

WALRUS HARVEST MONITORING IN CHUKOTKA IN 2009 TECHNICAL REPORT

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INTRODUCTION¹

The Pacific Walrus is one of the most important species harvested by the native people of Chukotka and Alaska. The annual harvest of walrus is several thousand animals, which has a considerable impact on the overall status of the population and on the isolated intra-population groups. Several population parameters indicate that a population decline has taken place over the last few years; this motivated American and Russian scientists to intensify their joint efforts to study Pacific walrus in order to develop practical measures for its protection and rational {sustainable} use.

Pacific walrus harvest monitoring throughout its entire range is a very important task. Harvest research in Russia and similar research done by American scientists provide information for the analysis of the population trends up until the late 1980s. The deep economic crisis in the early 1990s in Russia resulted in almost complete termination of walrus harvest research. The effort to renew harvest studies in Russia was undertaken in the mid 1990s when the Chukotka Branch of the Pacific Research Institute of Fisheries and Oceanography (ChukotTINRO) was designated in Anadyr. The next important stage was conducting the first US-Russian Pacific Walrus Harvest Monitoring Workshop (September 1998, Nome, Alaska, USA), where the main issues were discussed and the main objectives for walrus research in Chukotka were identified. Participants of the workshop included representatives of Alaska and Chukotka Native organizations and specialists from U.S. Fish and Wildlife Service, ChukotTINRO and Chukotka Regional Fisheries Protection Inspection. The workshop participants recognized that Pacific walrus harvest research in Chukotka is equally important for preservation of Pacific walrus as an inherent component of local marine ecosystems as well as for preservation of the ethnic culture of the marine mammal hunters (Гарлик-Миллер, Пангауи, 1999). It was concluded, therefore, that the participation of the Chukotka Native people in the Pacific walrus harvest monitoring was very important.

In March 1999, official agreements on implementation of walrus harvest monitoring in Chukotka were signed in Barrow (Alaska, USA) under the framework of the US-Russian Agreement on Cooperation in the Field of Environmental Protection (project 02.05-61 «Marine Mammals») by the US Fish and Wildlife Service, Cooperative «Naukan» (Lavrentiya, Russia), and Chukotka Eskimo Society «Yupik» (Provideniya, Russia). Pacific walrus harvest monitoring has been conducted since May 1999 and it has the following objectives:

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OBJECTIVE 1. Involve coastal walrus hunters in the resource management program and provide training opportunities for hunters in the coastal villages of Chukotkiy and Providenskiy regions.

OBJECTIVE 2. Document the numbers of walruses harvested in coastal villages of Chukotkiy and Providenskiy regions (Lorino, Uelen, Inchoun, New Chaplino, Sireniki, Enmelen) responsible for almost 70% of the entire walrus harvest.

OBJECTIVE 3. Document age categories (calves, one-year-olds, young animals, adults and unidentified age class) and sex composition (male, female, unidentified) of the harvest.

OBJECTIVE 4. Document the number of walruses that were wounded, or struck-and-lost.

OBJECTIVE 5. Gather biological samples (2 front teeth from the lower jaw of a harvested walrus) in order to determine the exact age composition of harvested walruses.

Between 1999 and 2004, the work under this project was implemented annually under the supervision of Gennadiy Smirnov (through 2002) and Maksim Litovka (after 2002). Over the years, several regional coordinators - Vladimir Rinteymit, Aleksey Ottoy, Lyudmila Aynana – and observers – Igor Makotorik, Dmitriy Kymyrovty, Yuriy Klimakov, Sergey Gorbunov, Nikolay Rul'tyntegreu, Sergey Ashkamakin, Andrian Omrukvyn, Yakov Vukvutagin and Sergey Skhaug'ye- participated in the project. Walrus harvest monitoring reports were presented annually at the meetings of the ChukotTINRO Science Board and were approved by the Board (Кочнев и др., 2005; Литовка Д. и др., 2004; Литовка М. и др., 2004; Ринтеймит и др., 2000; Смирнов и др., 2001).

In 2004, annual walrus harvest monitoring in Chukotka was interrupted but it was resumed again in 2005 under the leadership of Chukotka Association of Traditional Marine Mammal Hunters (CHAZTO) (with Eduard Zdor as a coordinator of the project). Harvest monitoring in Chukotkiy Region was conducted by Chukotka Scientific Research Support Group (with Dmitriy Eyneucheyvun as a coordinator), and by Chukotka Eskimo Society «Yupik» (coordinator Michael Bragin) in Providenskiy Region. Harvest data analysis and reports were done by Maksim Litovka (2005).

After 2005, due to the absence of funding, harvest monitoring in Chukotka had not been conducted. In 2009, the Alaska Eskimo Walrus Commission provided funding for this project with the help of «Kawerak» Native Corporation.

MATERIALS AND METHODS

Recording sex and age category of the harvested walruses, as well as gathering biological materials {samples} in the field was implemented by the observers from among marine mammal hunters in the seven coastal villages of Chukotksiy and Providenskiy Regions (Inchoun, Uelen, Lorino, Yanrakynnot, New Chpalino, Sireniki, and Enmelen) (Fig.1). Harvest monitoring was managed by local coordinators (Lyudmila Aynana in Providenskiy Region and Dmitriy Eyneucheyvun in Chukotksiy Region) who processed the documentations and recorded information that they received from observers on a monthly basis, and faxed their reports to the main Chukotka District coordinator of the project Eduard Zdor (city of Anadyr). The district coordinator put the obtained information in electronic format and passed it to the scientific consultant.

It is important to point out that the delay in delivering funding resulted in observers starting to document harvest data only in September. Information for August was provided only by the observer from Enmelen village. Besides, complete original records (field notes) came only from Enmelen and Lorino villages. Original observer's field notes from Inchoun covered only September and October and there were substantial discrepancies between those notes and the monthly reports on the numbers and sex and age composition of the walrus harvest. No original data for November were provided from Inchoun village and we could rely only on the summary report of the regional coordinator. In New Chaplino, only one September hunting trip was documented; the rest of the information was presented in the form of monthly summary reports. Other villages did not provide any primary/original field information at all, and we used only data presented in the summary reports.

Age material (teeth) was not collected in 2009.

In all (seven) villages, a total harvest of 224 walruses was documented.

RESULTS AND DISCUSSION

SEASONAL HARVEST DYNAMICS

April-July

The project work was not conducted during this period, although harvest was taking place during that time. According to the records of the Division of Agriculture and Provisions of Chukotskiy Autonomous District (hereafter, DAP), first walrus were harvested in April (four walrus in New Chaplino and one in Enmelen). In June, four walrus were harvested in Nunligran; in July, three walrus were harvested in New Chaplino, four in Sireniki, seven in Nunligran and nine in Enmelen (DAP records). Harvest conducted in the villages of Chukotskiy Region was not represented in the records of DAP due to reorganization of the municipal agricultural enterprises into marine mammal hunting communes.

August

In August, harvested walrus were registered only in Enmelen village. A total of 38 animals were harvested; the majority of walrus (60%) were males, both young and adult. Females with calves were also represented in the harvest and most of the females were recorded in the category of «young». Harvest was conducted by three crews. Seventeen hunting trips were recorded over seven days (each boat trip was counted separately). The harvest in the vicinity of the village targeted mostly walrus that moved along the coast from haulouts on Meeskyn Spit Island and Retkyn Spit (Rudder Bay) in the direction of the Chirikov Basin.

The observer from New Chaplino recorded that by the 1st of November, his commune harvested a total of 14 animals. Since only one walrus was harvested during September and October, it can be concluded that 13 walrus were harvested during the period from April through August.

According to the DAP records, there was no harvest conducted in any of the villages in August.

September

In September, harvesting activity in Enmelen village dramatically decreased. The observer did not provide any comments, therefore it is not clear whether it was caused by bad weather or by the absence of walrus. Only two trips out to sea were recorded and two young male walrus were harvested. Meanwhile, the DAP records show that 53 walrus were harvested in Enmelen during that same period of time.

The observer from Sireniki village did not record information about individual hunting trips. He provided only a combined monthly summary report. According to the report, a total of 11 walruses (both males and females) were harvested in September during the five harvest trips to sea. Two boats were used in the harvest, and it remains unclear whether a trip on both boats was considered a single harvest trip, or a trip on each boat was counted as a separate trip. According to the DAP records, 10 walruses were harvested in Sireniki in September.

In New Chaplino, only one hunting trip was recorded and it is also not clear whether it was a trip on two boats that the commune has in its possession or on a single boat. Hunting took place in the Arakamchechen Island area, where a regularly occupied coastal haulout site is located. The observer recorded that walruses left the haulout site in late August or on the first days of September. There were very few walruses on the haulout during the summer of 2009, similar to the previous two years. One young male was harvested. According to the DAP records, a total of six walruses were harvested in September in New Chaplino.

The observer from Yanrakynnot village reported that hunters in his village did not go out to sea in September due to frequent outboard engine breakages and bad weather conditions. The DAP records also confirm the absence of harvest in Yanrakynnot in September.

In Lorino, the observer regularly documented only the harvest by his own team that was based out of the Akkani harvest unit. Harvest by other teams was documented only if harvested walruses were brought to Akkani for butchering. If animals were delivered to Lorino or were butchered at the other sites along the coast, the observer did not register them. A total of eight hunting trips over six harvest days was registered in September, and 11 harvested walruses, mostly females, were documented. On the 26th of September, an adult male in very poor physical condition was harvested. The animal was emaciated, both tusks were rotten, and when it was butchered, multiple small bulbs or swellings of unknown origin were found on his lungs (the observer called them «bumps or pimples»). The observer concluded that the animal was sick. The DAP did not conduct any registration of harvested animals in Lorino in September.

The observer from Uelen village provided only a summary report for that month. Five hunting trips were documented, but it was not clear how many boats were used during those trips. The harvest of five males was recorded. DAP does not have any harvest data on Uelen for the month of September.

Materials received from the Inchoun observer and data from combined summary tables didn't match. It is stated in the original field notes that 15 walruses were harvested on 10 hunting trips over four days of harvest. In the summary report, 12 hunting trips are recorded, with a total harvest of 41 walruses. There was also some confusion in determination of sex-age composition of the harvest. The observer indicated that there were four young males among harvested animals, which was not reflected

in the combined summary report. We combined the data from both sources, using information presented in the summary report as a base and suggest that 41 walrus were harvested in Inchoun in September. DAP records on Inchoun for September are absent. The observer noted that on the 6th of September, walrus moving in a southern direction were hunted in the area located three kilometers away from the village. On the 27th of September, two adult females were harvested directly from the shore; one of the females was pregnant.

October

In October, the harvest intensity in Enmelen increased again. Ten hunting trips (three boats) over four days of harvest were recorded; this resulted in harvesting of 17 walrus. Sex composition of the harvest was mixed, with males prevailing. The observer pointed out that the harvest was conducted in the vicinity of the village during the walrus migration along the coast in the eastern direction. In late October, one of the young males was moving in the opposite (western) direction. DAP records show a harvest of 15 walrus in Enmelen during this month..

The observer from Sireniki provided only a combined summary report for this month. He reported seven hunting trips, but it is unclear how many boats were used. The goal of the trips out to sea was to look for whales, and walrus were harvested along the way. The harvest of two young females and a calf of the year (also female) was documented. All the walrus were harvested close to shore in the area of Kinligak Bay. DAP records show zero harvest in Sireniki in October.

The observer from New Chaplino provided only a combined summary report for this month, which lists 17 trips out to sea. It was not mentioned how many boats were used in each trip. Whales were the main hunting target during that period, and along the way, seals were harvested as well. There were no walrus in the waters where harvest took place, therefore no walrus harvest was conducted. Nevertheless, the DAP records indicate that one walrus was harvested in New Chaplino in October.

The observer from Yanrakynnot village reported that hunters in his village did not go out to harvest walrus in September due to absence of outboard motor and bad weather conditions. However, according to DAP records, three walrus were harvested in Yanrakynnot during that month.

In Lorino, the observer documented only the harvest done by his crew that was based out of Akkani harvesting unit. It included seven hunting trips over seven days of harvest in September [translators note: author refers to October but wrote September in the Russian version]; a total of 18 walrus were harvested with slightly more males than females. The observer recorded that three out five harvested females (young and adult) were pregnant. The DAP records show that 143 walrus

were harvested in Lorino in October. These data may represent the cumulative harvest over the entire previous part of the year starting from spring.

Combined summary table shows an absence of harvest in Uelen in October. However, DAP records show the harvest of 60 walruses. This number must represent the cumulative harvest for the previous part of the year starting from spring, similar to Lorino.

Information received from Inchoun again shows significant discrepancies between the original notes of the observer and the combined summary tables of the regional coordinator. This time, only three hunting trips and the harvest of 10 animals were recorded in the combined table, while the observer states that 21 walruses were harvested on five hunting trips over two days of harvest. We chose to rely on the data provided by the observer. The observer noted that in early October, walruses that were hunted were moving in the northern direction. DAP records show the harvest of 59 walruses in Inchoun during October; however, similar to the previous cases, it is unlikely that this number reflects the real size of the harvest during this particular month.

November

Due to bad weather conditions and strong surf, Enmelen hunters did not go out to sea in November. Nevertheless, DAP records show the harvest of one walrus during this month.

Based on the combined summary report of the Sireniki observer, three hunting trips were undertaken in November, and it is not clear how many boats were used. Walruses were not harvested, they were seen only once during the month – two adult animals passed along the coast heading southeast. DAP records confirm absence of harvest in Sireniki during this November.

The observer from New Chaplino provided only a combined monthly summary report that records 12 trips out to sea. The number of boats used for each trip was not mentioned. A single adult female was harvested near Csape Chukotskiy not far from a Steller sea lion haulout. DAP records show zero harvest in New Chaplino in November.

The observer from Yanrakynnot village provided a report recording five hunting trips to sea. Hunters did not see any walruses during this month, and hunted seals. The observer noted the formation of new ice. DAP records confirm the absence of walrus harvest in Yanrakynnot.

The combined summary table of the regional coordinator shows an absence of harvest in Lorino and Uelen in November. However, DAP records show the harvest of nine walruses in Lorino and 43 walruses in Uelen. We suggest that the DAP information about Uelen is not realistic.

Data on Inchoun is available only in the combined summary table of the regional coordinator. Eleven hunting trips were recorded in November with the total of 36 walruses harvested. It is most likely that hunting trips in this case mean the trips of hunters to the coastal haulout near Cape Unikan,

where walrus are traditionally harvested by spearing on shore during that time of the year. DAP records for Inchoun show the harvest of 54 walrus in November.

December

Most of the villages (Enmelen, Lorino, Uelen, Inchoun) did not have any harvest in December due to poor weather conditions and short daylight. DAP records confirm absence of harvest in those villages.

According to the combined monthly summary report, seven hunting trips were made in Sireniki, but it is not clear how many boats were used on those trips. Winter harvest of marine mammals is possible in this area due to the existence of a stationary polynia. Walrus were not harvested in this area; they were seen only once – on the 16th of November, two adult animals moved past the coast in a south-eastern direction. DAP records for Sireniki show the harvest of only three walrus in December.

In the New Chaplino combined monthly report, eight hunting trips were documented in December. Those must have been hunting trips on foot to the edge of the fast ice. Walrus were neither seen during those hunts nor harvested. DAP records confirm the absence of walrus harvest in New Chaplino in December.

In mid-December in Yanrakynnot, an emaciated female walrus was harvested; it was moving over the ice surface far from the open water in Senyavin Strait. DAP records do not reflect harvest of this animal.

HUNTING EFFORT AND EFFICIENCY OF HARVEST

It was complicated to evaluate hunting effort in each village, since only the observer from Enmelen provided data on each hunting trip and the number of walrus harvested on each trip per boat. It appears that in most of the other villages, one hunting trip meant a trip by a team that had two boats of different size at its disposal. The number of walrus recorded must have represented walrus harvested by one crew hunting either with one boat or with two boats. The number of boats used by one team was recorded in some cases (Lorino, Inchoun), and in some cases not. We could illustrate the dynamics of hunting trips over the period of harvest monitoring only for two villages: Enmelen and Lorino (Fig. 2-3). Harvest dynamics in Lorino may not reflect the real situation since in the majority of cases, the only hunting trips that were recorded were the trips made by the team in which the observer worked himself.

The total number of hunting trips for the month (without the number of boats used) was recorded in most of the villages. We tried to evaluate harvest activity throughout the season when monitoring was conducted based on those data (Fig. 4). The period of monitoring included the end of the harvest season in most of the villages. In Enmelen, most of the hunting trips were made in August, when monitoring was not conducted in other villages. The harvest was insignificant in October and almost non-existent in November, due to the absence of walrus and bad weather conditions. Increased hunting activity in the villages located in the vicinity of the Chirikov Basin (Sireniki, New Chaplino, Yanrakynnot) was mostly associated with gray whale and bowhead whale hunting in the areas. Walrus were harvested along the way. The only exception was Inchoun, where hunting activity in November was at about the same level as in September. This was due to the formation of a coastal walrus haulout in the area of Cape Unikyn, where both swimming walrus were hunted and hauled-out animals were speared on shore.

In December, the sea was freezing fast and hunting continued only in the villages located in the area of Chirikov Basin (Sireniki, New Chaplino, Yanrakynnot). At that time, boats were not used in New Chaplino and Yanrakynnot; hunters walked out on foot on already-strong fast ice to the ice edge, or used snowmachines or dogsleds. The main goal was to harvest seals, and a walrus was harvested by chance. The situation was different in Sireniki, where the mass appearance of walrus was recorded in December and a non-freezing polyniya was available for hunting walrus from boats and baydaras.

The efficiency of hunting, i.e. the proportion of hunting trips that resulted in hunters returning with one or more harvested walrus, was high (57.5 % in all villages), even though we considered all hunting trips including the ones that did not target walrus harvest as the main goal. There were almost no «empty» trips to sea in the villages of Enmelen, Inchoun, and Lorino (Table 1). It is possible that zero results were not recorded by the observers. But more likely, this efficiency resulted from specific characteristic of walrus harvest during that period: hunters went to sea only if they saw sufficient number of walrus at a small distance from shore. Therefore, each hunting trip resulted in taking an animal. This approach to walrus harvest is determined by limited availability of fuel for outboard motors.

Hunting efficiency expressed as an average for the numbers of walrus harvested in single hunting trips was the lowest in most of the villages for the period since 1999 (Table 2). It can be explained primarily by the fact that monitoring in 2009 was conducted during the last quarter of the year (September-December), while monitoring conducted from 1999 through 2005 covered a more extensive period from May through December. Relatively high efficiency was recorded only in Enmelen, where monitoring was started a month earlier (in August), and in Inchoun, where a considerable proportion of walrus is traditionally harvested in late autumn (Table 2).

SEX-AGE STRUCTURE OF TAKE (HARVESTED WALRUSES)

Out of the total harvest of 224 walruses, the observers recorded sex for 209 walruses (93.3% of the harvest) and age for 194 walruses (86.6% of the harvest) (Table 3). Over the previous years of monitoring (1999-2005), the proportion of animals whose age was not recorded did not exceed 1.1% (Table 4).

The sex ratio throughout all the years of monitoring was in favor of males (Table 5). However, the proportion of males in 2009 was the lowest. The proportion of males and females were similar in the harvests of 2001 and 2002. During the rest of the years, the harvest of males exceeded the harvest of females by a factor of 3 to 5 (Table 5). A higher proportion of males in the harvest is traditional because males are a preferred take due to their bigger weight (more meat) and the bigger size of their tusks (carving business). A relatively low proportion of males in the harvest of 2009 can be due to the fact that the data reflects only the autumn harvest season, when migrations of females that left the ice edge in the Chukchi Sea is more conspicuous near Chukotka.

In regards to the age composition, 2009 stands out as a year with a high proportion of younger animals in the harvest. The proportion of walruses identified as young in that year's harvest was within the norm (27.2%; percentage varied from 18.7 to 39.6 over the period from 1999 to 2005), while the proportion of new-born and one-year-old calves was the highest, and the proportion of the adult animals was the lowest (Table 4). It is necessary to point out that observers tend to underestimate the age of harvested walruses. That was revealed when visual estimates of age by the observers were compared to the age of the same animals determined using their teeth (Литовка и др., 2004). In 2009, walrus teeth were not collected; nevertheless, this tendency is noticeable even based on the records/notes of the observers. For example, females were identified as "young" even though they had suckling-calves. It is likely that the high proportion of "one-year-olds" in the harvest may have been a result of a large number of immature 2-4 year old walruses being recorded in that category. Thus, the category "young" does not represent the harvest of immature walruses accurately.

HARVEST LOSSES ANALYSIS

Total (cumulative) number of lost walruses (wounded animals that escaped or drowned) in all the villages in August-December of 2009 was 22 animals, or 8.9% of the total take calculated based on the harvest monitoring data (Table 6). It was one of the lower levels of loss for the entire duration of

this project. A lower level of 8.6% was recorded only in the first year of the project (1999). In 2000-2005 the level of loss varied from 10.5 to 12.3% (Table 7).

The traditionally low levels of harvest losses in Chukotka estimated based on the data gathered under this project can hardly be explained by some special masterful hunting skills. It is important to take into consideration that the majority of walrus are harvested during the ice-free period, when the risk of losing an animal struck when afloat in the water or wounding an animal is the highest. It is most likely that losses are significantly underrated, because marine hunters rarely tell about harvested animals being lost. It may result from the traditional way of thinking and psychology of the Native people who are cautious about providing anybody, including our observers, extra details or additional information. To a great extent, there is fear that such data may have a negative impact on their life; for example, may lead to reduction of the quota or fines for drowned animals. This attitude of native people is based on many decades of their interactions with government authorities.

The highest level of losses (34.1%) was recorded in Lorino (Table 6). It is hard to find an explanation for it, because during the previous years, the lowest level among all the villages where monitoring was conducted was recorded in that village (Table 6). This may result from hunters being forced to harvest walrus that had been long separated from ice, had to move a lot and were therefore emaciated. Animals with a thin layer of blubber drown faster if they are not harpooned promptly enough.

EVALUATION OF THE WALRUS HARVEST IN CHUKOTKA IN 2009 BASED ON THE PROJECT RESULTS

Based on the results of the project, the total number of documented harvested walrus in seven Chukotka villages from August through October was 224 animals. This is the lowest number for the entire duration of the project since 1999. Harvest recorded in many villages during the first years of the harvest monitoring project (1999-2002) was higher than the DAP records; in some cases, even 4-5 times higher (Figs. 5-13). The total documented harvest in all the villages in 1999-2002 was 3-11% higher than the size of the harvest recorded by DAP. However, the observers' work became less accurate in the following years. In 2003, the total harvest in the villages where the project was conducted was only 80% of the resulting numbers provided for the same villages by the DAP; in 2005, it was 62% and finally in 2003(?) – only 38%. Low level of registration of harvested walrus in 2009 can be explained primarily by the late start of the project that as a result covered less than half of the harvest season. At the same time, it is obvious that coordinators and observers are less interested in gathering and providing accurate harvest data. We suggest that many other factors can play a role here:

- 1) Improved standard of living in the villages, and as a result, coordinators and observers became less interested in the monetary compensation paid from the project budget;
- 2) Work under the project is done irregularly and with long gaps; therefore observers and coordinators do not see the outcomes of the project; the requirement to always provide harvest information does not become a habit or a normal aspect of the harvest;
- 3) During the first years of the project, annual seminars for the observers and coordinators were conducted in Alaska. This helped the participants to realize the importance of their work, to share their experience with each other and their American colleagues. Such seminars are not conducted any more;
- 4) It is important to reward the most active and accurate observers as well as the most responsible hunters, who provide complete information about their take. And those rewards should not be in the form of monetary compensations of different amounts; they should instead be valuable presents or certificates of recognition;
- 5) No outreach or educational work is conducted among marine mammal hunters. Brochures, posters, photographic and video materials are necessary to explain to the hunters the importance of providing complete and undistorted harvest data.

Only 38% of the final harvest statistics of the DAP for the same villages were recorded as a result of work under the walrus harvest monitoring project, and only 21% of the harvest reported by the DAP (Division of Agriculture and Provision) for the entire Chukotskiy Autonomous District. For that reason, we decided not to compute the total walrus harvest based on the data obtained as a result of the project implementation. We had to accept the final number provided by DAP – 1085 animals - as the size of the walrus harvest in Chukotka in 2009. If we account for the number of struck-and-lost walruses estimated during the project (8.9%), the total harvest take of Pacific walruses in Chukotka would come to 1192 animals. If we assume that the proportion of struck-and-lost animals was 42% (Fay et al., 1994), then the total harvest take of Pacific walrus in Chukotka would be 1871 animals. Thus, the size of walrus harvest in Chukotka in 2008 was between 1192 and 1871 animals.

In addition to traditional Native subsistence harvest, 25 walrus calves were captured for cultural and educational purposes (aquariums and zoos). The total anthropogenic (human caused) take of walruses in Chukotka including captured animals was therefore 1217-1896 walruses.

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FIGURES AND TABLES

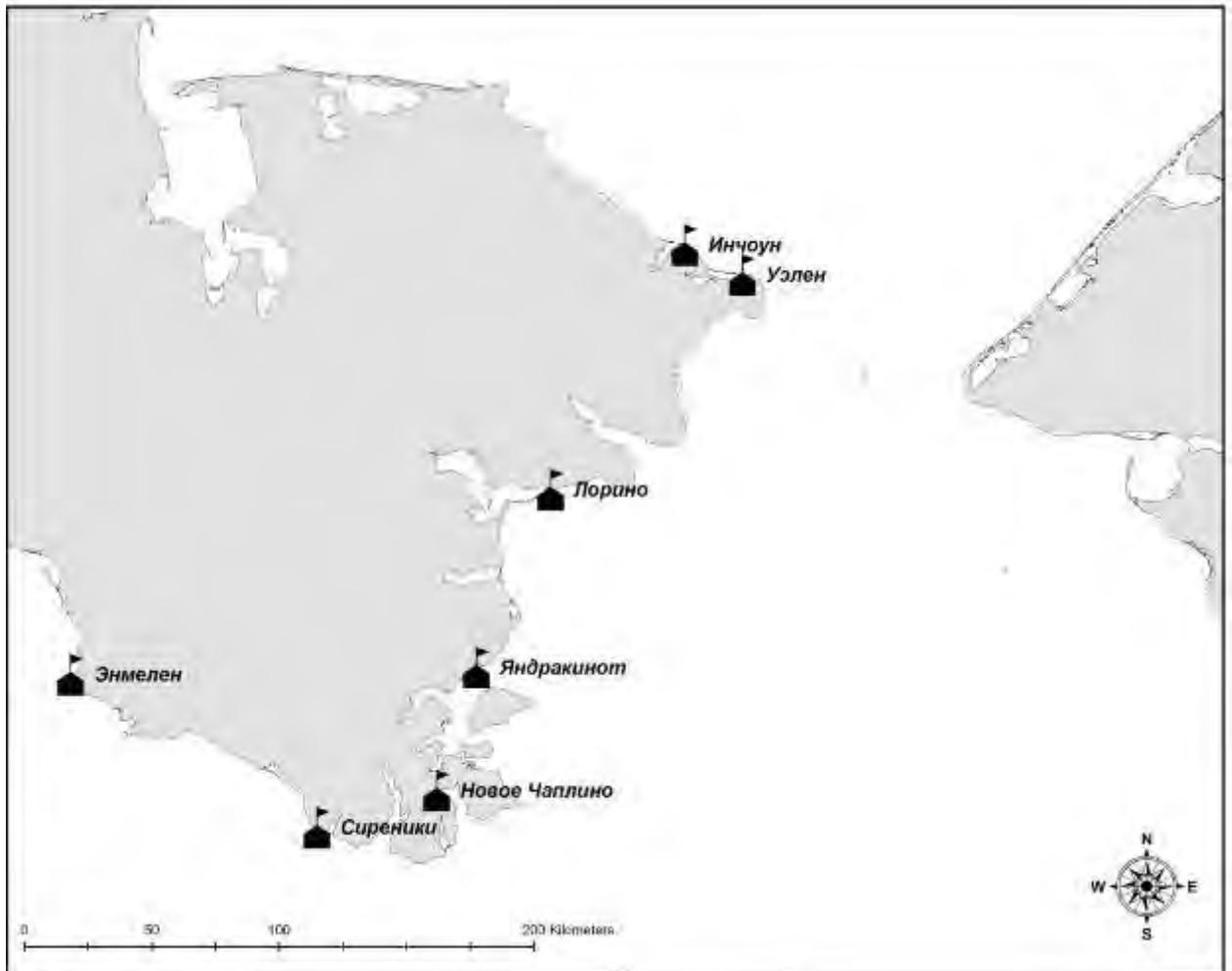


Fig. 1. Villages, where walrus harvest monitoring project was conducted in 2009

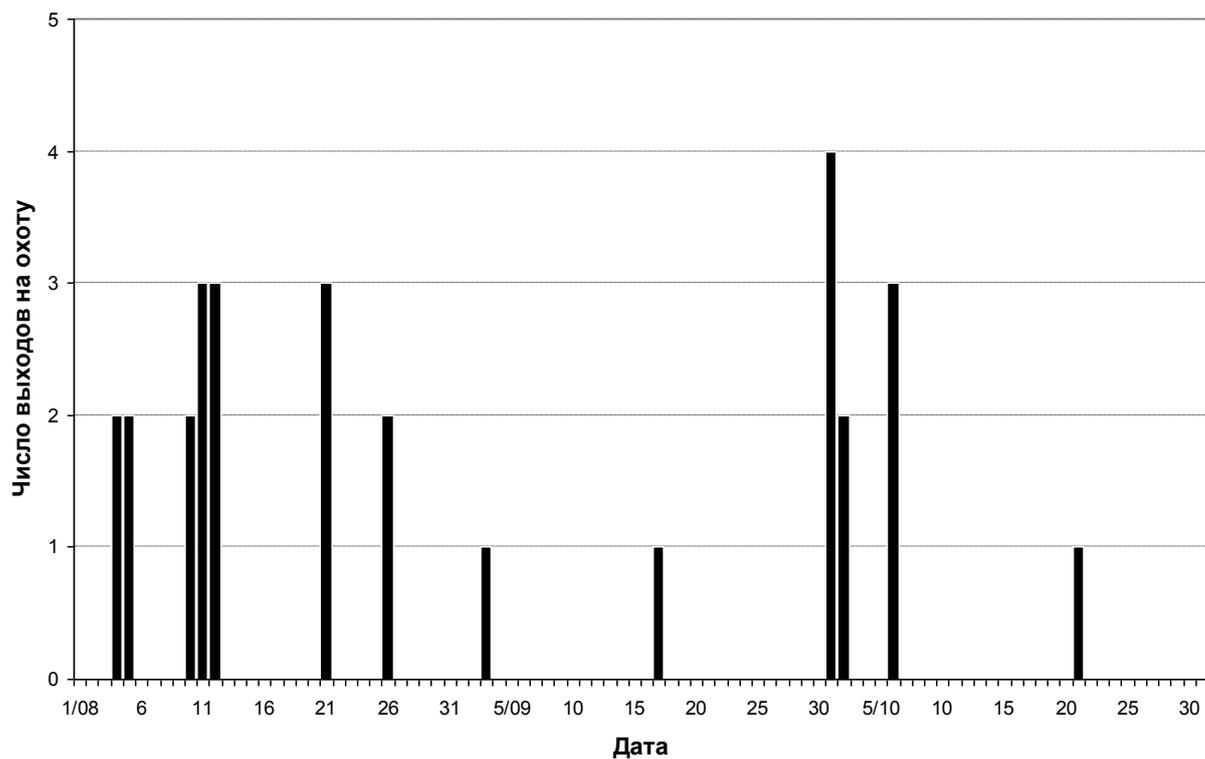


Fig. 2. Variation in the number of hunting trips taken from the Enmelen village over the period of Pacific walrus harvest monitoring (1 August – 30 October) in 2009

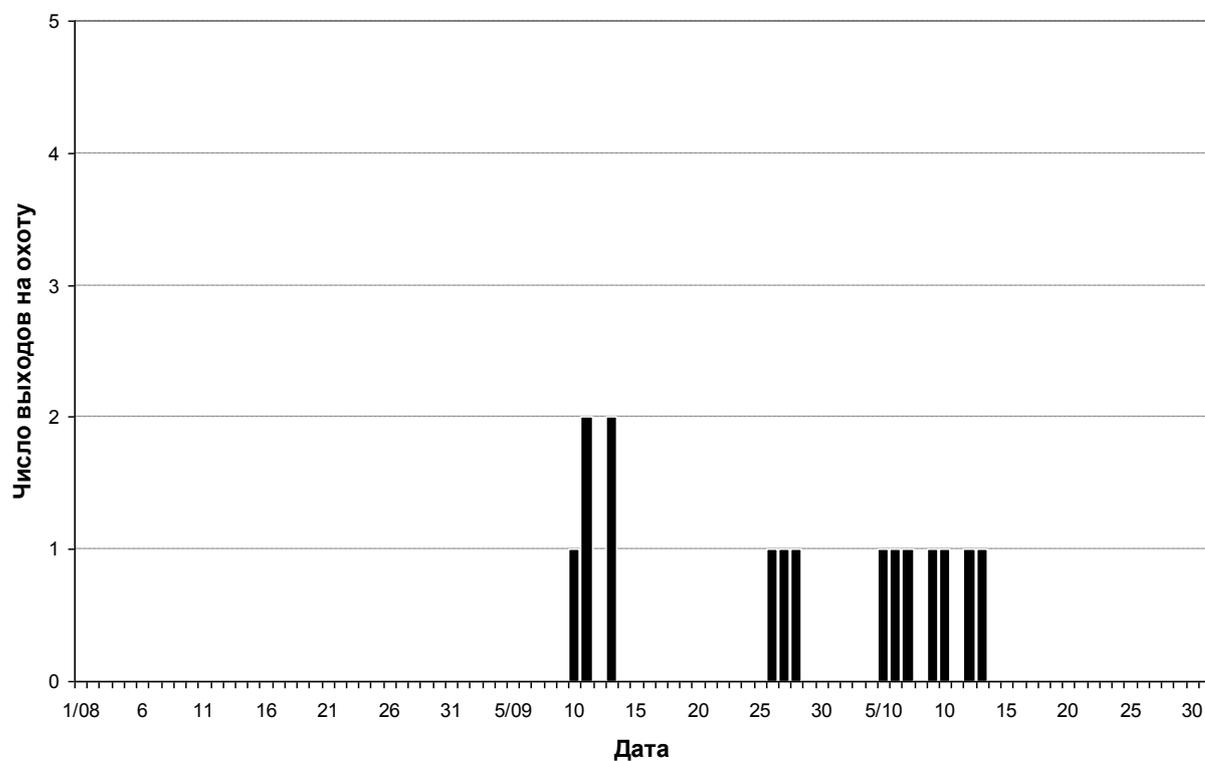


Fig. 3. Variation in the number of hunting trips taken from the Lorino village over the period of Pacific walrus harvest monitoring (1 September – 30 October) in 2009

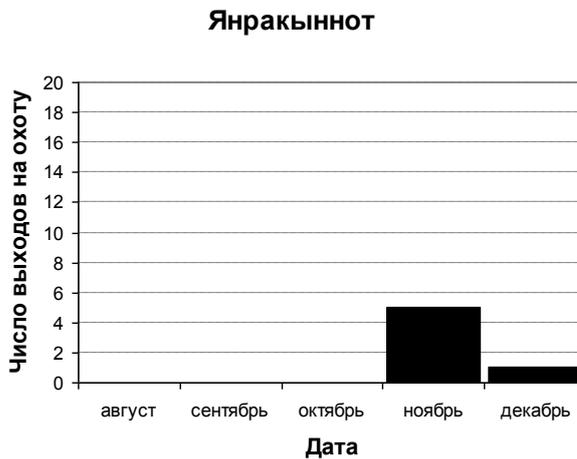
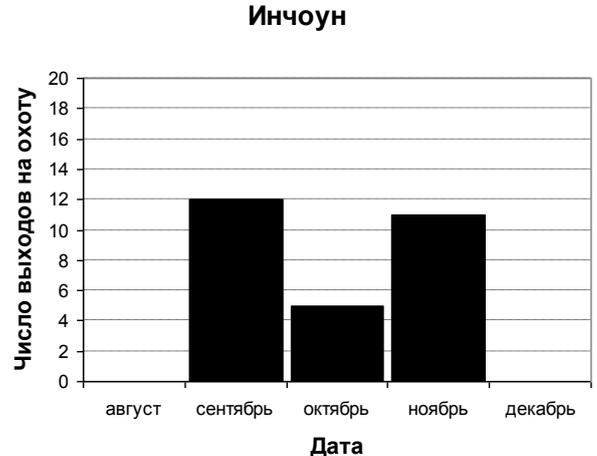
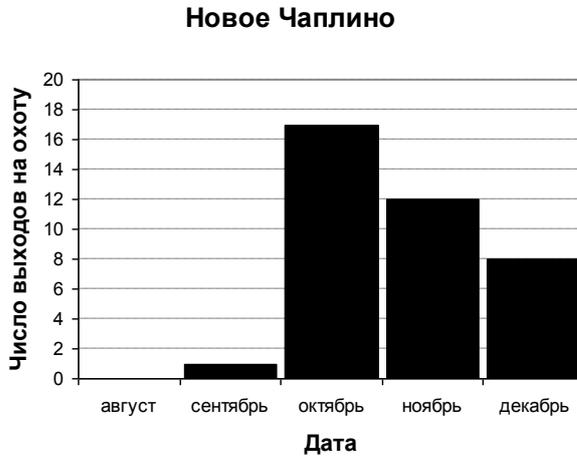
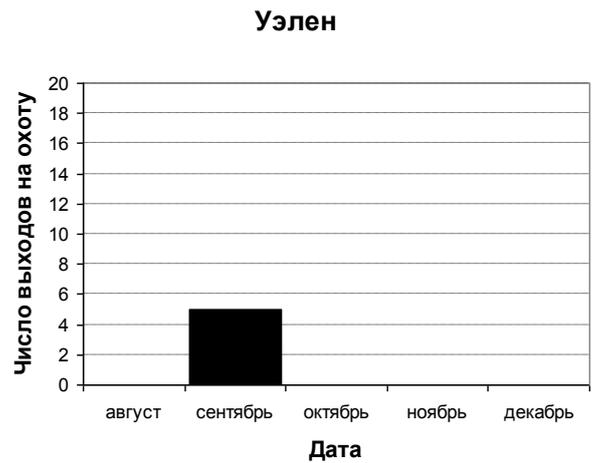
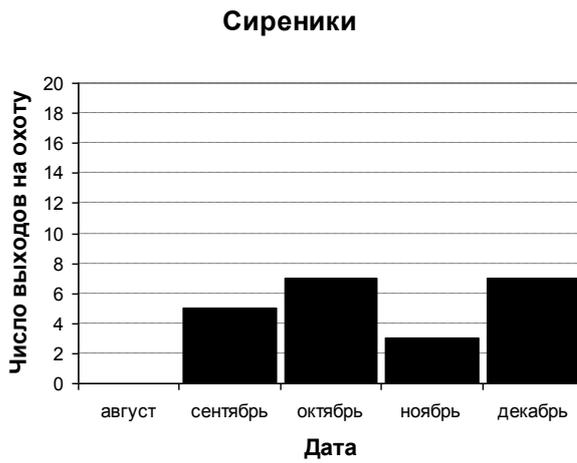
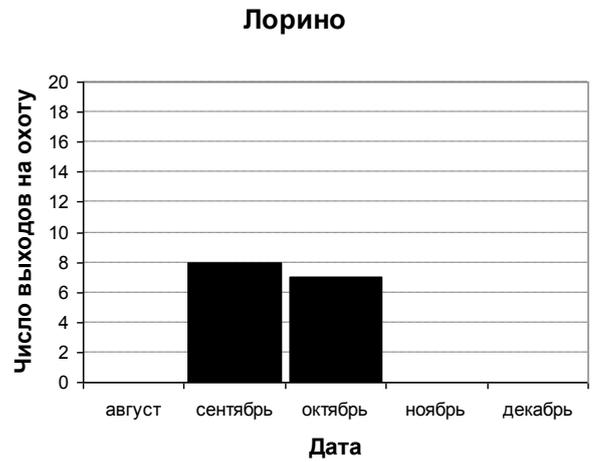
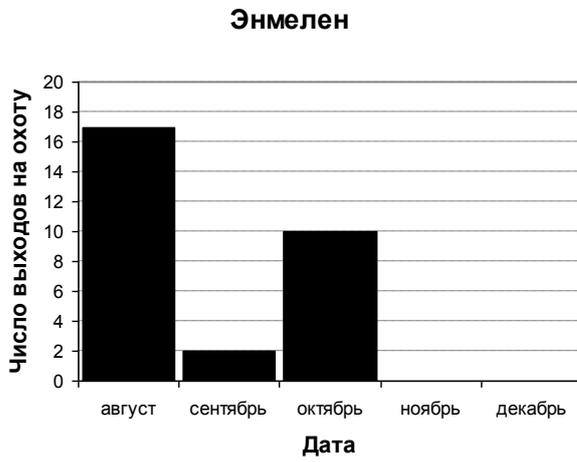


Fig. 4. Variation of the number of hunting trips in Chukotka villages over the period of pacific walrus harvest monitoring in 2009 (Monitoring was started on the 1st of August in Enmelen village and on the 1st of September in all other villages)

Table 1. Harvest efficiency (number of harvested walrus over each hunt and proportion of hunts during which one or more walrus were harvested)

Village	Number of hunting trips with harvested walrus recorded for each trip	Number of walrus harvested during each hunting trip							Efficiency, %
		0	1	2	3	4	5	6	
Enmelen	29	0	9	14	4	2	0	0	100.0
Sireniki	10	6	3	1	0	0	0	0	40.0
New Chaplino	38	36	2	0	0	0	0	0	5.3
Yanrakynnot	6	5	1	0	0	0	0	0	16.7
Lorino	15	1	4	6	3	1	0	0	93.3
Uelen									
Inchoun	15	0	5	6	1	0	2	1	100.0
TOTAL	113								57.5

Table 2. Average number of walrus harvested during a single hunt in 1999-2009.

Village	1999	2000	2001	2002	2003	2005	2009
Enmelen	2,5	1,8	3,6	2,1	1,7	3,8	2,0
Sireniki	1,4	1,7	3,3	1,6	0,5	0,3	0,9
New Chaplino	1,0	0,8	1,1	0,8	1,4	0,5	0,1
Yanrakynnot		1,5	1,3	1,5	2,0	3,3	0,2
Lorino	4,7	3,6	2,7	2,4	3,4	2,1	1,9
Uelen	3,8	4,1	2,7	2,9	4,9	1,1	1,0
Inchoun	1,9	2,5	2,0	1,7	1,5	3,8	3,5
TOTAL	2,6	2,8	2,8	1,9	2,3	2,0	1,5

Table 3. Sex-age composition of harvested walrus in 2009

Village	Age	Female	Male	Sex unknown	Total
Enmelen	Adults	5	18	0	23
	Young/subadults	9	16	0	25
	One-year-olds	1	3	0	4
	Calves of the year	1	4	0	5
	Age unknown	0	0	0	0
TOTAL		16	41	0	57
Sireninki	Adults	1	8	0	9
	Young/subadults	5	0	0	5
	One-year-olds	0	2	0	2
	Calves of the year	1	0	0	1
	Age unknown	0	0	2	2
TOTAL		7	10	2	19
New Chaplino	Adults	1	0	0	1
	Young/subadults	0	1	0	1
	One-year-olds	0	0	0	0
	Calves of the year	0	0	0	0
	Age unknown	0	0	13	13
TOTAL		1	1	13	15
Yanrakynnot	Adults	1	0	0	1
	Young/subadults	0	0	0	0
	One-year-olds	0	0	0	0
	Calves of the year	0	0	0	0
	Age unknown	0	0	0	0
TOTAL		1	0	0	1
Lorino	Adults	5	3	0	8
	Young/subadults	4	7	0	11
	One-year-olds	4	3	0	7
	Calves of the year	2	1	0	3
	Age unknown	0	0	0	0
TOTAL		15	14	0	29
Uelen	Adults	0	3	0	3
	Young/subadults	0	2	0	2
	One-year-olds	0	0	0	0
	Calves of the year	0	0	0	0
	Age unknown	0	0	0	0
TOTAL		0	5	0	5
inchoun	Adults	26	38	0	64
	Young/subadults	3	14	0	17
	One-year-olds	0	1	0	1
	Calves of the year	1	0	0	1
	Age unknown	0	15	0	15
TOTAL		30	68	0	98
All villages	Adults	39	70	0	109
	Young/subadults	21	40	0	61
	One-year-olds	5	9	0	14
	Calves of the year	5	5	0	10
	Age unknown	0	15	15	30
TOTAL		70	139	15	224

Table 4. Changes in age composition of the harvest in 1999-2009.

Year	N	Calves of the year	One-year-olds	Young/su badults	Adults	Age unknown
1999	888	2.8	3.5	39.2	55.5	0
2000	846	0.5	2.5	32.6	63.4	1.1
2001	936	1.7	2.9	39.6	55.1	0.6
2002	849	0.9	5.6	29.1	64.2	0.3
2003	651	1.5	2	18.7	77.7	0
2005	639	2.3	2.3	26.5	68.9	0
2009	224	4.5	6.3	27.2	48.7	13.4

Table 5. Sex ratio in harvests of 1999-2009.

Year	Males, %	Females, %	Male/female ratio
1999	72	28	2.6:1
2000	82.7	17.3	4.8:1
2001	69.9	30.1	2.3:1
2002	68.8	31.2	2.2:1
2003	80.2	19.8	4.1:1
2005	77.8	22.2	3.5:1
2009	66.5	33.5	2:1

Table 6. Strike and loss in 2009

Village	Harvested	Lost	Total take	Loss, %
Enurmino				
Inchoun	98	1	99	1.01
Uelen	5	0	5	0.00
Lorino	29	15	44	34.09
Yanrakynnot	1	0	1	0.00
New Chaplino	15	0	15	0.00
Sireniki	19	0	19	0.00
Enmelen	57	6	63	9.52
TOTAL	224	22	246	8.94

Table 7. Variation of the number of struck and lost walruses in 1999-2009, %

Village	1999	2000	2001	2002	2003	2005	2009
Enurmino	-	22.4	18.3	11.3	20.5	35.1	
Inchoun	17.3	9.5	13.1	13.1	14.3	6.1	1.0
Uelen	6.6	14.5	11.6	6.6	19.7	12.2	0.0
Lorino	3.4	2.9	3.9	3.7	2.7	2.6	34.1
Yanrakynnot		4.2	9.5	16.7	14.3	17.9	0.0
New Chaplino	19.7	10.2	19.2	21.2	25.0	30.8	0.0
Sireniki	4.3	8.2	17.1	44.5	55.6	27.5	0.0
Enmelen	13.7	16.9	15.9	12.5	5.5	6.3	9.5
TOTAL	8.6	10.5	11.2	12.3	11.4	10.8	8.9

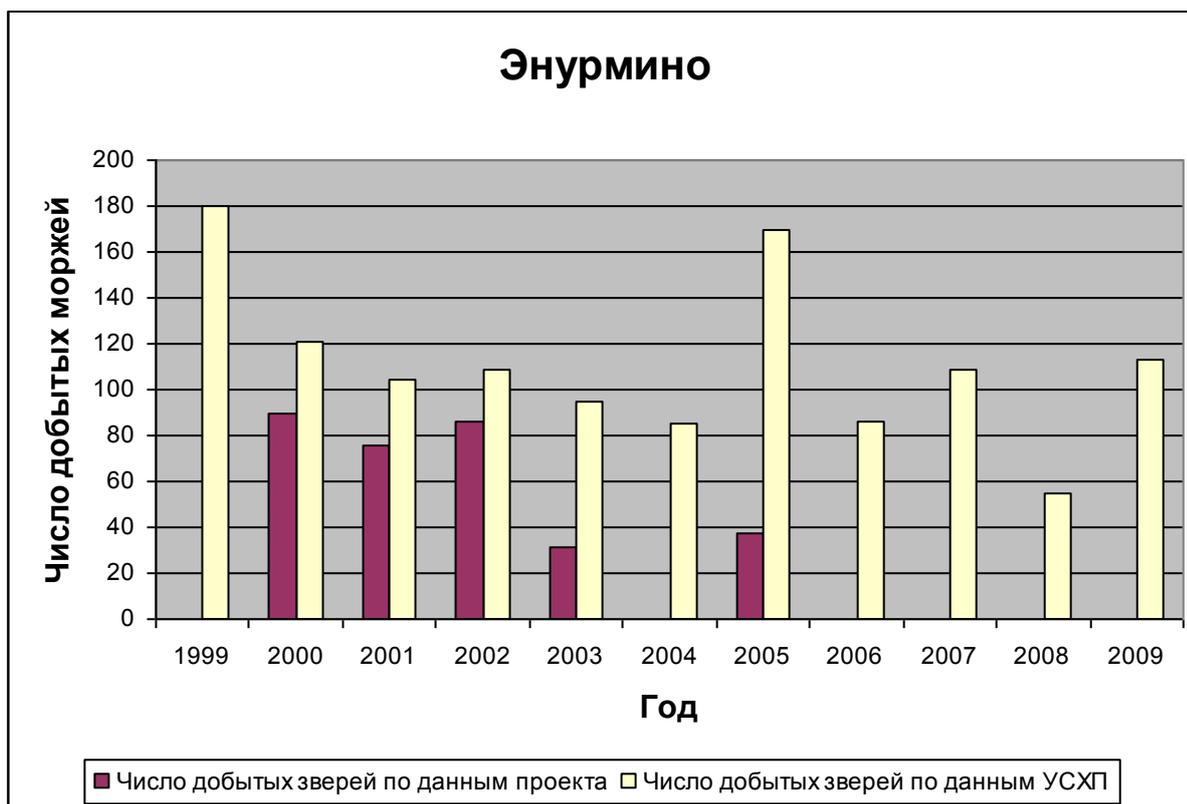


Fig. 5. Comparative dynamics of walrus harvest in Enurmino village according to the harvest monitoring project data and census data from the Division of Agriculture and use of natural Resources of Chukoskiy Autonomous District

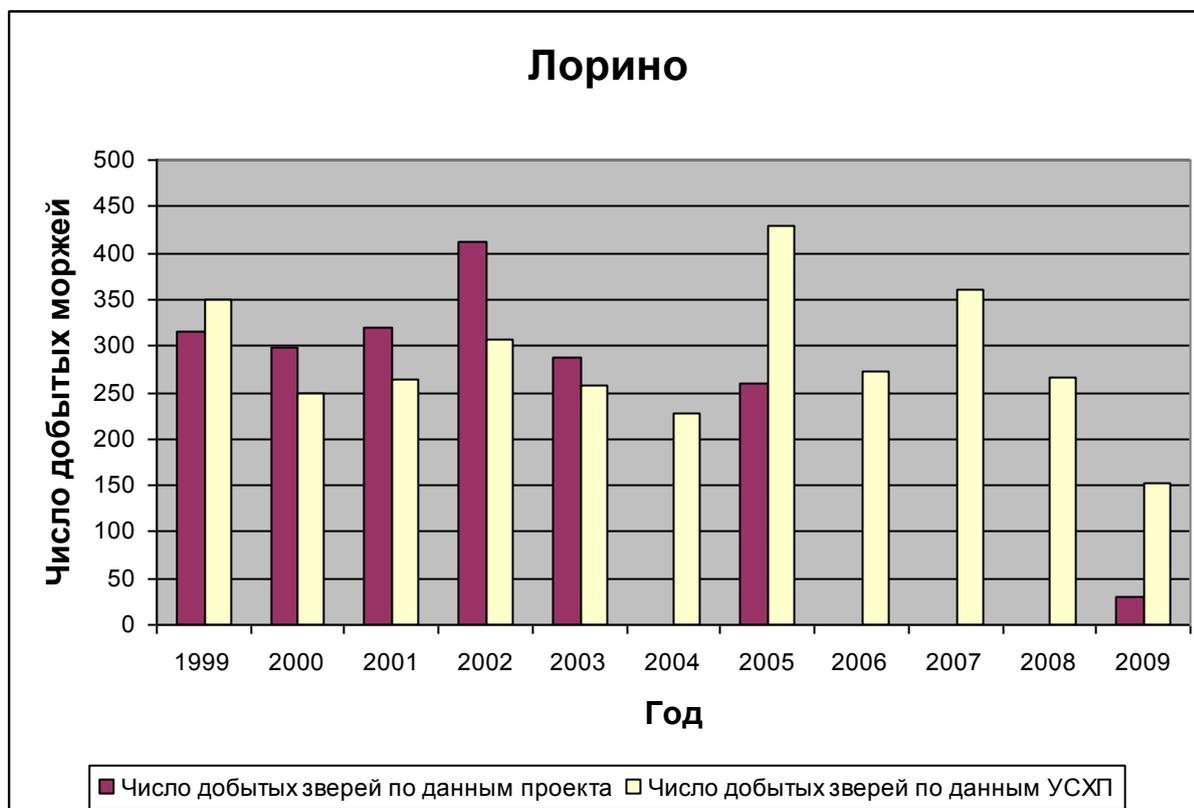


Fig. 6. Comparative dynamics of walrus harvest in Lorino village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District

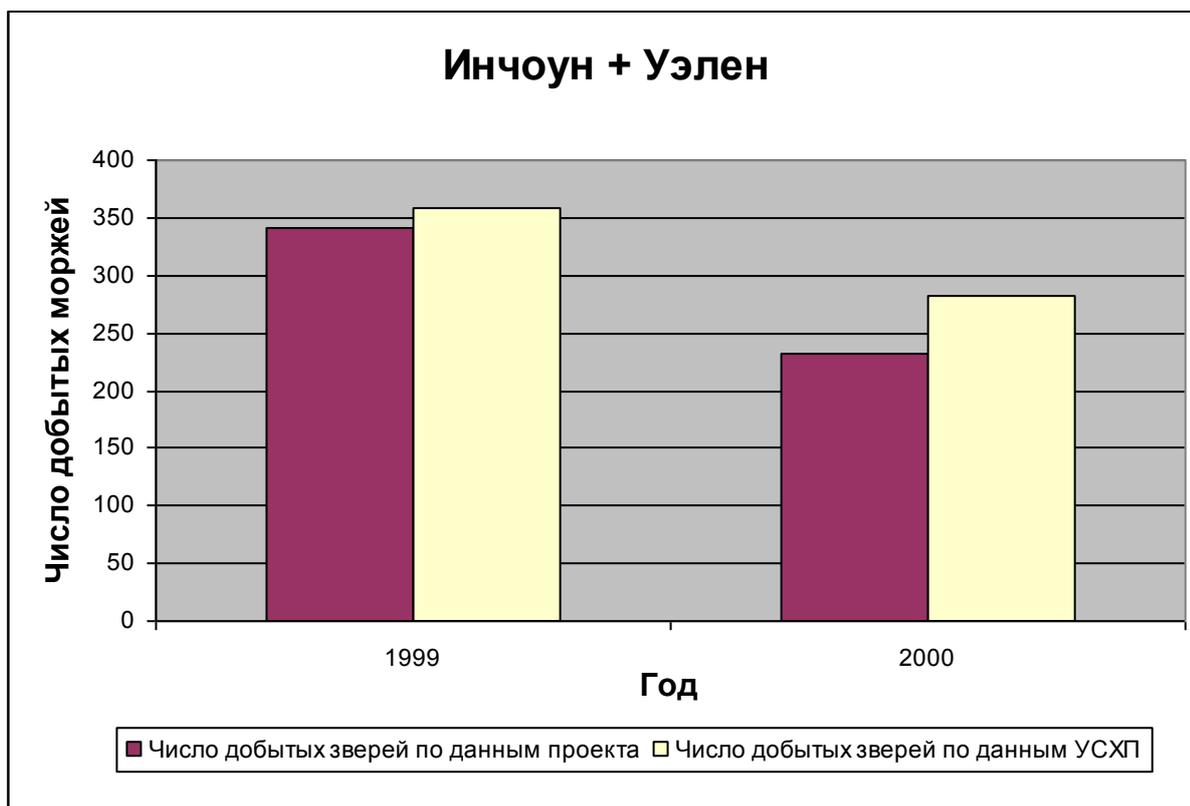


Fig. 7. Comparative dynamics of walrus harvest in Inchoun and Uelen villages according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District (1999-2000 data were combined since Division reports provide only combined harvest data for those villages)

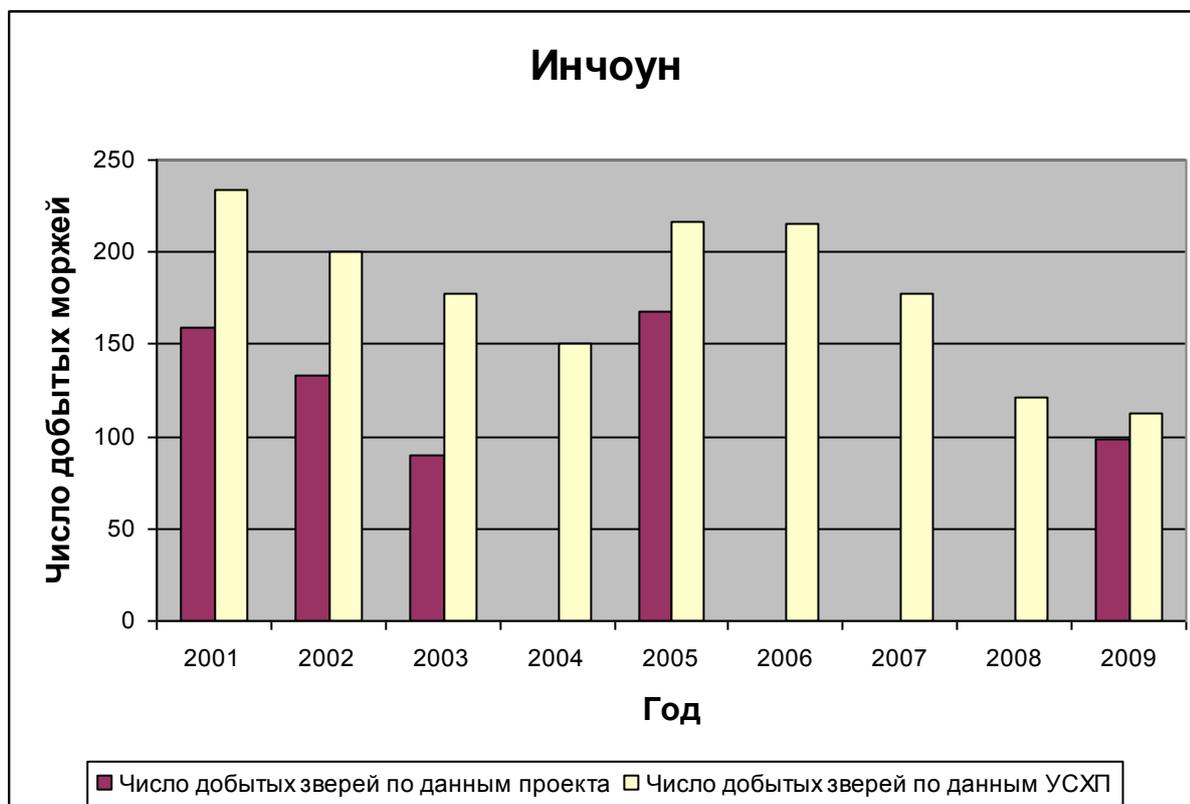


Fig. 8. Comparative dynamics of walrus harvest in Inchoun village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District

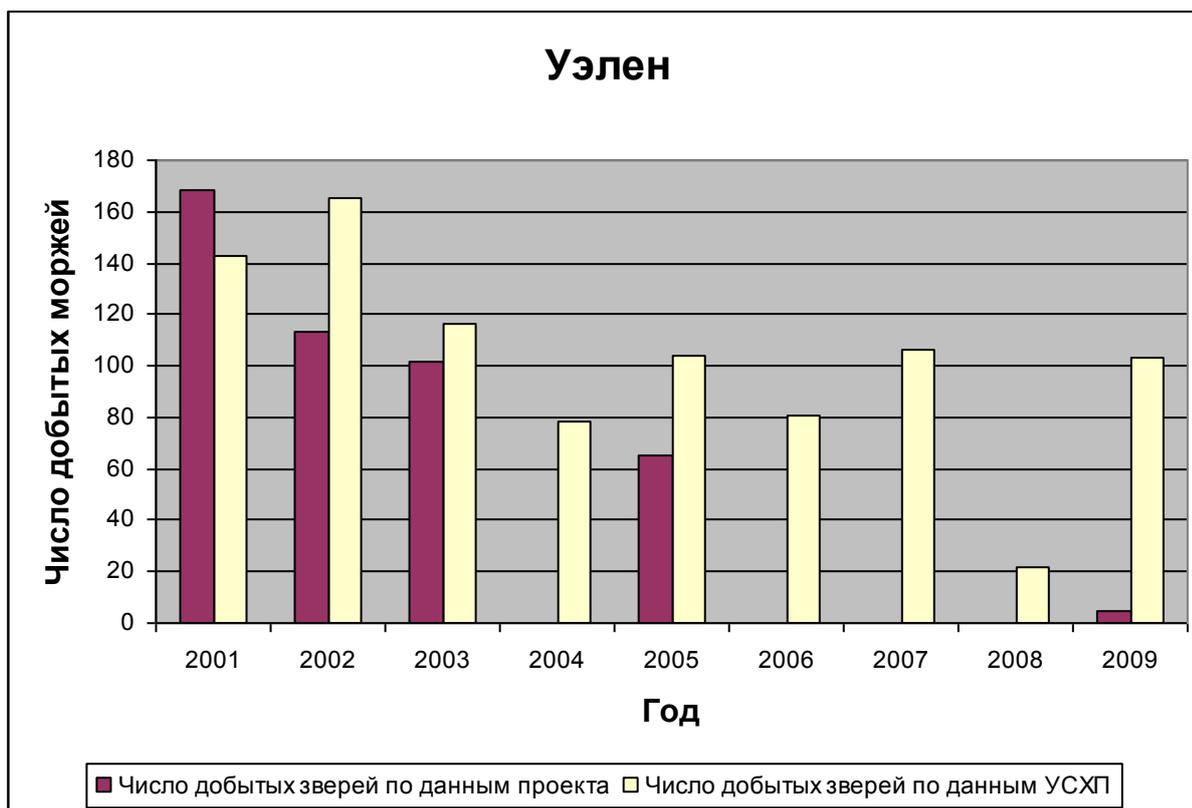


Fig. 9. Comparative dynamics of walrus harvest in Uelen village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District



Fig. 10. Comparative dynamics of walrus harvest in Yanrakynnot village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of the Chukotskiy Autonomous District

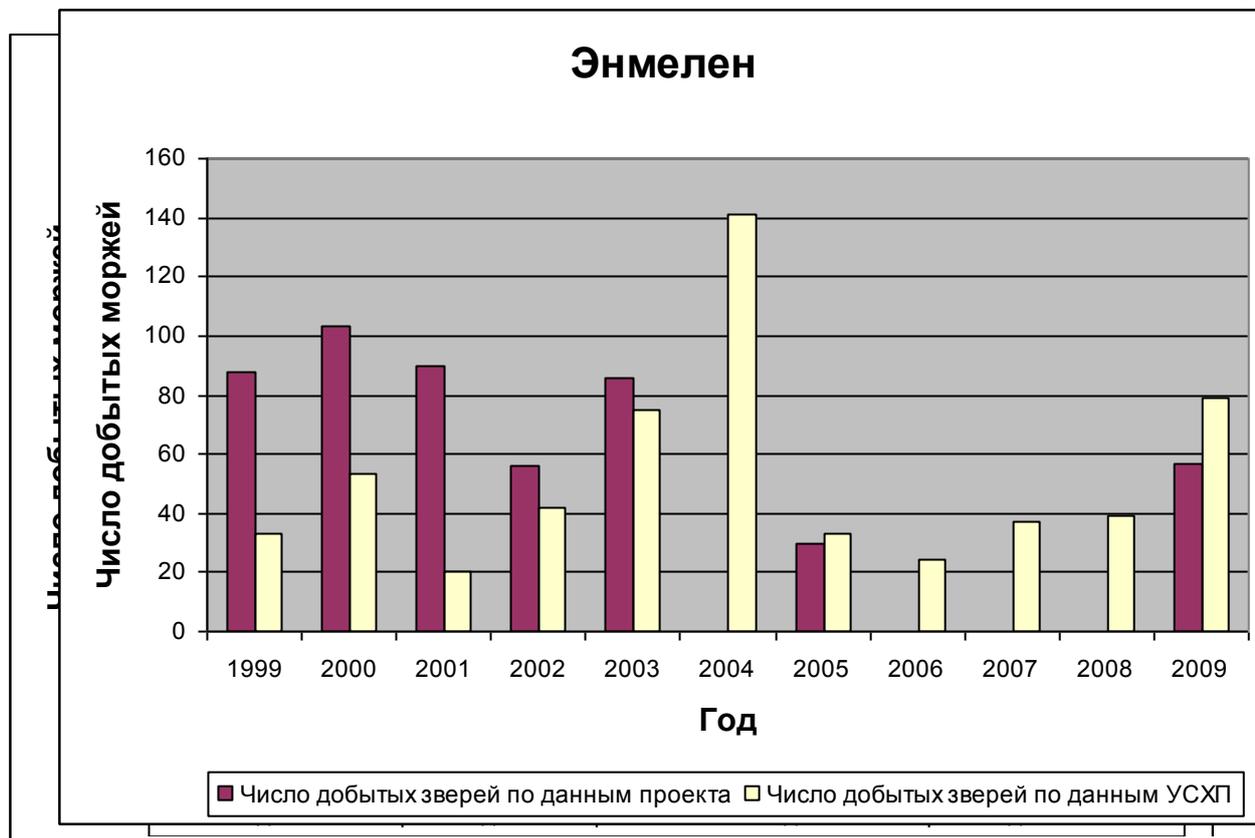


Fig. 13. Comparative dynamics of walrus harvest in Enmelen village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District



Fig. 12. Comparative dynamics of walrus harvest in Sireniki village according to the harvest monitoring project data and data reported by the Division of Agriculture and Use of Natural Resources of Chukotskiy Autonomous District

Combined report based on the results of the harvest monitoring in _____ village during (the month of) _____ of 2004.

Village	Total of harvested walrus	Males						Females						Sex unknown	Total walrus lost	Number of hunting trips
		New-born	One-year-old	Sub-adults	Adults	Unknown	Total	New-born	One-year-old	Sub-adults	Adults	Unknown	Total			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Observer _____ (Name)
 Date _____

Comment:

Guidelines for village observers on how to fill out monthly walrus harvest monitoring report.

1. Column 2 – total number of walrus harvested during that month should be listed
2. Columns 3-8 – filled by adding up data from observation journals; only males are selected and distributed between different age groups.
3. Columns 9-14 - filled by adding up data from observation journal; only females are selected and distributed between different age classes/groups.
4. Column 15 – number of walrus whose sex could not be identified using all available methods.
5. Column 16 – number of walrus that were not brought on to the shore: struck and lost animals, walrus that drowned, if such data are available.
6. Column 17 – total number of hunting trips including unsuccessful ones (no walrus harvested).
7. Combined monthly report is provided via telephone to the regional coordinator by the 5th of the next month.

Combined report based on the results of the harvest monitoring in _____ region during the month of _____ 2003.

Village	Total of harvested walrus	Males						Females						Sex unknown	Total walrus lost	Number of hunting trips
		New-born	One-year-old	Sub-adults	Adults	Unknown	Total	New-born	One-year-old	Sub-adults	Adults	Unknown	Total			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
TOTAL IN THE REGION																
ADDITIONAL INFORMATION:																

Regional coordinator _____

(Name)

Date _____

Comment:

The report must be sent by fax to the project supervisors by the 10th of the next month.