successful, more practical hunters.

Our annual meetings in Alaska provide positive motivation not only for the monitors but also for their assistants.

The interaction with the Alaskan sea hunters and monitors provides the opportunity to compare how the traditional harvesting and environmental protection have been preserved in Alaska and Chukotka. We also have the opportunity to see — and in some ways to envy — how in Alaska various private organizations work with the Native peoples and the respect that these organizations enjoy among the Native peoples.

I would like to relate one tradition of the many that have been preserved to this day.

As in the past, the hunters share with their sons and other youths their experience harvesting at sea. They teach the young people all the skills of the hunt. Then a young person makes his first kill, say, a seal. News of this kill travels throughout the whole village. Then the parents, without telling the youth, invite an older person, usually a grandmother, who weighs about the same as the youth. The grandmother then shares in the kill with the youth. This is done so that the youth starts out on a successful path, so that every hunt results in a kill and so that he learns to share this kill and to remember the older generation. Then the youth tries with every hunt to take a kill and to share it.

The management of the project expresses its gratitude to all those involved in the Chukotka Walrus Harvest Monitoring Project.

Many thanks to the monitors for their good, conscientious work in the 2001 season. This includes: Nikolai Rultintigreu, Enmelen; Sergei Skhaugye, Sireniki; Igor Makotrik, Novo-Chaplino; and Artur Apalyu, Yanrakynnot.

An enormous “thank you” to the other Russian participants who have contributed to this project: Igor Zagrebin, Lyudmila Ainana (head of the Yupik Society) and Mikhail Zelenskii.

We would like to express particular gratitude to the American and Russian specialists and researchers for their persistence and enthusiasm in developing and implementing this project: Genadii Smirnov, ChukotTINRO; Carl Kava, Roza Atuk Fosdik and Austin Amasuk, from Kawerak.

We would like to personally thank the head of the monitoring program in Alaska for the USFWS, Joel Garlich-Miller, for his persistent efforts in developing this project, and Jonathon Snyder, coordinator in Alaska.

We thank you all and look forward to further collaboration.

5. RESULTS OF THE HARVEST MONITORING

5.1. Seasonal Dynamic of the Harvest

For the whole 2001 harvesting season, 936 walrus were harvested (Table 1), 90 head more than in 2000. A total of 722 walrus (or more than three-quarters of the total number) were harvested in the Chukotskii District, with a third (319) of the entire harvest for Chukotka attributable to Lorino. The average take for the harvest for both districts was 2.4 walrus per hunting foray, a slight decline from the level of the previous year (2.8). The highest average takes per foray, unlike the previous year, were achieved by the hunters in the villages of Enmelen and Sireniki: on average, over the season, the hunters from these settlements took, respectively, 3.6 and 3.3 walrus per foray (Table 1). For the whole season, 118 struck-and-lost walrus were counted (in 2000, the figure was 99), which amounted to 12.6 percent of the total number of harvested animals.¹

As in the previous year, the first walrus were taken in Provideniya District, in Novo-Chaplino. Following, this report describes the harvest dynamic by month. Unfortunately, we do not have information on the hunts and precise dates of walrus kills from Uelen and Sireniki because the observers' harvest journals for these villages have yet to arrive.

May

In May hunters from four villages harvested walrus: Novo-Chaplino, Enmelen, Sireniki and Lorino.

The first walrus taken in this month (and in the season) were killed on May 6 and 7 by hunters from **Novo-Chaplino**. The hunters killed two adult males in the area around Cape Sivulkut on shore ice and in the open water. On May 7 the walrus harvest began in **Enmelen**, where an adolescent male was killed. On May 9 the Novo-Chaplino hunters killed four more walrus (two females with two yearlings). During the first ten days of May, harvesting took place only in the Provideniya District.

The intensity of the harvest increased noticeably in mid-May, when hunters from **Lorino** opened the walrus hunting season by killing an adult male on ice on May 11. According to Aleksei Ottoi, the observer for Lorino, 80 walrus were killed in the second half of May (including five adolescent females and seven adult females, with the remaining 62 being males, including 26 adults and the remainder adolescents), with the average take per hunting foray reaching 4.4 head.² In Lorino, in May, hunting was conducted adjacent to the settlement, from a strip of shore ice, among walrus at a haul-out of up to seven head. In Provideniya District, from May 11 to the end of the month, just three walrus were taken: on May 14 in Enmelen (an adult male) and on May 18 and 27 in Novo-Chaplino (an adult female and an adult male).³

¹ Incomplete data. See Table 1.

² This information differs from that provided by Vladimir Rinteimit, who indicated that the Lorino hunters took 24 walrus in May, not 80.

³ We have not included here walrus killed in May by hunters from Sireniki because we do not have information on the dates when the walrus were killed.

The high productivity of the Lorino hunters harvesting in the Gulf of Mechigmen can be explained both by their great experience and their professional preparations, as well as by an increase in the intensity of the walrus migration to the north (according to Aleksei Ottoi, the number of migrating walruses increased significantly in the second half of the month).

For the entire month, 45 walruses were killed (53.3 percent in the Chukotskii District). The number of kills per hunting foray is indicated in Table 2.

In the previous year, monitoring had shown that small groups of mature males are the first to arrive on the coast of the Chukotka Peninsula during the spring migration northward, while mixed groups (females with young, adolescent and adult males) arrive two to three weeks later. The results of monitoring in Lorino confirm our earlier supposition (Smirnov et al., 2001) that mixed groups (females with young) migrate later in the spring since the first females to be killed in this village were taken 13 days later than the mature males. In 2001, the situation was somewhat different in the southern part of the Bering Strait (around Novo-Chaplino): adolescents and females with children were seen here in the first ten days of the month, just one or two days after the first adult males were killed. It is possible that this reflects the general winter redistribution of the population caused by the unique ice situation that took shape in February and March 2001. Judging by an analysis of ice maps, the absence of ice in the waters south of St. Lawrence Island could have forced the main reproductive concentrations of walruses to move during this period into the Bering Strait and into the northwestern region of the Gulf of Anadyr. In this regard, it is possible that the migration of females with young from the Gulf of Anadyr and from their wintering regions around St. Lawrence Island and into the Chukotka Sea in 2001 took place much earlier than usual (by ten to 15 days).

June

During this month, harvesting took place only in the Chukotskii District, with the exception of one sick walrus (an adult male) taken in the Provideniya District at Novo-Chaplino.

Harvesting in the Chukotskii District was quite active from the very start of the month. In the first week of June, in the course of four hunting forays, **Lorino** hunters killed 23 walruses on ice haul-outs: 13 on June 1 (12 adult males and one adolescent male) and 10 on June 6 (all adult males). We do not have further information on the harvest in Lorino for this month.

Hunters from **Enurmino** killed four walruses in the course of four hunting forays on June 10 and 16. One walrus each (both adult males) was taken in **Novo-Chaplino** (walrus killed on the open water across from Cape Staroye Chaplino on June 18) and **Inchoun** (June 27).

During the entire month, 95 walruses in all were killed (twice as many as in May, and 25 more than in June 2000), of which the bulk of the kills can be ascribed to two villages, Lorino (68.4 percent) and Uelen (25.3 percent). The highest levels of productivity in June were achieved by the teams from Lorino (at 2.9 walrus kills per foray) and Uelen (4.8). The average number of kills per foray for the Chukotskii District as a whole was 2.9. The number of struck-and-lost walruses for the month was 13.

July

The first walruses (two adult females and two adolescent females) of the this month were killed in **Enmelen** on July 1. This village also had successful hunts on July 10 and 18, and

in all eight walrus were killed during this month (all females, with five being adults and three, adolescents).

Two adult walrus were killed in **Enurmino** on July 3. Hunters from this village killed a total of 11 walrus (ten adult males and one adult female) during this month (on July 3, 19, 21, 23 and 24), with an average take of 1.8 kills per hunting foray.

Until July 20, harvesting was conducted only in these villages. The intensity of the harvest was relatively low: during this time, 13 walrus were killed (five each of adult males and females, and three adolescent females) during five forays to sea. After this, the productivity level of the harvest increased sharply (reaching a maximum level of six walrus taken in one foray) when the **Lorino** hunters joined in the harvesting. In the area around Cape Akkani, on July 20 and 21, during four forays to sea, the Lorino hunters killed 24 walrus (of which 4 percent were yearlings of both sexes; 4 percent, adult males; 42 percent, adolescent males; 17 percent, adult females; and 29 percent, adolescent females). In all, 48 walrus were killed at Lorino during this month (or 111 walrus, according to observer Aleksei Ottoi). The Gulf of Mechigmen, by this time, had become free of ice, and the walrus were passing in transit. Hunting was conducted primarily in the region around Akkani.

Hunters from **Inchoun** took 76 walrus (all adult males) on July 25 using spears at a haul-out. The greatest number of walrus killed at one time was 20.

In July, the first walrus of the season (six males, including one adolescent and the rest adults) were taken in **Yanrakynnot**. During this time, the hunters went to sea four times. No walrus were struck and lost.

In all for the month, 187 walrus were harvested, with 81.3 percent of this number attributable to the Chukotskii District. The average number of kills per hunting foray was 3.1 walrus (Table 2). A total of 61 hunting forays were made.

August

In August, harvesting took place in all the regions encompassed by the monitoring. This month saw the greatest number of walrus killed (275) and the greatest number of hunting forays (102) for this season. A total of 43.6 percent of all the kills were attributable to Lorino. The remaining villages saw harvest takes for the month ranging from eight (Yanrakynnot) to 38 (Enmelen) walrus. Males predominated in the kills (63.6 percent).

Hunters from **Novo-Chaplino** took the first walrus of the month (which turned out to be an adult male) on August 2 in the area around Yttygran Island. For most of August, Novo-Chaplino's teams hunted walrus in the area around Arakamchechen Island. For the entire month they took 14 walrus (in ten hunting forays) and lost four.

On August 3, hunters from **Lorino** killed 12 walrus in two forays (all males, 41.7 percent adults). They hunted in the waters adjacent to the village. For all of August, four teams of Lorino hunters, in the course of 42 forays, took 120 walrus, among which females predominated (60.8 percent). The number of females taken in this month amounted to 72.3 percent of the total number of females killed by this village's hunters during the 2001 season.

Hunters from **Enmelen** took their first walrus of the month (a female with a newborn and an adolescent male) on August 4. The Enmelen hunters were the most productive of this month, having taken 38 walrus in seven forays to sea (an average of 5.4 walrus per foray).

In **Inchoun**, this month's harvesting began on August 5. During this month, the hunters went after walruses floating by on ice and in the open waters adjacent to the village. In 20 forays to sea, the Inchoun hunters took 26 walruses (all males, including four adolescents and the rest, adults) and lost 10 walruses. There were many stuck-and-lost walruses when the hunters shot from the shore at walruses floating by on ice.

Yanrakynnot hunters only took walruses in the middle of the month, on August 15. For all of August, they made seven forays, killed eight walruses (all males: half adults and two each of yearlings and adolescents) and lost two walruses.

The predominance of females, including those with young, among the kills by Lorino hunters is quite unusual for this time of the year and points to the active migration of the females from the Gulf of Anadyr into the Chukotka Sea. Monitoring at the Meyechkyn and Rudderskoye haul-outs in 2001 showed a sharp drop in the number of walruses this season (a drop of more than 50 percent compared to the previous season). It is clear that in July and August the hunters from Lorino also took females migrating from the Gulf of Anadyr. This phenomenon could be viewed as a late consequence of the winter redistribution of the population that resulted from the unique ice conditions in February and March.

September

The intensity of the harvest fell in September compared to the previous month. In all, 152 walruses were killed during this month (more than half, 56.5 percent, were taken in the Chukotskii District), and hunters made 52 forays to sea (with 38 of these forays taking place in the Chukotskii District). The overall productivity level for both districts, therefore, was 2.9 walruses killed per hunting foray. Hunting took place in all the villages.

Hunters from **Enurmino** took the first walrus killed this month (an adult male) on September 5. During the entire month, these hunters made eight forays, took 13 walruses (three adult females, six adolescent males and four adult males) and lost five animals.

Novo-Chaplino hunters had successful forays on September 6 and 7: in these two days, they killed seven walruses (all males, with two of them being adults and the rest, adolescents). The overall productivity level for the hunt was 1.8 walruses per foray; in all for the month, this village's hunters took 18 walruses (having lost one animal), of which all were males (seven adolescents and 11 adults). In September they harvested walruses in the area around Arakamchechen Island.

In **Inchoun**, hunters killed 21 walruses (61.9 percent adults, all males). The harvest went on from September 8 through 26 around the Inchoun haul-out using harpoons and spears, and also on ice and in open water. During this period, the hunters made 15 forays to sea. The number of lost walruses amounted to four.

Hunters from **Lorino** and **Enmelen** began going after walruses starting on September 12. For the whole month, the Lorino hunters took 36 walruses (30 males and six females). Clearly in September their primary efforts were directed toward harvesting whales, which explains the small number of walruses harvested at this village compared to previous months. The Enmelen hunters killed more walruses this month than any other village, a total of 39, with males predominating among the kills by a two-to-one ratio. Among the females, adolescent animals predominated (76.9 percent), while among the males, adults predominated (73.1 percent).

In **Yanrakynnot** five walruses (all adult males) were taken. In addition, data from the monitor for this village show that on September 18 and 19, two walruses were killed, but the age and sex of these animals could not be determined.

October

In October, the intensity of the harvest was much higher in the Chukotskii District than in the Provideniya District, where just ten walruses were killed during this month (the second lowest number of walruses taken by hunters from this district; in June, just one walrus was taken). In October, for the first time in the season, more females were killed than males. A large number of the females (85.1 percent) were killed by hunters from villages along the northern coastline of the Chukotka Peninsula: Enurmino, Uelen and Inchoun. In the villages situated along the coast of the Gulf of Anadyr, just one of the nine walruses killed during October was a female.

On October 1, **Lorino** hunters killed five adult males in three forays. The hunt took place in the area around Akkani among feeding walruses. These hunters went out to sea ten more times before the end of the month, bringing the total number of walruses killed this month to 26, with equal numbers of males and females (the males were all adults, while adolescents predominated among the females). During this month, the teams hunted primarily adjacent to Goryachie Klyuchi among feeding walruses. Most of the animals were killed within the first ten days of the month.

In **Enurmino**, teams hunting from October 4 through 17 killed the greatest number of walruses for any month by this village (and almost half of the village's entire harvest for the season): 33 walruses, averaging 4.7 kills per foray. Just four males (one yearling and the rest adolescents) were included in the kill, while among the females (29 in all), about one-third were adolescents and the rest were adults. Eight walruses were struck and lost.

In **Novo-Chaplino** just one walrus (an adult male) was killed this month, on October 11, although the hunters made four forays to sea. The teams hunted, as before, in the area around Arakamchechen Island.

The intensive migration of walruses from the Chukotka Sea to the south accounted for the high level of harvesting activity in **Uelen**. Compared to the other villages, the Uelen hunters harvested the greatest number of walruses this month (78) in just nine forays. Twelve walruses were struck and lost. Males and adolescents predominated in the kills (60.3 percent and 83.3 percent, respectively). This village's productivity level for October, 8.7 walruses per foray, was the highest level for any village throughout the season, just as in 1999 and 2000, when 6.8 and 10.4 walrus kills per foray marked the highest productivity levels for any village.

During the period from October 17 through 30, hunters from **Inchoun** harvested 35 walruses in 27 forays. Most often this village's teams hunted around the summer ice haul-out and adjacent to the village. Females predominated in the kills (57.1 percent), and two-thirds of these females were adolescents, the remainder being adults.

In **Enmelen**, during two forays, on October 25 and 27, hunters killed three males (one yearling and two adolescents). Enmelen hunters took no further walruses this month.

In **Yanrakynnot**, walruses were not hunted in October.

The predominance of females (54.1 percent) among the kills in the Chukotskii District might be evidence of an earlier autumn migration by mixed groups of Pacific walruses from the Chukotka Sea to wintering areas.

The spring-summer peak of harvest activity for 2001 came in the last ten days of July and August, that is, later by one or two weeks than in 2000, and later by three to four weeks than in 1999. The most intense period in the autumn harvest came in September, as it did in the previous year.

5.2. Age-Sex Composition of the Kill

Males predominated in the walrus kills in all villages in 2001 (69.6 percent of all walruses killed were males), although the percentage of males for this year fell compared to 2000 by 12.9 percentage points. In the Provideniya District, the ratio of males to females among the walruses killed remained almost the same as in 2000. But in the Chukotskii District the share of females increased by more than two-and-a-half times, reaching 29.6 percent (in 2000, the figure was 11.6 percent), and an increase in the females' share in the kill was recorded for all villages in this district. In walrus kills in **Enurmino** during 2001, the male-female ratio was about one-to-one, while in 2000 males made up almost the entire harvest (females constituted just 5.6 percent that year). The percentage of females in the kill increased significantly (by 25.3 percentage points) in the walrus harvest by **Lorino** hunters. **Inchoun** and **Uelen** did not see significant changes in the sex composition of the kills, with males predominating overall, although the share of females did increase by a small amount: by 4.7 percentage points in Inchoun and by 1.5 percentage points in Uelen. In the villages of the Provideniya District, the correlation of males and females in the 2001 harvest was almost unchanged from the previous year. In **Yanrakynnot**, as is traditionally the case, the entire harvest consisted exclusively of males. In **Novo-Chaplino**, the percentage of females in the 2001 kill was 2.6 percentage points greater than in the previous year. In the villages situated along the coast of the Gulf of Anadyr, the percentage of males (57.5 percent) exceeded the percentage of females. The villages of **Sireniki** and **Enmelen** saw the percentage of males increase by 4.6 percentage points and 3.1 percentage points, respectively, in 2001. The predominance of males that we saw in the 2000 harvest in Enmelen continued in 2001. Notably, we know that females predominated (at 73.7 percent) in the kill for 1999, while their share in the harvest shrank to 39.8 percent in 2000 and to 36.7 percent in 2001. In earlier years the predominance of females in the harvests along the coast of the Gulf of Anadyr was the norm (Mymrin, Grachev, 1986; Grachev, 1988; Grachev, Mymrin, 1991; Mymrin et al., 1988; 1990; Smirnov, 1996).

For the villages in both districts, the approximate ratios of males to females in the 2001 walrus harvest were as follows: Enurmino and Sireniki - 1:1; Lorino, Uelen, Enmelen - 2:1; Inchoun - 7:1; Novo-Chaplino - 13:1. In Yanrakynnot, the harvest consisted entirely of males. We should note here that the walrus harvest in the latter two villages (Inchoun and Novo-Chaplino), as well as in Yanrakynnot, was conducted primarily in the vicinity of male haul-outs, which accounts for the significant predominance of males in the kills.

The sex composition of the harvested walruses in 2001 on Chukotka varied as the harvesting season progressed, unlike in the previous year, when males predominated throughout the entire season. In contrast to 2000, when the percentage of males among the harvested walruses saw practically no change for the first three months of the harvest (ranging from 82 percent to 80 percent), in 2001, the share of males in the kills increased in June as compared to May by 18.5 percentage points, reaching a peak for the season (87.4 percent). After this peak, the share of females in the kills increased in July and August to 16.6 percent and 36.4 percent, respectively. In September, the share of males in the kills

rose again, to 79.6 percent, while females predominated in the sex composition of harvest kills in October. Their share this month reached a peak for the season (51.6 percent). In 1999 and 2000, the share of females among harvested walrus peaked in August with levels of 26.4 percent and 56.1 percent, respectively.

In terms of the age composition of the kills, the percentage of newborns among the harvested walrus increased in 2001 over 2000 by 1.2 percentage points, reaching 1.7 percent. Yearlings constituted 2.9 percent of the harvest in 2001, an increase of 0.4 percentage points over 2000. The percentages of adolescents (39.6 percent) and adults (55.1 percent) in 2001 were about the same as in 1999 but represented increases of 6.6 percentage points and 8.2 percentage points, respectively, compared to the figures for 2000. Age could not be determined for four walrus (0.6 percent).

The harvests for the villages of Uelen, Lorino, Novo-Chaplino, Sireniki and Enmelen included the few newborns and yearling walrus taken during the 2001 season.

5.3. Analysis of Harvest Losses

According to data on harvest losses, the total number of struck-and-lost walrus in 2001 was 118 (12.6 percent), which, as a percentage of the total number of walrus harvested was about the same as the figure for the previous year (11.6 percent). The highest losses were recorded in Enurmino and Novo-Chaplino. For the individual villages, the figures were as follows:

	<u>1999</u>	<u>2000</u>	<u>2001</u>
Lorino	3.50 percent	3.02 percent	4.10 percent
Uelen	7.10	16.90	13.10
Inchoun	20.90	10.50	15.10
Enurmino	-	28.90	22.40
Novo-Chaplino	24.60	11.40	23.80
Sireniki	4.50	8.90	20.60
Enmelen	15.90	20.40	18.90
Yanrakynnot	-	4.40	10.50
Total	9.40	11.70	12.60

In the opinion of many researchers (Belopolskii, 1931; Nikulin, 1941; Fay et al., 1994; Smirnov, 1996; Garlich-Miller, 1998; and others), the level of harvest losses of Pacific walrus can reach 40 percent to 50 percent of the total number of harvested walrus. The size of the losses depends on various factors and can vary greatly. When walrus are harvested on ice haul-outs, the losses decrease, while losses increase during hunts on the water. In recent years on Chukotka, socioeconomic factors have been a significant factor in the decrease in harvest losses. The chronic shortage of weapons, ammunition, fuel and other material resources has encouraged the Chukotka hunters to carry out the harvest with minimal losses. They have begun to employ spears more frequently when harvesting walrus near haul-outs. For hunts on the water, the hunters in many villages use fast aluminum boats, which allow them to quickly catch up to a walrus and harpoon it prior to shooting it.

At the same time, high losses continue where walrus are harvested on the water using slow whaleboats. This was confirmed by observations by ChukotTINRO biologists from 1995 through 2000 in various harvesting regions (A. Kochnev, Ye. Kompantseva, D. Litovka and A. Kharitonov, verbal communications and our own observations).

Despite the fact that in 2000 and 2001 many villages received new, fast cargo boats for hunting whales and walrus (intended to "replace" the old whaleboats), the loss percentage for 2001 was higher than the figures for 1999 and 2000.

The data on losses for individual villages cited at the beginning of this section seem incomplete to us. It is quite possible that the sea hunters did not provide information about harvest losses for subjective reasons (fear of official repercussions, etc.). Biologists from ChukotTINRO had previously noted resistance on the part of certain managers when information was requested on the harvests in the villages of Sireniki and Lorino. Despite the educational work done with team leaders and hunters by the coordinators and the project's scientific director, many of them still are afraid to provide all the data on walrus losses during the hunt. Therefore, we calculated the harvest losses of Pacific walrus for all the coastal enterprises on Chukotka based on the upper estimates received from monitors' observations in Novo-Chaplino, 23.8 percent.

5.4. Evaluation of Objectivity of Officially Reported Data and Calculation of Actual Take

A comparison of the officially reported data on the number of harvested walrus with the data from the 2001 monitoring program showed, as in the previous two years, substantial differences in the monthly and seasonal data for all the villages (Table 4). The total number of harvested walrus for the six months of observations in the eight monitored villages based on the official reports from harvesting enterprises and the Chukotka fisheries agency was 840, while our data show 936 walrus killed in these villages. The shortfall in the official count was 94 walrus, or 10.4 percent (compared to 17.7 percent in 2000). The greatest numbers of officially uncounted harvested walrus were in Novo-Chaplino, 71.4 percent (against 86.4 percent in the previous year), and Enmelen, 77.8 percent (54.3 percent in 2000). Notably, similarly high variances with the official data were observed in Novo-Chaplino and Enmelen in 1999 (72.1 percent and 79.5 percent, respectively).

Based on the assumption that the correlation of the actual harvest versus official reports is the same for all villages of Chukotka where walrus are hunted, we can estimate the number of walrus actually killed with a correction coefficient calculated using the USFWS Marine Mammals Management method (Garlich-Miller, 1998):

$$R = \text{DHM}/\text{GSD} \quad (1)$$

In the formula, R is the correction coefficient; DHM is the data from the harvest monitoring in the eight monitored villages (936); and GSD is the government statistical data on the number of walrus harvested in the eight monitored villages (840).

The correction coefficient is therefore equal to 1.114 (compared to 1.215 in 2000, and 1.242 in 1999). Multiplying the total number of walrus reportedly harvested on Chukotka in 2000 (1,196 according to the official reports) by the correction coefficient gives us the estimated number of harvested walrus: 1,332.

The estimated number of walrus taken out of the population in 2001 by Chukotka's sea hunters (including harvest losses, 23.8 percent) was 1,649 animals (versus 1,562 in 2000, and 2,080 in 1999).

6. CONCLUSION

The monitoring of the harvest of Pacific walrus on Chukotka, begun in 1999, continued in 2001 at a qualitatively higher level. Monitoring was conducted in eight villages on the Chukotka Peninsula where visual reporting of the age and sex of the harvested walrus took place. In 2001, as in the previous year, in all the villages, samples of teeth were collected from harvested walrus. A biological analysis of the teeth will produce valuable information on the current age-sex structure of those walrus removed from the population. In addition, muscle tissue samples were collected from the harvested walrus for subsequent genetic analysis.

The results of the harvest monitoring confirmed the earlier onset of the spring migration by females in the Bering Strait region and also the subsequent more active (compared to previous years) summer migration of walrus from the Gulf of Anadyr (portions of the Anadyr group of walrus) to the Chukotka Sea in July and August 2001. The causes of the phenomena are likely connected with the winter redistribution of the Pacific walrus population caused, in turn, by unusual ice conditions in February and March 2001.

The 2001 research confirmed that males predominate among the harvested walrus. It was established that in the villages along the northern coastline of the Chukotka Peninsula, the share of females in kills can reach more than 45 percent (Enurmino). In walrus harvests in villages on the Gulf of Anadyr (Sireniki and Enmelen), females predominate from May to July, while males predominate from August to October. Based on this, we can put forth the hypothesis that a significant percentage of the females in the Anadyr group of Pacific walrus left the Gulf of Anadyr at the end of July and were subsequently able to reach the coastal waters around Enurmino. The decline in the percentage of females in the kills along the coastline of the Gulf of Anadyr continued, which could reflect the trend toward a decline in the numbers of walrus in the Anadyr group.

The data from the harvest monitoring point to dynamic changes in the sex composition of local walrus communities living along Chukotka's coastline at different times of the year. The results of the harvest monitoring are confirmed by data from research into walrus' coastal haul-outs in the Gulf of Anadyr and on the Chukotka Peninsula.

Visual inspections by the monitors showed that, compared to 2000, the share of newborns among the harvested walrus in both districts increased by 1.2 percent. Yearlings comprised 2.9 percent of the harvest, or 0.4 percent greater than in 2000. The percentages of adolescents (39.6 percent) and adults (55.1 percent) were about the same as in 1999, but increased by 6.6 percent and 8.2 percent, respectively, compared to 2000.

The extent of harvest losses, as in the previous year, varied considerably between villages. Reported losses might have been subjectively lowered by hunters and therefore might not reflect the actual losses. To get an idea of the true extent of harvest losses, it would be necessary to conduct alternative research using more objective methods.

The estimated number of harvested walrus in 2001 for Chukotka was 1,332. Taking into account the harvest losses (struck-and-lost), a total of 1,649 walrus were removed from the population by Chukotka's sea hunters in 2001 (compared to 1,562 in 2000, and 2,080 in 1999).

Further development of walrus harvest monitoring on Chukotka will require an increase in the quality of the work and the inclusion of other villages, including villages in the Iultinskii District. It is necessary to continue the collection of the age-indicating and genetic material,

which is particularly important due to the need to quickly obtain an understanding of the current state of the population. The collection of information on harvest losses requires methodological improvement. For the purpose of improving the quality of the first-hand information collection, consideration should be given to providing additional compensation for the monitors from Lorino, Uelen and Inchoun, who perform significantly more work than their colleagues from other villages.

Constant training for the staff of the monitoring program and increased educational work in the villages, districts and administrative centers of Chukotka, as well as in Alaska, would help more quickly meet the goals for rational management of the Pacific walrus population by people on both sides of the Bering Strait.

ACKNOWLEDGEMENTS

The staff of the project would like to express their sincere gratitude to the U.S. Fish and Wildlife Service in Alaska, the Kawerak Incorporated of Nome, Alaska, and the U.S. National Park Service, with the financial support of which the 2000 monitoring research was expanded both geographically and in terms of content.

We would like to personally thank the head of the Walrus Harvest Monitoring Program in Alaska (under the USFWS), Joel Garlich-Miller, for his consistent efforts to develop this joint project. We thank Jonathon Snyder, biologist with Marine Mammal Management at USFWS, for his constant practical assistance. We would like to express our gratitude to the head of Marine Mammal Management (USFWS), Dr. Rosa Meehan; the former chairman of the Alaskan Eskimo Walrus Commission, Carl Kava; the current chairman of the commission, Austin Amasuk; and the staff of this commission, including Roza Atuk Fosdik and Jerry Knudsen, for their practical support in the implementation of this project. We are also grateful to our many volunteer helpers in Alaska, including Sue Cruz, Marina Bell, Natasha Novik, Charlie Johnson, Clarence Vaghi, Nancy Mendenhall and others. We would also like to express our regards and thanks to Larry Dickerson, our partner from the very start of the projects.

We are particularly grateful to our Russian assistants. Igor Zagrebin helped with translation and interpretation, and with communication assistance in Provideniya District. We are grateful to ChukotTINRO staff members Anatolii Kochnev and Denis Litovka for training the monitors and for consulting on the practical aspects of collecting biological samples. We thank the heads of ChukotTINRO (Dr. Vladimir Myasnikov), Naukan Production Cooperative (Mikhail Zelenskii) and the Yupik Society of Eskimos of Chukotka (Lyudmila Ainana) for providing various technical assistance. A huge "thank you" to all the hunters of the villages of Enurmino, Inchoun, Uelen, Lorino, Yanrakynnot, Novo-Chaplino, Sireniki and Enmelen. Without the assistance of these people, it would not be possible to implement this project.

BIBLIOGRAPHY

Works in Russian

Belopolskii, L.O. A Brief Preliminary Report on the Work to Study the Marine Mammals of the Anadyr Region. TINRO Archive, 1931. 25 pages.

Grachev, A.I. "Summer Distribution of Walruses in the Gulf of Anadyr." Research Works on Marine Mammals of the Northern Pacific Ocean in 1986-1987. Moscow, VNIRO, 1988, pp. 118-123.

Grachev, A.I., Mymrin, N.I. "Number and Age-Sex Composition of Walruses at Haul-outs on the Chukotka Peninsula." Research Works on Marine Mammals of the Northern Pacific Ocean in 1989-1990. Moscow, VNIRO, 1991, pp. 48-51.

Kleinenberg, S.Ye., and Klevezal, G.A. Determining the Age of Mammals Based on the Layer Structure of the Teeth and Bones. Nauka, 1967.

Mymrin, N.I., Grachev, A.I. "Number and Gender Composition of Walruses on Haul-outs in the Gulf of Anadyr and Arakamchechen Island in 1984." Study, Protection and Rational Use of Marine Mammals (Thesis Report for the Ninth All-Union Conference). Arkhangelsk, 1986, pp. 286-287.

Mymrin, N.I., Smirnov, G.P., Gayevskii, A.S., Grachev, A.I., Klimenko, Yu.V. "Migration of Pacific Walruses and the Dynamics of Their Numbers at Haul-outs." Research Works on Marine Mammals of the Northern Pacific Ocean in 1986-1987. Moscow, VNIRO, 1988, pp. 109-115.

Mymrin, N.I., Smirnov, G.P., Gayevskii, A.S., Kovalenko, V.Ye. "Seasonal Distribution and Numbers of Walruses in the Gulf of Anadyr of the Bering Sea." *Zool. Zhurn.*, 1990, vol. 69, issue 3, pp. 105-113.

Nikulin, P.G. "Chukotka Walrus." Publications of TINRO, 1941, vol. 20, pp. 21-59.

Report on the Scientific Work "Socioecological Evaluation of the Use and State of Marine Mammals Resources in the Gulf of Kresta." (G.P. Smirnov) Anadyr, 1996, p. 45. (ChukotTINRO Archives)

Rinteimit, V.M., Agnagisyak, M.D., Smirnov, G.P. Walrus Harvest Monitoring On Chukotka in 1999 (Technical Report for the U.S. Fish and Wildlife Service), Anchorage, Alaska, 2000, 65 pages.

Smirnov, G.P., Rinteimit, V.M., Agnagisyak, M.D. Walrus Harvest Monitoring On Chukotka in 2000 (Technical Report for the U.S. Fish and Wildlife Service), Anchorage, Alaska, 2001, 72 pages.

Works in English

Fay, F.H. "Ecology and Biology of the Pacific Walrus, *Odobenus rosmarus divergens* Illiger." North Amer. Fauna, no. 74. Washington, DC, US Dept. of the Interior, Fish and Wildlife Service, 1982. 279 pages.

Fay, F.H., Burns, J.J., Stocker, S.W., and Grundy, J.S. "The Struck-and-Lost Factor in Alaskan Walrus Harvests, 1952-1972." 1994, *Arctic* 47: pp. 368-373.

Garlich-Miller, J. "Estimating the Harvest of Pacific Walrus in Alaska." In: Proceedings of the workshop concerning walrus harvest monitoring in Alaska and Chukotka. Nome, Alaska. September 22-25, 1998: pp. 21-26.

Smirnov, G.P. "Monitoring the Pacific Walrus Harvest in Russia: History and Present Time." In: Proceedings of the workshop concerning walrus harvest monitoring in Alaska and Chukotka. Nome, Alaska. September 22-25, 1998: pp. 29-34.

APPENDICES

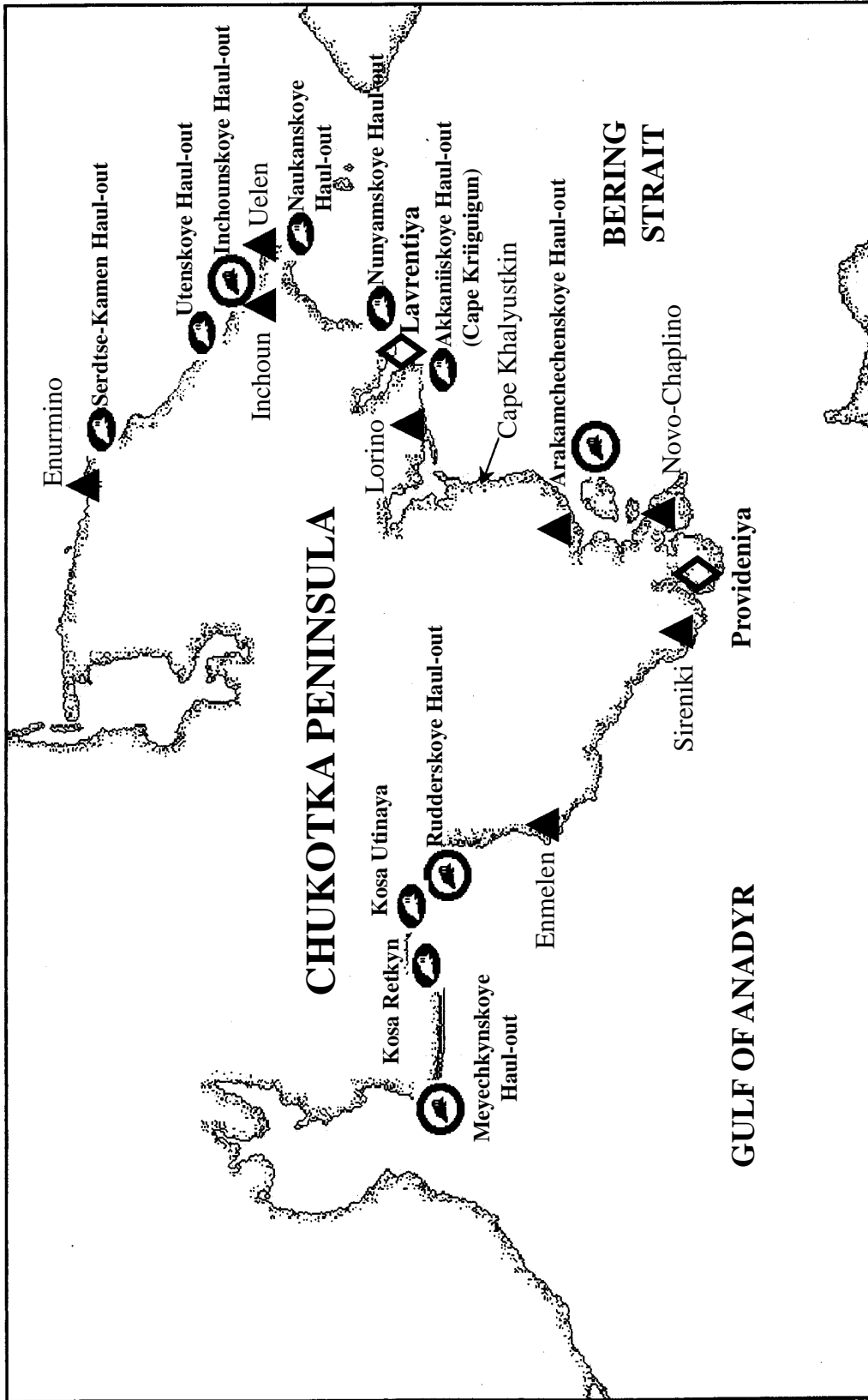


Illustration 1. Map of the research area: location of observers (▲), regional coordinators (◊), dislocation of permanent (⊙) and autumn (⊙) haul-outs.

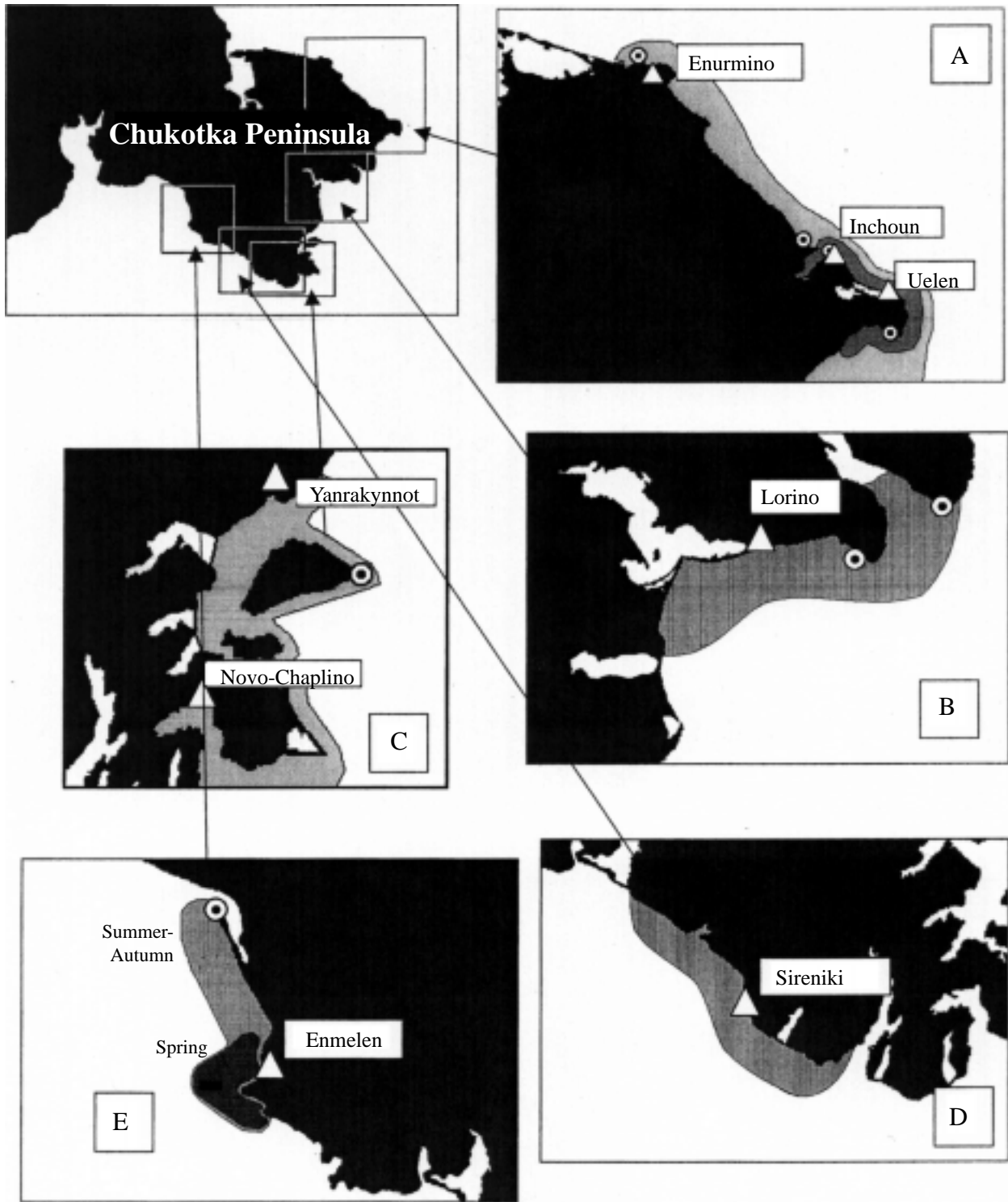


Illustration 2. Traditional areas of walrus harvesting (shaded areas). Coastal haul-outs are indicated with the symbol ⊙.

Illustration 3.1. Sex composition of harvested walrus for all villages over the course of the season.

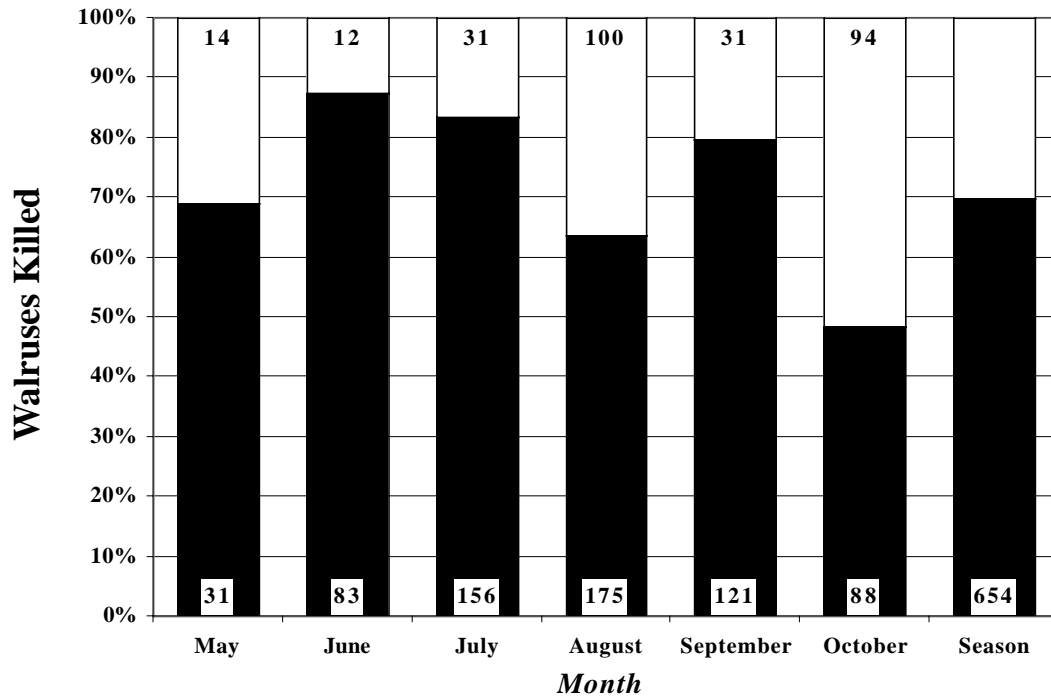


Illustration 3.2. Sex composition of harvested walrus by village and region for the entire season.

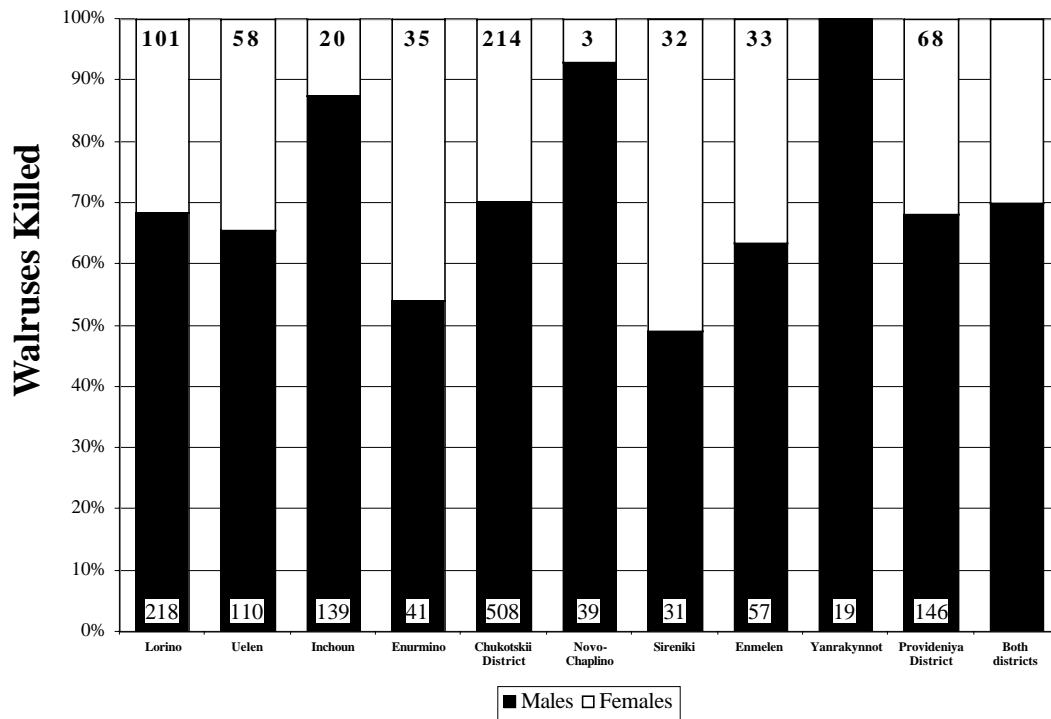


Illustration 4. Seasonal dynamic of sex composition of walrus harvest kills, by village.

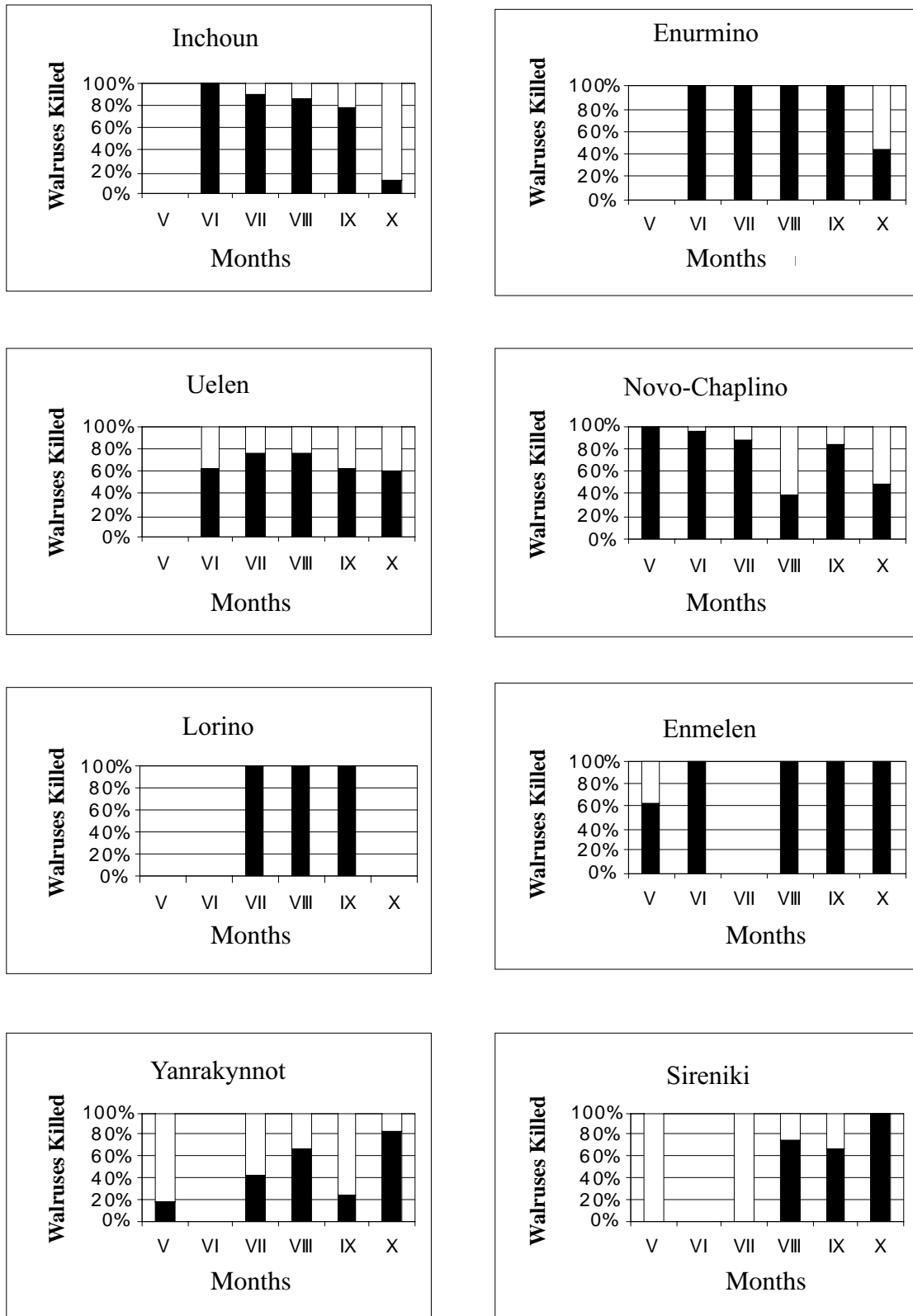


Table 1. Final data for Walrus Harvest Monitoring on Chukotka in 2001

Villages, Months	Walruses Taken	Including Males						Including Females						Total	Unknown	Sex	Lost	Hunting Forays
		Newborns	Yearlings	Adolescents	Adults	Unknown	Total	Newborns	Yearlings	Adolescents	Adults	Unknown	Total					
May																		
Lorino	24	0	0	11	13	0	24	0	0	0	0	0	0	0	0	0	?	?
Uelen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inchoun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enurmino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal for Chukotskii District	24	0	0	11	13	0	24	0	0	0	0	0	0	0	0	0	?	?
Novo-Chaplino	8	2	0	0	3	0	5	0	0	0	3	0	3	0	3	0	5	12
Sireniki	11	1	1	0	0	0	2	0	1	3	5	0	9	0	9	0	?	?
Emmelen	2	0	0	0	0	0	0	0	0	1	1	0	2	0	2	0	0	2
Yanrakynnot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal for Provideniya District	21	3	1	0	3	0	7	0	1	4	9	0	14	0	14	0	5	14
Subtotal for May	45	3	1	11	16	0	31	0	1	4	9	0	14	0	14	0	5?	14?
June																		
Lorino	65	0	0	23	39	0	62	0	0	0	3	0	3	0	3	0	7	22
Uelen	24	0	5	7	3	0	15	0	1	8	0	0	9	0	9	0	6	5
Inchoun	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Enurmino	4	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	4
Subtotal for Chukotskii District	94	0	5	30	47	0	82	0	1	8	3	0	12	0	12	0	13	32
Novo-Chaplino	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	?	?
Sireniki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emmelen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yanrakynnot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal for Provideniya District	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	?	?
Subtotal for June	95	0	5	30	48	0	83	0	1	8	3	0	12	0	12	0	?	?
Subtotal for 2 months	140	3	6	41	64	0	114	0	2	12	12	0	26	0	26	0	18?	46?

Table 1. Final data for Walrus Harvest Monitoring on Chukotka in 2001 (continued)

Villages, Months	Walrus Taken		Including Males				Including Females				Total	Sex Unknown	Lost	Hunting Forays	
	Newborns	Yearlings	Adolescents	Adults	Unknown	Total	Newborns	Yearlings	Adolescents	Adults					Unknown
July															
Lorino	48	0	0	23	0	42	0	0	2	4	0	6	0	2	22
Uelen	17	1	3	8	1	13	0	0	3	1	0	4	0	0	4
Inchoun	76	0	0	76	0	76	0	0	0	0	0	0	0	4	15
Enurmino	11	0	0	10	0	10	0	0	0	1	0	1	0	0	6
Subtotal for Chukotskii District	152	1	3	110	0	141	0	0	5	6	0	11	0	6	47
Novo-Chaplino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Sireniki	21	0	0	3	2	4	9	0	9	1	2	12	0	0	5
Emmelen	8	0	0	0	0	0	0	0	3	5	0	8	0	0	3
Yanrakynnot	6	0	0	1	5	0	6	0	0	0	0	0	0	0	4
Subtotal for Provideniya District	35	0	0	4	7	4	15	0	12	6	2	20	0	0	14
Subtotal for July	187	1	3	31	117	4	156	0	17	12	2	31	0	0	61
Subtotal for 3 months	327	4	9	72	181	4	270	0	29	24	2	57	0	24?	107?
August															
Lorino	120	4	6	21	16	0	47	0	40	33	0	73	0	4	42
Uelen	33	0	0	2	23	0	25	0	2	6	0	8	0	?	42
Inchoun	26	0	0	4	22	0	26	0	0	0	0	0	0	11	20
Enurmino	15	0	0	1	12	0	13	0	0	2	0	2	0	4	8
Subtotal for Chukotskii District	194	4	6	28	73	0	111	0	42	41	0	83	0	19	73
Novo-Chaplino	14	0	0	4	10	0	14	0	0	0	0	0	0	4	10
Sireniki	21	0	0	5	9	0	14	0	3	3	0	7	0	5	5
Emmelen	38	1	0	6	21	0	28	2	3	5	0	10	0	5	7
Yanrakynnot	8	0	2	2	4	0	8	0	0	0	0	0	0	2	7
Subtotal for Provideniya District	81	1	2	17	44	0	64	2	6	8	0	17	0	16	22
Subtotal for August	275	5	8	45	117	0	175	2	48	49	0	100	0	35	95
Subtotal for 4 months	602	9	17	117	298	4	445	2	77	73	2	157	0	59?	202?

Table 1. Final data for Walrus Harvest Monitoring on Chukotka in 2001 (continued)

Villages, Months	Walrus Taken	Including Males					Including Females					Total	Unknown	Sex	Lost	Hunting Forays
		Newborns	Yearlings	Adolescents	Adults	Unknown	Total	Newborns	Yearlings	Adolescents	Adults					
September																
Lorino	36	0	0	21	9	0	30	0	2	0	4	0	6	0	0	12
Uelen	16	0	0	1	9	0	10	0	0	2	4	0	6	4	4	3
Inchoun	21	0	0	8	13	0	21	0	0	0	0	0	0	0	4	15
Enurmino	13	0	0	6	4	0	10	0	0	0	3	0	3	0	5	8
Subtotal for Chukotskii District	86	0	0	36	35	0	71	0	2	2	11	0	15	4	13	38
Novo-Chaplino	18	0	0	7	11	0	18	0	0	0	0	0	0	0	1	10
Sireniki	4	0	0	0	1	0	1	0	0	3	0	0	3	0	3	3
Enmelen	39	0	0	7	19	0	26	0	0	10	3	0	13	0	12	?
Y anarakynnot	5	0	0	0	5	0	5	0	0	0	0	0	0	0	0	1
Subtotal for Provideniya District	66	0	0	14	36	0	50	0	0	13	3	0	16	0	16	14
Subtotal for Sept.	152	0	0	50	71	0	121	0	2	15	14	0	31	4	29	52
Subtotal for 5 months	754	9	17	167	369	4	566	2	5	92	87	2	188	4	88?	254?
October																
Lorino	26	0	0	0	13	0	13	1	0	9	3	0	13	0	?	13
Uelen	78	3	2	40	2	0	47	1	1	25	4	0	31	0	12	9
Inchoun	35	0	0	8	7	0	15	0	0	13	7	0	20	0	5	27
Enurmino	33	0	1	3	0	0	4	0	0	10	19	0	29	0	8	7
Subtotal for Chukotskii District	172	3	3	51	22	0	79	2	1	57	33	0	93	0	25	56
Novo-Chaplino	1	0	0	0	1	0	1	0	0	0	0	0	0	0	?	4
Sireniki	6	0	0	1	4	0	5	0	0	1	0	0	1	0	5	3
Enmelen	3	0	1	2	0	0	3	0	0	0	0	0	0	0	?	2
Y anarakynnot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal for Provideniya District	10	0	1	3	5	0	9	0	0	1	0	0	1	0	5	9
Subtotal for October	182	3	4	54	27	0	88	2	1	58	33	0	94	0	30	65
SEASONAL TOTAL	936	12	21	221	396	4	654	4	6	150	120	2	282	4	118	365

Table 2. Average number of walrus taken in one hunting foray.

	May			June			July			Aug.		
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001
Lorino	1.66	2.12	?	4.65	2.52	3.0	5	6.55	2	2	4.55	2.9
Uelen	1	0	0	2	1.55	4.8	2	4.66	6.3	6.3	2	0.8
Inchoun	0	2	0	2.25	0	1.0	2	1	0.7	0.7	1.82	1.3
Enurmino	-	0	0	-	0	1.0	-	7	-	-	2.43	1.9
Average for Chukotskii District	1.5	2.11	?	3.7	2.21	2.9	3.1	5.32	1.7	1.7	2.75	1.7
Novo-Chaplino	0.5	0.14	0.7	0.9	0.25	?	0.4	1.2	0.6	0.6	1.62	1.4
Sireniki	1	0.37		0.5	0	-	1.22	5.33	4.8	4.8	0.33	4.2
Enmelen	2	0.8	1.0	1.4	?	-	3	3.66	3.3	3.3	2.54	5.4
Average for Provideniya District	1	0.3		0.71	0.67		1.3	3.57	2.6	2.6	2.15	2.8
Average for both districts	1.1	0.7		1.9	1.67	3.0	2.2	4.61	2.2	2.2	2.48	2.0

	Sept.			Oct.			6-month Average		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Lorino	4.35	2.37	3.0	5.87	2.63	2.0	4.65	3.55	2.7
Uelen	2.16	3.5	5.3	6.84	10.4	8.7	3.83	4.06	2.7
Inchoun	2.3	4.86	1.4	2.54	1.41	1.3	1.92	2.53	2.0
Enurmino	-	2.18	1.6	-	0	4.7	-	3.6	2.3
Average for Chukotskii District	2.82	3.14	2.3	5.35	3.5	3.1	3.51	3.39	2.4
Novo-Chaplino	1.3	1.8	1.8	1.9	0.5	0.3	0.97	0.83	1.1
Sireniki	1.2	0	1.3	2.5	2.2	2.0	1.37	1.7	3.3
Enmelen	3.3	3.5		1.2	4.33	1.5	2.5	1.8	3.6
Average for Provideniya District	1.97	2.06		1.9	2.22		1.46	1.68	2.0
Average for both districts	2.54	2.73	2.9	4.3	3		2.58	2.64	2.4

Table 3. Age composition of harvested walruses, by village.

Months	Newborns		Yearlings		Adolescents		Adults		Unknown Sex		Total	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Lorino												
May	0	0.0	0	0.0	11	45.8	13	54.2	0	0.0	24	100.0
June	0	0.0	0	0.0	23	35.4	42	64.6	0	0.0	65	100.0
July	0	0.0	0	0.0	21	43.8	27	56.3	0	0.0	48	100.0
August	4	3.3	6	5.0	61	50.8	49	40.8	0	0.0	120	100.0
September	0	0.0	2	5.6	21	58.3	13	36.1	0	0.0	36	100.0
October	1	3.8	0	0.0	9	34.6	16	61.5	0	0.0	26	100.0
6-mo. total	5	1.6	8	2.5	146	45.8	160	50.2	0	0.0	319	100.0
Ulelen												
May	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
June	0	0.0	6	25.0	15	62.5	3	12.5	0	0.0	24	100.0
July	1	5.9	3	17.6	11	64.7	2	11.8	0	0.0	17	100.0
August	0	0.0	0	0.0	4	12.1	29	87.9	0	0.0	33	100.0
September	0	0.0	0	0.0	3	15.0	13	65.0	0	0.0	20	100.0
October	4	5.1	3	3.8	65	83.3	6	7.7	0	0.0	78	100.0
6-mo. total	5	3.0	12	7.1	98	58.3	53	31.5	0	0.0	168	100.0
Inchoun												
May	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
June	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	1	100.0
July	0	0.0	0	0.0	0	0.0	76	100.0	0	0.0	76	100.0
August	0	0.0	0	0.0	4	15.4	22	84.6	0	0.0	26	100.0
September	0	0.0	0	0.0	8	38.1	13	61.9	0	0.0	21	100.0
October	0	0.0	0	0.0	21	60.0	14	40.0	0	0.0	35	100.0
6-mo. total	0	0.0	0	0.0	33	20.8	126	79.2	0	0.0	159	100.0
Enurmino												
May	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
June	0	0.0	0	0.0	0	0.0	4	100.0	0	0.0	4	100.0
July	0	0.0	0	0.0	0	0.0	11	100.0	0	0.0	11	100.0
August	0	0.0	0	0.0	1	6.7	14	93.3	0	0.0	15	100.0
September	0	0.0	0	0.0	6	46.2	7	53.8	0	0.0	13	100.0
October	0	0.0	1	3.0	13	39.4	19	57.6	0	0.0	33	100.0
6-mo. total	0	0.0	1	1.3	20	26.3	55	72.4	0	0.0	76	100.0
Novo-Chaplino												
May	2	25.0	0	0.0	0	0.0	6	75.0	0	0.0	8	100.0
June	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	1	100.0
July	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
August	0	0.0	0	0.0	4	28.6	10	71.4	0	0.0	14	100.0
September	0	0.0	0	0.0	7	38.9	11	61.1	0	0.0	18	100.0
October	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	1	100.0
6-mo. total	2	4.8	0	0.0	11	26.2	29	69.0	0	0.0	42	100.0
Sireniki												
May	1	9.1	2	18.2	3	27.3	5	45.5	0	0.0	11	100.0

Table 3. Age composition of harvested walruses, by village (continued).

Months	Newborns		Yearlings		Adolescents		Adults		Unknown Sex		Total	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Enmelen												
May	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	2	100.0
June	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
July	0	0.0	0	0.0	3	37.5	5	62.5	0	0.0	8	100.0
August	3	7.9	0	0.0	9	23.7	26	68.4	0	0.0	38	100.0
September	0	0.0	0	0.0	17	43.6	22	56.4	0	0.0	39	100.0
October	0	0.0	1	33.3	2	66.7	0	0.0	0	0.0	3	100.0
6-mo. total	3	3.3	1	1.1	32	35.6	54	60.0	0	0.0	90	100.0
Yanrakynnot												
May	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
June	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
July	0	0.0	0	0.0	1	16.7	5	83.3	0	0.0	6	100.0
August	0	0.0	2	25.0	2	25.0	4	50.0	0	0.0	8	100.0
September	0	0.0	0	0.0	0	0.0	5	100.0	0	0.0	5	100.0
October	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6-mo. total	0	0.0	2	10.5	3	15.8	14	73.7	0	0.0	19	100.0

Table 4. Difference between official data and data from monitoring program in 2001.

Villages	Number of Walrus Harvested in 2001		Difference
	Monitoring Data	Official Data	
Inchoun & Uelen	327	377	+50
Lorino	319	263	-56
Enurmino	76	104	+28
Yanrakynnot	19	15	-4
Novo-Chaplino	42	12	-30
Sireniki	63	49	-14
Enmelen	90	20	-70
Total	936	840	-94

Program: Walrus Monitoring on Chukotka

Information on take:

Name of village:	
Starting date of foray:	Name of team foreman:
Return date from foray:	Number of hunters:
Notes on hunt (<i>area of hunt, method of harvesting, notes on weather, ice conditions, etc.</i>):	

Use check marks to show sex and age of each walrus

No.	Sex			Approximate Age					Notes
	Male	Fem.	Unkn.	Newb.	Year.	Adlsnt	Adult	Unkn.	

Total number of walrus taken during hunting foray: _____ head.

Any losses or wounded animals? (circle one) Yes No Unknown How many? _____

Name of observer _____ Date of reporting _____

NOTE: 1. The numbering of the harvested walrus must be sequential (that is, the numbers on new pages should continue the numbering from the previous page). 2. When collecting the teeth from harvested walrus, the number on the envelope should coincide with the sequential number noted in the journal.

Appendix 2

**Summary Report for Results of Walrus Harvest Monitoring
in village of _____ for _____, 2000**

Village	Number of Walrus Taken	Including Males					Including Females					Sex not est.	Lost Wal- ruses	No. of forays		
		Newb.	Year.	Adlsnt	Adult	Unkn	Total	Newb.	Year.	Adlsnt	Adult				Unkn	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Observer _____
Date _____
(full name)

NOTES:

Instructions for village observers on completing the monthly monitoring report on the walrus harvest.

1. In blank 2, indicate the total number of harvested walrus for the reporting period.
2. In blanks 3 through 8, total the data from the observation journals, indicating only the males, with a breakdown by age categories.
3. In blanks 9 through 14, total the data from the observation journals, indicating only the females, with a breakdown by age categories.
4. In blank 15, indicate the number of walrus for which you were unable to establish the sex through any possible means.
5. In blank 16, indicate the number of walrus that were not brought to shore (wounded animals that were lost, walrus that sank), if you have such data.
6. In blank 17, indicate the total number of hunting forays, including those that were unsuccessful.
7. The monthly summary report is relayed by telephone to the district coordinator by the fifth day of the following month.

Appendix 3

Summary Report for Results of Walrus Harvest Monitoring
in district of _____ for _____, 2000

Village	Number of Walrus Taken	Including Males						Including Females						Sex not est.	Lost Walrus	No. of forays
		Newb.	Year.	Adlsnt	Adult	Unkn.	Total	Newb.	Year.	Adlsnt	Adult	Unkn.	Total			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

District Total

Additional Information:

District Coordinator

Date _____

(full name)

NOTE:

Report to be faxed to Project Scientific Leader Gennadii Smimov at (42722) 4-67-61 and Joel Garlich-Miller at (907) 786-3816 by the tenth of the following month.

INSTRUCTIONS

For Collecting Teeth from Harvested (Found) Walrus for Determining Age

Observers (monitors), prior to hunting forays, provide to captains (hunting team leaders) plastic bags and permanent markers, as well as pencils and paper for notations.

The captains or other responsible individuals, prior to dividing up harvested walrus, collect the teeth and package them in the plastic bags using the following procedure:

1. At the site where the walrus meat is divided, the harvested walrus are numbered in order (1, 2, 3, ...), and a plastic bag is placed beside each walrus carcass. Notations on the plastic bags (***only write on dry plastic bags***) include the number, an indication of the sex of the animal, the age class (newborn, yearling, adolescent or adult) and date of harvesting. The plastic bag can be held down with a stone or placed in the mouth cavity of the walrus, with efforts made to prevent the labeling from becoming too stained with blood. In order to ensure that the information is preserved, a paper label with the same information written in pencil should be placed inside the plastic bag.
2. Beginning with walrus No. 1, remove and collect the teeth, and package them in the appropriate plastic bags.

COLLECT ONLY THE LOWER FRONT TEETH

Removed teeth (just the two lower front teeth) are packaged in the plastic bags in such a way as to ensure that they cannot accidentally fall out of the bag and mix with teeth from other walrus.

3. All the bags with the teeth from walrus harvested in one foray should be placed in one common bag on which is marked, in permanent marker, the date of the foray and the name of the captain (hunting team leader).
4. After returning from the foray, the bag with the collected teeth is given to the observer (monitor).

The observer (monitor) keeps track of all the harvested walrus in a special working journal (table), marking the sequential numbers of the harvested walrus from the first to last of the season.

Upon receipt of a package with collected teeth, the observer records in the journal the information on the harvested walrus and simultaneously assigns them sequential numbers. The collected teeth are removed from the plastic bags; cleaned of dirt, blood and oil; dried; and then packaged in special paper envelopes. Marked on the envelopes are the sequential number (not the number from the plastic bag but the sequential number from the working journal), sex, cause of death of the animal, date when the animal was killed or found, village, name of the observer and, in certain cases, notes (for example, notation of why just one tooth instead of a pair was received, or notation of some anatomical anomaly, and so on). When possible, the teeth packaged in the paper envelopes are handed over to the district coordinator, who in turn sends them to the scientific leader in Anadyr.

Scientific Leader for the Walrus Harvest
Monitoring on Chukotka Program

G. Smirnov

Teeth from Walrus No. _____
(sequential number of walrus in the working journal - filled in by observer)

Identification Code: _____
(filled in by scientific leader)

1. One envelope is used for packaging the teeth from just one walrus. The following information must be provided for each walrus:

Sex: Male Female Unknown

Cause of Death: Harvesting
Natural Causes
Unknown

Other: _____

Date When Walrus Was Harvested (or Found): _____

Village: _____

Observer (Monitor): _____

Notes: _____

2. Position of lower teeth that must be removed and packaged.



3. Send to the following address:

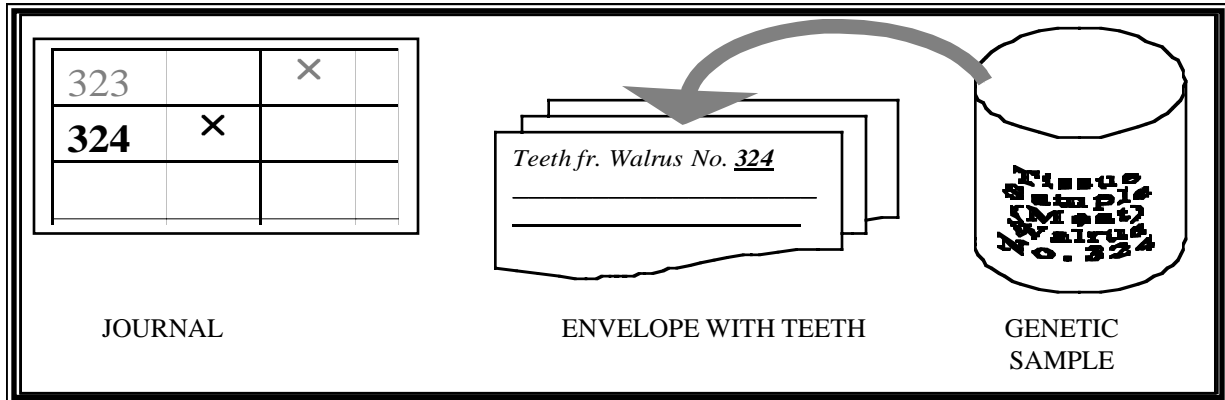
Chukotka Branch of the Pacific Fisheries Research Center, Otko, 56, Anadyr, P.O. Box 29,
Chukotka, Russia 689000
Tel./Fax: (42722) 2-67-61

INSTRUCTIONS

For Collecting Teeth and Genetic Samples from Harvested (Found) Walrus

ATTENTION!

The number on the packets with the genetic samples should match the sequential numbers of the harvested walrus and the number on the envelope with the teeth from these walrus.



Observers (monitors), prior to hunting forays, provide to captains (hunting team leaders) plastic bags, vials/small bottles for genetic samples with disposal razor blades and permanent markers, as well as pencils and paper for notations.

SEE SEPARATE INSTRUCTIONS FOR COLLECTING GENETIC SAMPLES.**COLLECTION OF TEETH TO DETERMINE EXACT AGE.**

The captains or other responsible individuals, prior to dividing up harvested walrus, collect the teeth and genetic samples and package them in the plastic bags using the following procedure:

1. At the site where the walrus meat is divided, the harvested walrus are numbered in order (1, 2, 3, ...), and a plastic bag is placed beside each walrus carcass. Notations on the plastic bags (***only write with the marker on dry plastic bags***) include the number, an indication of the sex of the animal, the age class (newborn, yearling, adolescent or adult) and date of harvesting. The plastic bag can be held down with a stone or placed in the mouth cavity of the walrus, with efforts made to prevent the labeling from becoming too stained with blood. In order to ensure that the information is preserved, a paper label with the same information written in pencil should be placed inside the plastic bag.
2. Beginning with walrus No. 1, remove and collect the teeth, and package them in the appropriate plastic bags.

COLLECT ONLY THE LOWER FRONT TEETH

Removed teeth (just the two lower front teeth) are packaged in the plastic bags in such a way as to ensure that they cannot accidentally fall out of the bag and mix with teeth from other walrus.

3. All the bags with the teeth from walrus harvested in one foray should be placed in one common bag on which is marked, in permanent marker, the date of the foray and the name of the captain (hunting team leader).
4. After returning from the foray, the bag with the collected teeth is given to the observer (monitor).

The observer (monitor) keeps track of all the harvested walrus in a special working journal (table), marking the sequential numbers of the harvested walrus from the first to last of the season.

Upon receipt of a package with collected teeth, the observer records in the journal the information on the harvested walrus and simultaneously assigns them sequential numbers. The collected teeth are removed from the plastic bags; cleaned of dirt, blood and oil; dried; and then packaged in special paper envelopes. Marked on the envelopes are the sequential number (not the number from the plastic bag but the sequential number from the working journal), sex, cause of death of the animal, date when the animal was killed or found, village, name of the observer and, in certain cases, notes (for example, notation of why just one tooth instead of a pair was received, or notation of some anatomical anomaly, and so on). When possible, the teeth packaged in the paper envelopes are handed over to the district coordinator, who in turn sends them to the scientific leader in Anadyr.

Scientific Leader for the Walrus Harvest
Monitoring on Chukotka Program

G. Smirnov

INSTRUCTIONS
For Collecting Biological Samples for Genetic Analysis
(Walrus Muscle Tissue for DNA Analysis)

Muscle tissue is preferable for genetic analysis of walrus DNA. Tissue from any muscles can be used. However, due to the need to precisely number the samples, it is most convenient to collect muscle tissues from the head and facial area of the animal. When several walruses are being dressed at one time, pieces of their meat usually are thrown together into one pile, but if you have the opportunity to take a sample from the head of the walrus, then it will also be easier for you to establish the sex and age of this animal. In addition, you will be able to easily avoid mistakes in using the same number for all samples (teeth and muscle samples) taken from one animal.

The size of the muscle samples is not large. It is quite sufficient to take a muscle sample the size of an eraser on the end of a pencil. After the muscle sample is placed in the jar with the buffer solution, the sample can be stored indefinitely at room temperature. **Please make sure that each sample is fully immersed in the buffer solution. Also, be certain that each time you take muscle tissue, you use clean, sterile instruments (knife, forceps, disposable razor). This is necessary to ensure the biological purity of the sample and the accuracy of the results of subsequent laboratory analysis. Each sample should have a unique number corresponding to the sequential number of the harvested walrus in the monitoring journal.**

1. In every instance, without exception, before taking a muscle sample, **be sure that your knife, razor blade, forceps and cutting instrument have clean surfaces and are sterile.** First, wipe off the instruments with a clean rag, then use the special alcohol wipe and follow this by rinsing them in clean water. This will protect the genetic samples from biological cross-contamination.
2. **To take a muscle sample, use only a clean knife or razor.** The initial sample size should be 1.5 cubic centimeters or greater. Only one sample should be taken from each animal!
3. On a clean surface (use a clean sheet of paper), cut off a piece of the muscle from each side (from six sides), **using for this purpose the special disposable razor blade**, leaving a chunk not more than 1 cubic centimeter in size.
4. Using the clean forceps, take the sample and put it in the container (vial) with the buffer solution. Tightly close the lid of the vial. **Make sure that the sample is entirely immersed in the buffer solution.**
5. **Apply to each vial a label with a unique sample number written in permanent marker (the number of the sample should correspond to the sequential number of the harvested walrus).** Also, use the pencil, but not a pen, to write the same number on a small piece of paper that you place inside the container with the tissue sample. Close the lid tightly.
6. In the section for additional comments, note that you took a muscle sample for genetic study.

7. Place the disposable razor blade in the container for sharp instruments.
8. Store the collected samples and all the equipment at room temperature in a secure, dry location until you send the entire collection to the scientific director.

THANK YOU!!!

Joel Garlich-Miller
Marine Biologist

Chad Jay
Research Ecologist

Jonathon Snyder
Marine Biologist

Sandra Talbot
Research Geneticist

US Fish and Wildlife Service
Marine Mammals Management
Alaska, USA

US Geological Survey
Alaskan Biological Center
Alaska, USA

Walrus Harvest Monitoring on Chukotka - 2001

WORKING PLAN

No.	Action	Deadline	Responsible Party	Notes
1	Working meeting on results of walrus harvest monitoring on Chukotka and in Alaska in 2000. Development of walrus harvest monitoring program in 2001. Training on harvest monitoring methods. Receipt of equipment and materials for field and laboratory work. Signing of contract with Alaskan Eskimo Walrus Commission and receipt of funding for implementation of project in 2001 (Nome, Alaska, USA).	July 2001	Joel Garlich-Miller and Jonathon Snyder, heads of walrus harvest monitoring in the United States; Carl Kava, executive director of Alaskan Eskimo Walrus Commission; Jerry Knudsen, Natural Resources Office, Kawerak Incorporated.	Russian participants: M. Agnakisyak, S. Skhaugye, V. Rinteimit, D. Kymyrovty, G. Smirnov
2	Selection of observers for monitoring program in villages. Initial instruction, provision of working documents and equipment.	April - May 2001	District coordinators: M. Agnakisyak, V. Rinteimit.	
3	Presentation of program in villages of Chukotskii and Provideniya districts (meetings with local officials, hunters and community groups of Native peoples). Training for observers on methods for collecting firsthand field data, working with monthly reports. Distribution to them of 2000 reports, working documents, equipment, special clothing and so on.	July - August 2001	District coordinators: M. Agnakisyak, V. Rinteimit. G. Smirnov, scientific leader.	The working trips by the district coordinators are particularly important. They should be carried out immediately, as soon as practically possible.

Walrus Harvest Monitoring on Chukotka - 2001

WORKING PLAN (continued)

4	Presentation of program in the capital of the Chukotka Autonomous Region, Anadyr.	June - October 2001	G. Smirnov, scientific leader.	
5	Walrus harvest monitoring in eight villages.	May - October 2001	Monitoring program observers.	
6	Submission of monthly monitoring reports from villages to district coordinators.	Monthly	Monitoring program observers.	Reports are submitted by telephone by the fifth day of the following month. At the same time, written reports are sent by mail or delivered by hand.
7	Submission of monthly summary reports on monitoring observations from the districts to scientific leaders G. Smirnov, and to J. Garlich-Miller; and to Carl Kava of the Alaskan Eskimo Walrus Commission [fax: (907) 443-4452].	Monthly	District coordinators: M. Agnakisyak, V. Rinteimit; G. Smirnov, scientific leader.	Reports are submitted by fax by the tenth day of the following month.
8	Collection of biological materials (teeth) to determine age of walruses, with delivery of the samples to Anadyr.	Ongoing	District coordinators: M. Agnakisyak, V. Rinteimit; observers.	All samples should be provided to the scientific leader by December 1, 2001.

Walrus Harvest Monitoring on Chukotka - 2001

WORKING PLAN (continued)

9	Collection of observation journals from observers. Photocopying of journals. Submission of photocopies to scientific leader G. Smirnov.	November 2001	District coordinators: M. Agnakisyak, V. Rinteimit.	Copies of the journals should be submitted to the scientific leader, G. Smirnov, by December 1, 2001.
10	Laboratory processing of collected teeth and their optical study to determine ages of walruses.	December 2001	G. Smirnov, scientific leader.	
11	Preparation of computer database on walrus harvest in monitored villages, preparation of scientific section of final report.	September - December 2001	G. Smirnov, scientific leader.	
12	Collection of materials on cultural traditions and customs relating to walrus harvesting.	May - October 2001	District coordinators: M. Agnakisyak, V. Rinteimit; observers S. Skhaugye, D. Kymyrovtyñ	
13	Preparation of sections by district coordinators for the final report. Submission of suggestions for the general sections of the report. Submission of text and graphic appendices for the report.	October- November 2001	District coordinators: M. Agnakisyak, V. Rinteimit.	
14	Preparation of final report.	December 2001 - February 2002	G. Smirnov, scientific leader; district coordinators: M. Agnakisyak, V. Rinteimit.	

Walrus Harvest Monitoring on Chukotka - 2001

WORKING PLAN (continued)

15	Payment to observers and district coordinators.	Monthly	District coordinators: M. Agnakisyak, V. Rinteimit.	Payment to be made by the tenth day of the following month.
16	Submission of monthly financial reports in English to the Alaskan Eskimo Walrus Commission (Nome, Alaska) [fax: (907) 443-4452].	Monthly	District coordinators: M. Agnakisyak, V. Rinteimit; G. Smirnov, scientific leader.	Report is submitted by fax no later than the 12th of the month.
17	Submission of the final technical and financial reports, with backup documentation, to the Alaskan Eskimo Walrus Commission (Nome, Alaska).	March 2002	District coordinators: M. Agnakisyak, V. Rinteimit; G. Smirnov, scientific leader.	
18	Working meeting on results of walrus harvest monitoring in 2001. Planning of work for 2002. Training on harvest monitoring methods. Receipt of equipment and materials for field and laboratory work. Signing of contract with Alaskan Eskimo Walrus Commission and receipt of funding for implementation of project in 2002 (Nome, Alaska, USA).	March 2002	Joel Garlich-Miller and Jonathon Snyder, U.S. Fish and Wildlife Service; Kawerak Incorporated; Carl Kava and Jerry Knudsen Alaskan Eskimo Walrus Commission	