

WALRUS HARVEST MONITORING IN CHUKOTKA: 2009 TECHNICAL REPORT

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Table of contents

INTRODUCTION	1
MATERIALS AND METHODS.....	3
REUSLTS AND DISCUSSION	4
SEASONAL CATCH DYNAMICS.....	4
April-July	4
August	4
September	4
October.....	6
November.....	7
December	8
HUNTING EFFORT AND EFFICIENCY OF WALRUS CATCH.....	8
SEX-AGE STRUCTURE OF TAKEN WALRUS	10
ANALYSIS OF CATCH LOSSES.....	10
EVALUATION OF WALRUS CATCH IN CHUKOTKA IN 2009	11
ACKNOWLEDGEMENTS	13
LITERATURE CITED	14
FIGURES AND TABLES	15

INTRODUCTION¹

The Pacific Walrus is one of the most important species harvested by Native subsistence hunters in Chukotka and Alaska. The annual subsistence catch of walrus is of several thousand animals, which has a considerable impact on the overall status of the walrus population and its specific sub-population groups. Several 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 to increase its protection and sustainable use.

Pacific walrus harvest monitoring throughout its entire range is an important task. Earlier research in Russia and similar research done by the U.S. scientists provide information for the analysis of the population trends up until the late 1980s. The economic crisis in the early 1990s in Russia resulted in almost complete termination of walrus research. The effort to renew walrus studies in Russia was undertaken in the mid 1990s when the Chukotka Branch of the Pacific Research Institute of Fisheries and Oceanography (ChukotTINRO) was established in Anadyr. The next important stage was the first US-Russian Pacific Walrus Harvest Monitoring Workshop (September 1998, Nome, Alaska, USA), where the main issues related to walrus subsistence use and conservation were discussed and key objectives for walrus studies in Chukotka were identified. Participants of the workshop included representatives of Alaska and Chukotka Native organizations and agency staff of the U.S. Fish and Wildlife Service, ChukotTINRO and Chukotka Regional Fisheries Protection Inspection. The workshop participants recognized that Pacific walrus research in Chukotka is equally important for the preservation of Pacific walrus as an inherent component of local marine ecosystems as well as for the continuity of cultural traditions of Native marine 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 agreement on the implementation of walrus harvest monitoring in Chukotka was 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 “Yupik” Eskimo Society (Provideniya, Russia). Pacific walrus harvest monitoring has been conducted in Chukotka since May 1999 with the following objectives:

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- Involve coastal walrus hunters in the resource management programs and provide training opportunities for hunters in the coastal communities of the Chukotkiy and Providenskiy Districts.
- Document the number of walrus harvested in coastal communities of Chukotskiy and Providenskiy Districts and, specifically, in Lorino, Uelen, Inchoun, New Chaplino, Sireniki, Enmelen, that contribute almost 70% of the Chukotka Native walrus catch.
- Document age (calves, yearlings, young animals, adults and unidentified age class) and sex composition (male, female, unidentified) of the Chukotka subsistence catch.
- Document the number of walrus that were wounded, or struck-and-lost.
- Collect biological samples (2 front teeth from the lower jaw of a harvested walrus) in order to determine the exact age composition of harvested walrus.

Between 1999 and 2004, the work under this project was implemented annually, under the supervision by Russian biologists 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 Kymyrovtyun, 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 catch monitoring in Chukotka was put on hold; it was resumed in 2005 under the leadership of Chukotka Association of Subsistence Marine Hunters (CHAZTO) (Eduard Zdor, project coordinator). Harvest monitoring in Chukotskiy Region was conducted by the Chukotka Scientific Research Support Group (Dmitriy Eyneucheyvun, coordinator), and by the “Yupik” Eskimo Society «Yupik» (Michael Bragin, Coordinator) in Providenskiy Region. Harvest data analysis and final reports were produced by Maksim Litovka (2005).

Due to the shortage of funds, subsistence harvest monitoring in Chukotka had not been conducted in 2006–2008. In 2009, the Alaska Eskimo Walrus Commission provided support for this project in 2009 with the assistance from Kawerak, Inc.

MATERIALS AND METHODS

Recording the sex and age data on the harvested walrus, as well as the field collection of biological samples were implemented by local observers recruited from among marine mammal hunters in seven coastal communities in the Chukotkiy and Providenskiy Districts – Inchoun, Uelen, Lorino, Yanrakynnot, New Chaplino, Sireniki, and Enmelen (Fig.1). Catch reporting and monitoring were supervised by two local coordinators, Lyudmila Aynana in Providenskiy District and Dmitriy Eyneucheyvun in Chukotkiy District. They processed the documentation and harvest information received from the village observers on a monthly basis, and submitted their reports to the main project coordinator, Eduard Zdor, in the City of Anadyr. The Project Coordinator (EZ) processed the information in electronic format and forwarded it to the scientific consultant (AK) for further analysis.

It is important to point out that the delay in funding resulted in observers starting to document walrus catch data in September 2009 only. Data for August 2009 are available from one community, *Enmelen*, only. Also, the complete original records (field notes) for the duration of the project are available for two communities, *Enmelen* and *Lorino*, only. Observer's field notes from the community of *Inchoun* for September and October 2009 reveal substantial discrepancies between the original notes and monthly reports on the number and sex-and-age composition of local walrus catch. No original notes are available for November 2009 and, in order to assess the amount of monthly catch, we may rely on the summary report of the district 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. Observers in other communities (*Sireniki*, *Uelen*, *Yanrakynnot*) did not submit any original field notes, so that we may rely on the data from respective district monthly reports only.

Age sample material (teeth) was not collected in 2009.

Overall, 224 walrus were harvested in seven Chukotka communities in August–December 2009, according to the provided records.

RESULTS AND DISCUSSION

MONTHLY CATCH DYNAMICS: 2009

April-July

Due to the delay in project funding, catch monitoring was not conducted during this period, although hunters continued to harvest walrus during that time. According to the records of the Division of Agriculture and Provisions of Chukotskiy Autonomous Area in Anadyr (hereafter, DAP), first walrus of the season were harvested in April (4 in New Chaplino and 1 in Enmelen). In June, 4 walrus were harvested in Nunligran; in July, 3 walrus were harvested in New Chaplino, 4 in Sireniki, 7 in Nunligran and 9 in Enmelen (DAP records). Catch data for the Chukotskiy District was not available for April–July 2009, due to the reorganization of municipal agricultural enterprises into marine hunting communes.

August

In August, walrus catch was reported in one community (Enmelen) only. Altogether, 38 animals were harvested; the majority (60%) were males, both young and adult. Females with calves were also represented in the catch and most of the females were reported as “young”. Hunting 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 the animals that were moving along the coast from the established haul-out sites on Meeskyn Spit (Island) and Retkyn Spit (Rudder Bay) eastward, toward the Chirikov Basin.

The observer from New Chaplino recorded that by November 1, 2009 his community has taken a total of 14 animals. Since only one walrus was killed in September and October 2009, we may assume that the remaining 13 walrus were taken from April through August 2009.

According to the DAP official catch record, no walrus were taken in the month of August in any of the participating community, in direct contradiction to the observers’ reports.

September

In September, walrus catch in Enmelen decreased dramatically. The observer did not provide any comments; it is unclear whether the drop in local subsistence catch it was caused by bad weather or by the absence of walrus in the area. Only two hunting trips were reported and two young male walrus were taken. Meanwhile, the DAP official record indicates that 53 walrus were taken in

Enmelen during that same of time (evidently, adding the animals taken during the previous months – Ed.).

The observer from Sireniki did not provide information on individual hunting trips, but supplied a combined monthly summary instead. A total of 11 walruses (both males and females) were taken in September during five hunting trips. Two boats were used; it remains unclear whether a trip on two boats was considered a single hunting episode, or each boat was counted separately. According to the DAP records, 10 animals were taken in Sireniki in September.

In New Chaplino, a single hunting trip was recorded and it is unclear whether both of the two whaleboats in the community were engaged or just a single boat. Hunting took place in the vicinity of the Arakamchechen Island, near a regularly occupied walrus haulout site. The observer recorded that walrus left the haulout site in late August or on the first days of September. There were very few walrus at the haulout site on Arakamchechen Island in the summer of 2009, as in 2007–2008. One young male was taken. According to the DAP record, a total of 6 walruses were taken in September 2009 in New Chaplino.

The observer from Yanrakynnot reported that hunters in his community did not go out to sea in September due to frequent engine breakages and bad weather. The DAP record confirms the lack of walrus catch in Yanrakynnot in September.

In Lorino, local observer regularly documented only the harvest by his own crew that was based at Akkani (abandoned village site north of Lorino). Catch by other crews was reported in case the animals killed were brought to Akkani for butchering. Animals delivered directly to Lorino or butchered at other sites along the coast, were not reported by local monitor. A total of eight hunting trips over six harvest days were logged in September 2009, with 11 walrus, mostly females, killed. On September 26, an adult male in poor physical condition was taken. 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 the walrus harvested out of Lorino in September 2009.

The observer from Uelen supplied only a summary report for September 2009. Five hunting trips were documented; it was unclear how many boats were used during those trips. The catch of 5 walrus was recorded. DAP does not have any harvest data from Uelen for the month of September.

Data submitted by the local observer in Inchoun and those from combined summary tables for the community do not match. The original notes state that 15 walruses were taken on 10 hunting trips over four days. In the monthly summary report, 12 hunting trips are recorded, with a total harvest of

41. There was also confusion regarding the sex-age composition of the animals killed. The observer indicated that there were four young males in the catch that were not listed in the monthly summary report. We combined the data from both sources, using the information from the monthly summary report as a base and suggest that 41 walrus were taken in Inchoun in September 2009. DAP record for the community for the month of September is missing. The observer noted that on September 6, walrus moving to the south were hunted three kilometers from the village. On September 27, two adult females were harvested directly from the shore; one of the females was pregnant.

October

In October, the hunting activities in Enmelen increased once again. Ten hunting trips (in three boats) over four days were reported; this resulted in 17 walrus taken. Sex composition of the catch was mixed, with males prevailing. The observer pointed out that the hunt was conducted in the vicinity of the village, with the walrus moving eastward along the coast. In late October, one of the young males taken was moving in the opposite (western) direction. DAP records show a total catch of 15 walrus during this same month.

The observer from Sireniki submitted a combined monthly report only. Seven hunting trips are reported; it is unclear how many boats were used. The actual goal of the trips was to search for whales, and walrus were taken along the way. Two young females and a calf of the year (yearling, also a female) were killed. All reported walrus were taken close to the shore near Kinligak Bay, a few miles west from Sireniki. DAP records show zero harvest in Sireniki in October.

The observer from New Chaplino provided a combined monthly report only that lists 17 hunting trips, with no data on how many boats were used on each trip. Whales were the main hunting targets and along the way, seals were harvested as well. No walrus were seen in the area where hunting took place. Nevertheless, the DAP record indicates that one walrus was taken in New Chaplino in October.

According to local observer in Yanrakynnot, hunters in his community did not go out to hunt walrus in September due to the lack of a working outboard motor and bad weather. However, the DAP record indicates that 3 walrus were taken in Yanrakynnot during that month.

In Lorino, the observer, once again, documented only the harvest of his crew that was based out at the Akkani site. Seven hunting trips were undertaken over seven days [translators note: author refers to October but wrote September in the Russian version]; a total of 18 walrus were killed with slightly more males than females. The observer recorded that three out five females killed (young and adult) were pregnant. The DAP record shows that a total of 143 walrus were killed in Lorino in

October 2009. The data may represent the cumulative catch in the community for the years starting from spring 2009.

Combined summary table for Uelen shows zero walrus catch in October 2009. However, DAP reports a combined catch of 60 walrus. This number most certainly represents the cumulative community harvest, starting from spring 2009, similar to Lorino.

Information from the community of Inchoun, once again, shows significant discrepancies between the original notes of the observer and the combined summary tables of the district coordinator. Three hunting trips resulting in 10 animals killed were recorded in the combined table, while the observer stated that 21 walruses were taken on five hunting trips over two days. We chose to rely on the data provided by the observer. According to observer's notes, in early October, walrus that were hunted were moving in the northern direction. DAP record shows the catch of 59 walrus in Inchoun during October 2009. Again, as in the previous cases, it is unlikely that this number represents actual catch for a single month.

November

Due to bad weather and strong surf, Enmelen hunters did not go out to sea in November. Nevertheless, DAP reports 1 walrus taken during this month.

Based on the combined monthly report from Sireniki, three hunting trips were undertaken in November; it is unclear how many boats were used. No walrus were taken; in fact, the animals were seen but once during the entire month, when two adult walrus passed by heading southeast. DAP records confirms zero catch in Sireniki in November 2009.

The combined monthly report from New Chaplino lists 12 hunting trips in November 2009, with the unknown number of boats used on each trip. A single adult female was taken near Cape Chukotskiy not far from a Steller sea lion haul-out site. DAP record shows zero harvest in New Chaplino in November.

The observer from Yanrakynnot reported 5 hunting trips. Hunters did not see any walrus and hunted seals only. The observer noted the formation of new ice. DAP record confirms the absence of walrus catch in Yanrakynnot.

The combined summary table of the regional coordinator shows zero catch in both Lorino and Uelen in November. However, the DAP reports 9 walrus killed in Lorino and 43 in Uelen. We believe that the DAP information from Uelen is unreliable or erroneous.

Data on walrus catch in Inchoun come from the combined summary table of the regional coordinator. Eleven hunting trips were recorded in November with the total of 36 walrus killed. It is

most likely that hunting trips in this case mean indicate hunters' visits to the coastal haul-out site at Cape Unikan, where walrus are traditionally hunted by spearing on shore. DAP records for Inchoun show the catch of 54 walrus in November.

December

Most of the communities participating in the project (Enmelen, Lorino, Uelen, Inchoun) did not report any catch in December due to poor weather and short daylight. DAP records confirm zero catch in those four communities.

According to the combined monthly report, seven hunting trips were undertaken in Sireniki, but it is unclear how many boats were used. Winter harvest is possible in this area due to the existence of a stationary polynia. Walrus were not harvested and were seen only once, on December 16, when two adult animals moved past the coast in a south-eastern direction. DAP records for Sireniki show the harvest of 3 walrus in December 2009.

In New Chaplino, according to observer's monthly report, eight hunting trips were undertaken December. These were most certainly hunting trips over the ice to the edge of the shore-fast ice. Walruses were neither seen during those trips nor harvested. DAP records confirm zero harvest in New Chaplino in December.

In mid-December in Yanrakynnot, an emaciated female walrus was killed; it was moving over the shore-fast ice far from open water in the Senyavin Strait. DAP record does not reflect this catch.

HUNTING EFFORT AND EFFICIENCY OF WALRUS CATCH

It was hard to evaluate hunting effort in each community, since only the observer from Enmelen provided sufficient data on each hunting trip and the number of walrus taken on each trip per boat. It appears that in other communities, one hunting trip commonly meant a trip by a crew that used *two* boats of different size. The reported catch, thus, may represent walrus taken by one crew using either one or two boats. The number of boats used by one team was reported in some cases (Lorino, Inchoun) but not in others. Therefore, we may illustrate the dynamics of hunting trips over the entire monitoring period for two communities, Enmelen and Lorino, only (Fig. 2-3). On top, reported monthly catch dynamics in Lorino may not reflect the actual situation in the community, since the reported hunting trips were primarily (if not exclusively) those made by the crew based at Akkani, on which the observer was a member.

The total number of hunting trips per month (without the number of boats used) was recorded in most of the communities participating in the monitoring program. We tried to evaluate the harvest activity throughout the season based on those data (Fig. 4). The period of monitoring covered the end of the 2009 harvest season. In Enmelen, most of the hunting trips were made in August, when monitoring was not conducted in other communities. The catch was insignificant in October and almost non-existent in November, due to the absence of walrus and bad weather. Increased hunting activity in the communities in the vicinity of the Chirikov Basin (Sireniki, New Chaplino, and Yanrakynnot) was mostly associated with the gray whale and bowhead whale hunting. Walrus were pursued and killed along the way. The only exception was the community of Inchoun, where hunting in November was at about the same level as in September, due to the formation of a coastal walrus haul-out at Cape Unikyn. Both the swimming walrus were hunted from boats and hauled-out animals were speared on shore.

In December, the sea was freezing fast and hunting continued only in the communities located in the area of Chirikov Basin (Sireniki, New Chaplino, Yanrakynnot). At that time, boats were not used in New Chaplino and Yanrakynnot; as hunters used dog-teams, snowmobiles or walked out on foot over the already strong shore-fast ice to get to the ice edge. The main goal was to harvest seals, and only a single walrus was killed 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 walruses from wooden and skin boats (baydaras).

The efficiency of hunting, i.e. the proportion of hunting trips that resulted in hunters returning with one or more killed walrus, was high (57.5 % in all of the communities in the program), even though we considered all hunting trips, including those that did not target walrus as the main goal. There were almost no «empty-hand» trips in Enmelen, Inchoun, and Lorino (Table 1). It is possible that unsuccessful trips were not reported by the observers. More likely, the high efficiency was an outcome of other factors affecting walrus harvest. During the study period hunters went to sea only when sufficient number of walrus was seen at a small distance from the shore. Each hunting trip thus resulted in taking an animal. This approach by subsistence hunters is determined by the limited availability of fuel for outboard motors in Chukotka Native communities.

Hunting efficiency in 2009 expressed as an average number of walrus taken on a single trip was the lowest in most of the communities 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 the monitoring

was started a month earlier (in August), and in Inchoun, where a considerable share of annual walrus catch is secured by hunting near the haul-out site in late fall (Table 2).

SEX-AGE STRUCTURE OF TAKEN WALRUS

Out of the total reported walrus catch of 224, the observers recorded sex for 209 animals (93.3%) and age for 194 walrus (86.6%) killed (Table 3). During 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 the entire period of monitoring (1999-2009) was in favor of males (Table 5). However, the share of males in the 2009 subsistence catch was the lowest. The proportion of males to females was similar in 2001 and 2002. During the remaining years, male walrus surpassed females in local catch by a factor of 3 to 5 (Table 5). The higher proportion of males in subsistence catch reflects traditional preference, since males are a preferred take due to their higher weight (more meat) and larger tusks (for carving). A relatively low proportion of males in 2009 can be due to the fact that the data reflects only the fall harvest season, when the migration of female walrus that left the ice edge in the Chukchi Sea is more conspicuous off Chukotka.

In regards to the age composition, 2009 stands out as a year with a high proportion of younger animals. The proportion of walrus identified as young in that year's harvest was within the norm (27.2%, with the actual share varying from 18.7 to 39.6% during 1999 to 2005), whereas the share of newborn (calves) and yearlings was the highest, and the share of adult animals was the lowest (Table 4). It is necessary to point out that local observers tend to underestimate the age of killed walrus. That was revealed when visual age estimates by the observers were compared to the age of the same animals determined via the analysis of their teeth (Литовка и др., 2004). In 2009, walrus teeth were not collected; nevertheless, this same trend is noticeable even based on observers' notes. For example, females were identified as "young" even though they had suckling-calves. It is likely that the high proportion of yearlings in local catch may have been a result of a large number of immature 2-4 year old walrus being recorded in that category. Thus, the category "young" does not represent the actual catch of juvenile walrus accurately.

ANALYSIS OF CATCH LOSSES

Total (cumulative) number of lost walrus (wounded animals that escaped or drowned) in all of the communities in August-December 2009 was 22, or 8.9% of the total take calculated from 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 (1999). In 2000-2005 the level of loss varied from 10.5 to 12.3% (Table 7).

The low level of harvest losses in Chukotka based on the data collected under this project can hardly be explained by any particular hunting skills. It is important to take into consideration that the majority of walrus were taken during the ice-free period, when the risk of losing an animal struck when afloat in the water or wounding it is the highest. It is most likely that losses were significantly underreported, because marine hunters rarely tell about the animals being lost. It may result from the traditional way of thinking and psychology of the hunters who are cautious about providing extra details or additional information, even to local monitors from the same community. To a great extent, there is fear that such data may have a negative impact, for example, may lead to the reduction of the annual quota or fines for drowned animals. This attitude is based on many decades of hunters' interactions with the government authorities and local agencies.

The highest level of losses (34.1%) was recorded in the community of Lorino (Table 6). It is hard to find any plausible explanation, because in the previous years, that community had the lowest level of losses among the communities where monitoring was conducted (Table 6). This may result from hunters being forced to go after the animals 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.

EVALUATION OF WALRUS CATCH IN CHUKOTKA IN 2009

Based on the results of the local monitoring efforts, the total number of walrus taken in seven Native communities in Chukotka from August through October 2009 was 224. This is the lowest number for the entire duration of the project since 1999. Catch level in many communities during the first years of the harvest monitoring (1999-2002) was higher than the DAP records; in some cases, 4-5 times higher (Figs. 5-13). The total documented catch in all of the communities in 1999-2002 was 3-11% higher than reported by DAP. However, the observers' work eventually became less accurate in the following years. In 2003, the cumulative reported walrus catch in the communities where monitoring was conducted was only 80% of the catch numbers provided by the DAP; in 2005, it was 62%, and finally in 2003 (2009?) – it dipped to 38%. Low level of reported killed walrus in 2009 can

be explained primarily by the late start of the monitoring effort. As a result, it covered less than half of the hunting season. At the same time, it is obvious that coordinators and observers are less interested in collecting and providing accurate catch data.

Many factors may play a role here:

1) Standards of living in Chukotka communities have gradually improved, and as a result, coordinators and local monitors became less interested in the monetary compensation paid from the project budget;

2) Work under the village monitoring project is done irregularly and with long gaps (1999–2003, 2005, 2009); therefore observers and coordinators do not see the outcomes of their effort. The requirement to provide harvest information has not become a habit or a normal aspect of the local subsistence hunting;

3) During the first years of the monitoring project, annual seminars for local observers and coordinators were conducted in Alaska. This helped the participants appreciate the importance of their work and share experience with each other and with their Alaskan colleagues. Due to the shortage of funding, 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. Those rewards should not be in the form of monetary compensations but rather come as valuable gifts or certificates of recognition;

5) No outreach or educational work is conducted among Chukotka Native hunters. Brochures, posters, photographic and video materials are necessary to explain to the hunters the importance of providing complete and undistorted harvest data.

Only a portion (38%) of the total walrus catch covered in the DAP records was reported for the same communities as a result of the current walrus monitoring project, and an even small portion (21%) of the entire annual catch reported by the DAP (Division of Agriculture and Provision) for the Chukchi Autonomous Area in 2009. For that reason, we decided not to compute the total walrus catch based on the data obtained as a result of this project. We are, therefore, inclined to accept the final catch number provided by the DAP, 1085 animals, as the amount of subsistence walrus catch in Chukotka in 2009. If we account for the number of struck-and-lost walruses estimated during the months of the local monitoring (8.9%), the total subsistence take of Pacific walrus in Chukotka comes to 1192 animals. If, on the other hand, we assume that the actual rate of struck-and-lost animals was at a level estimated by Fay et al. (1994), i.e. 42%, than the total subsistence take of Pacific walrus in

Chukotka would stand at 1871 animals. Thus, the actual size of walrus catch in Chukotka in 2009 was somewhere between 1192 and 1871.

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

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FIGURES AND TABLES

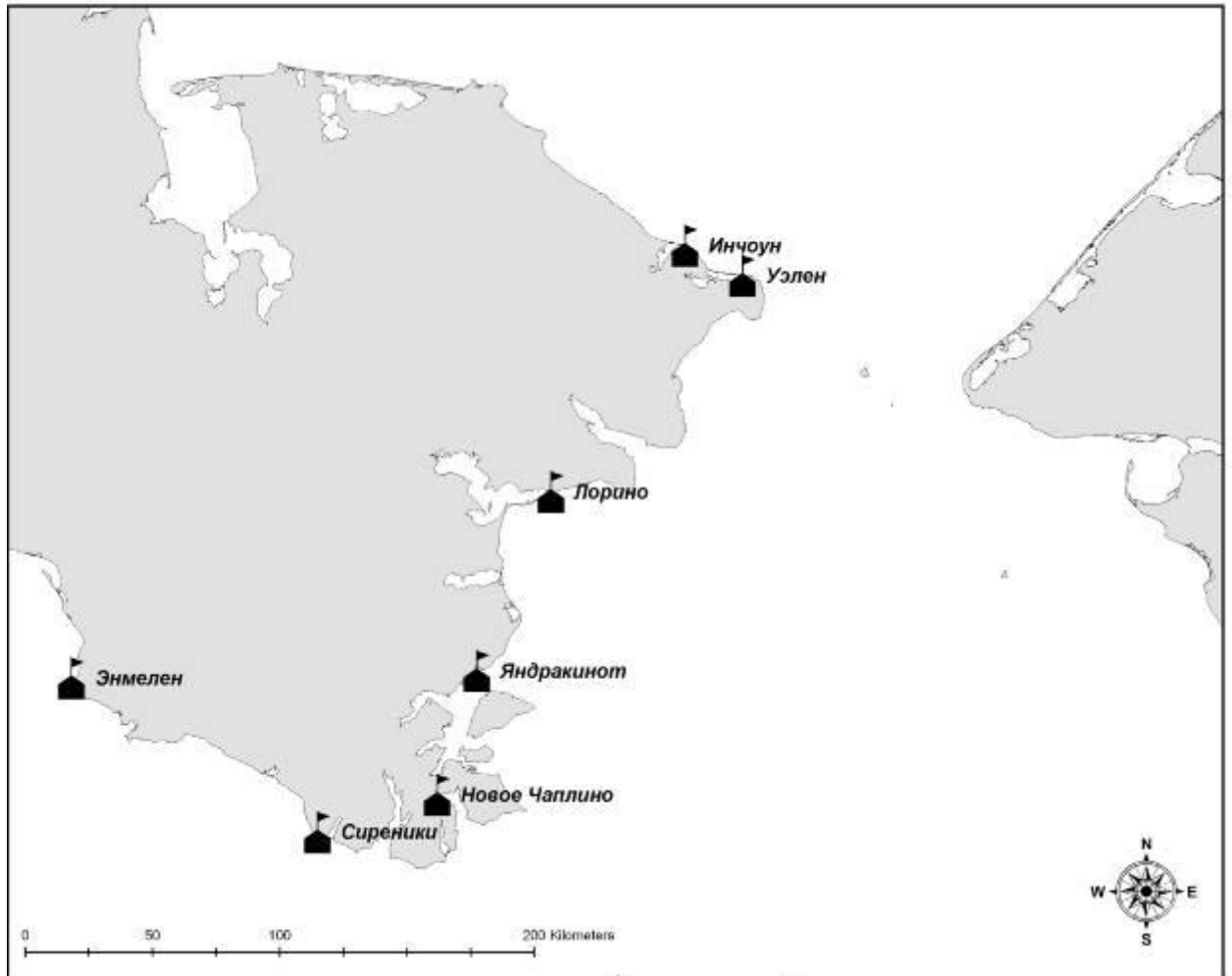


Fig. 1. Chukotka communities, in which walrus subsistence harvest monitoring was conducted in August–December 2009

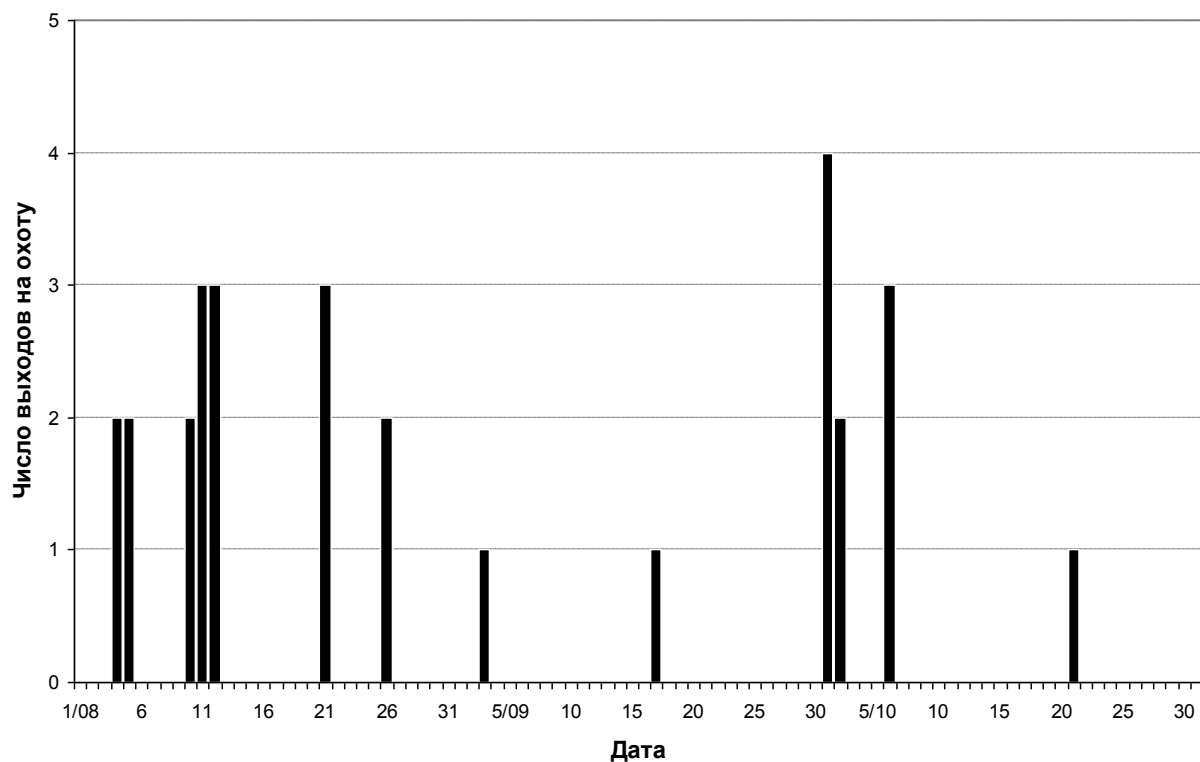


Fig. 2. Number of hunting trips in the community of Enmelen during the period of walrus harvest monitoring (1 August – 30 October) in 2009 [Vertical axis – number of trips; horizontal axis - dates

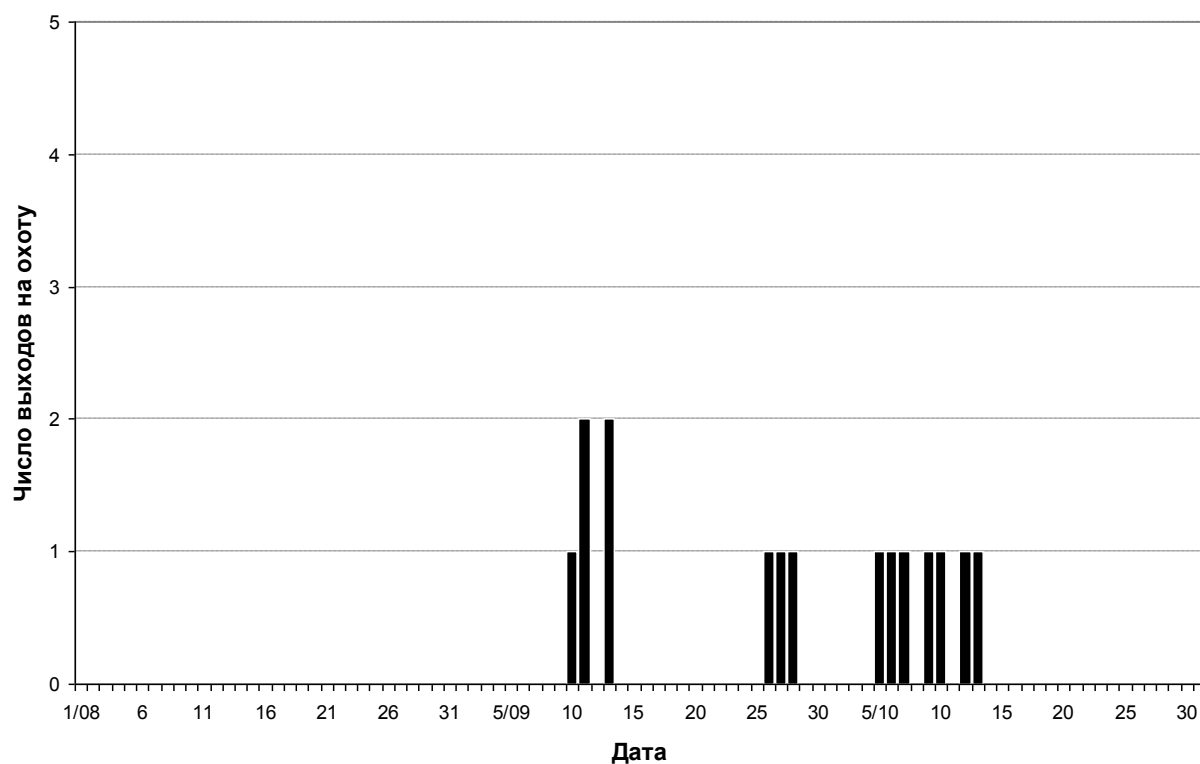


Fig. 3. Number of hunting trips in the community of Lorino, during the period of walrus harvest monitoring (1 September– 30 October) in 2009. Vertical axis – number of trips, horizontal axis - dates

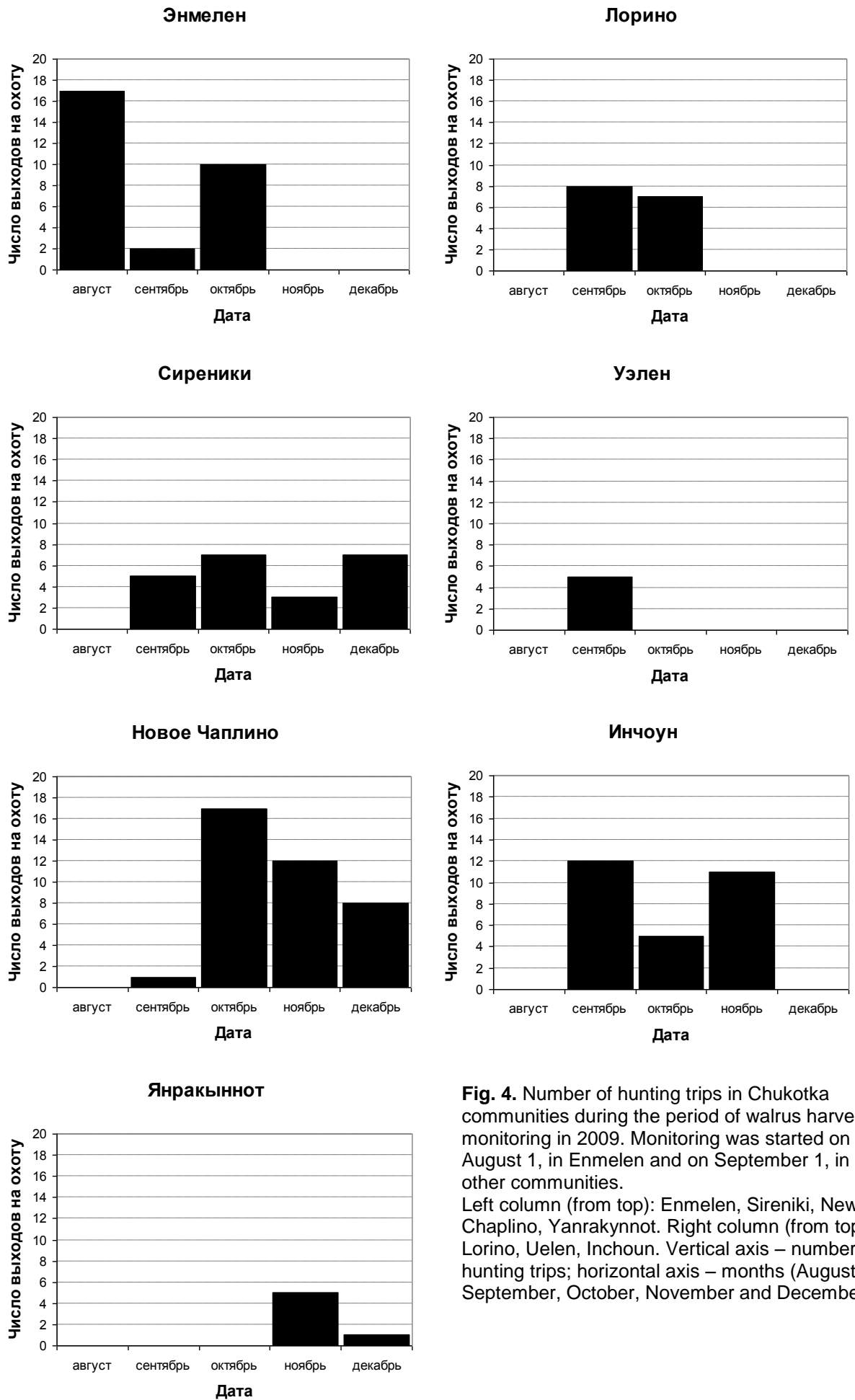


Fig. 4. Number of hunting trips in Chukotka communities during the period of walrus harvest monitoring in 2009. Monitoring was started on August 1, in Enmelen and on September 1, in all other communities. Left column (from top): Enmelen, Sireniki, New Chaplino, Yanrakynnot. Right column (from top): Lorino, Uelen, Inchoun. Vertical axis – number of hunting trips; horizontal axis – months (August, September, October, November and December)

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

Village	Number of hunting trips with harvested walruses recorded for each trip	Number of walruses 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 walruses taken during single hunt, 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 walruses, 2009

Community	Age	Female	Male	Sex unknown	Total
Enmelen	Adults	5	18	0	23
	Young/subadults	9	16	0	25
	Yearlings	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
	Yearlings	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
	Yearlings	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
	Yearlings	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
	Yearlings	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
	Yearlings	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
	Yearlings	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
	Yearlings	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 in Chukotka subsistence walrus catch, 1999-2009.

Year	N	Calves of the year	Yearlings	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, 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

Community	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. Ratio of struck and lost walrus, 1999-2009, %

Community	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

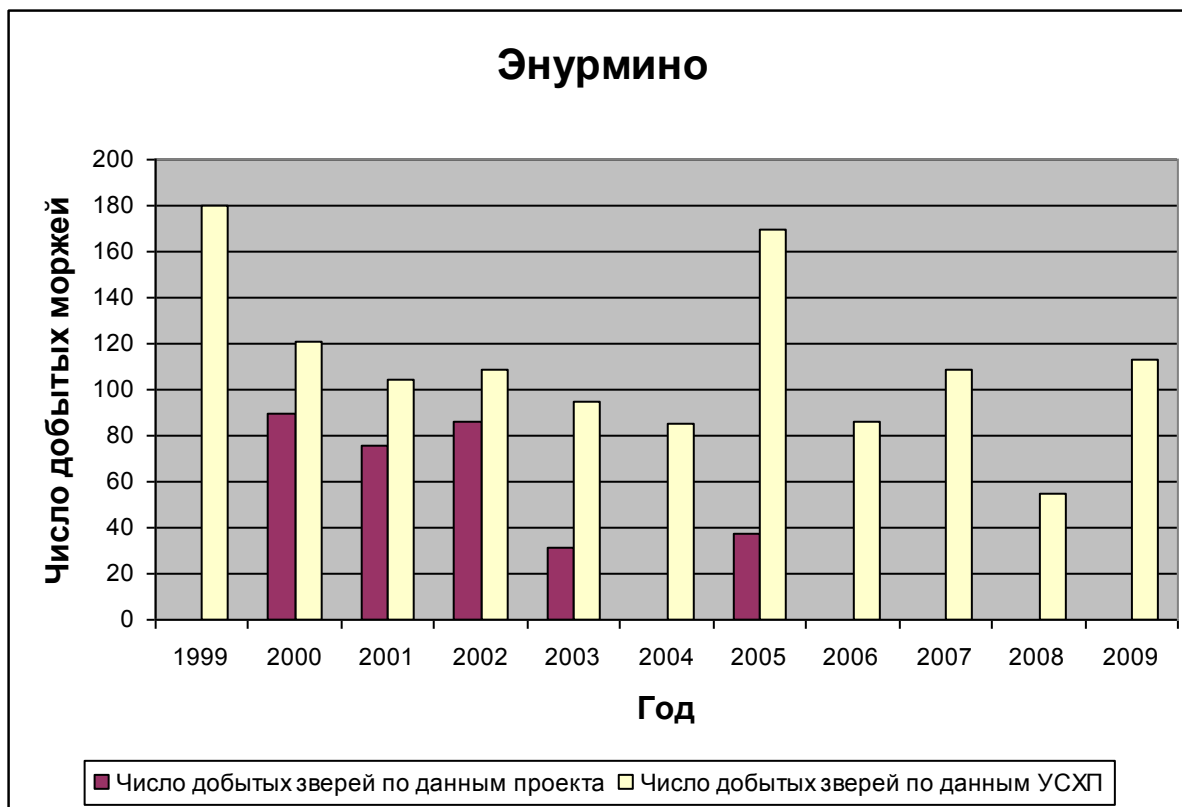


Fig. 5. ENURMINO: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

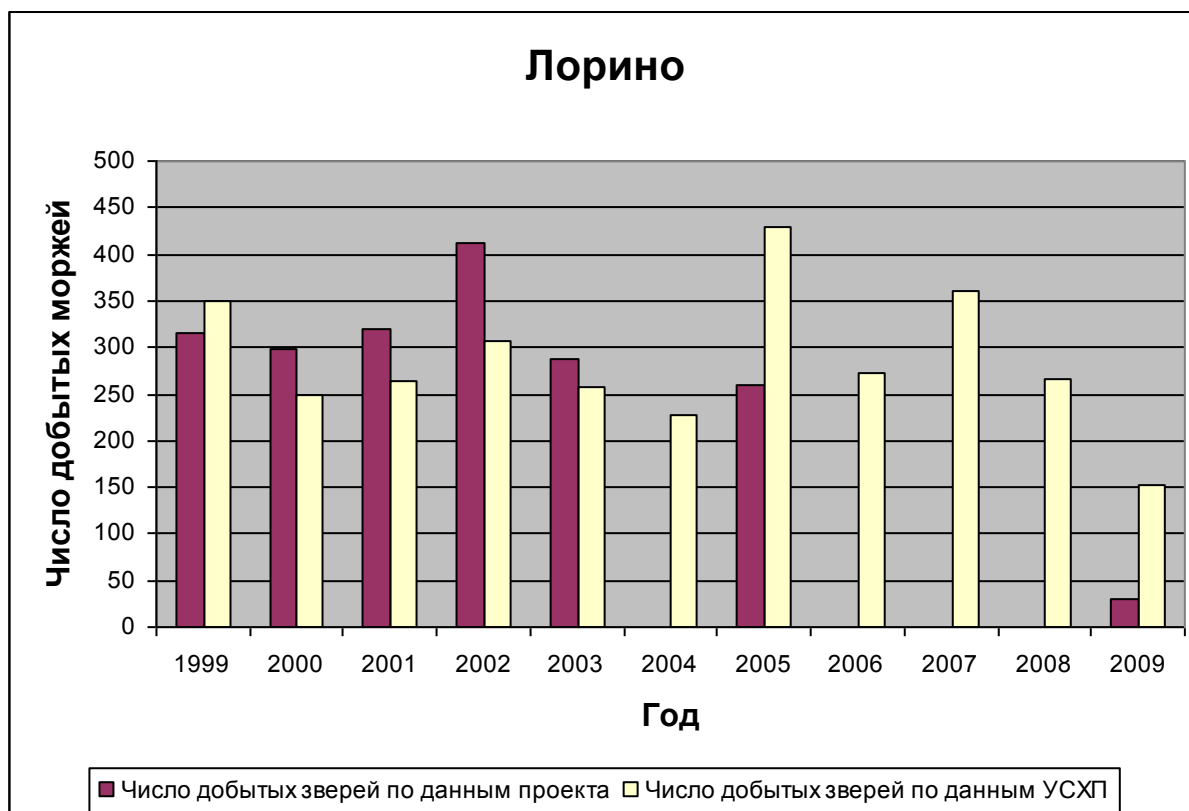


Fig. 6. LORINO: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

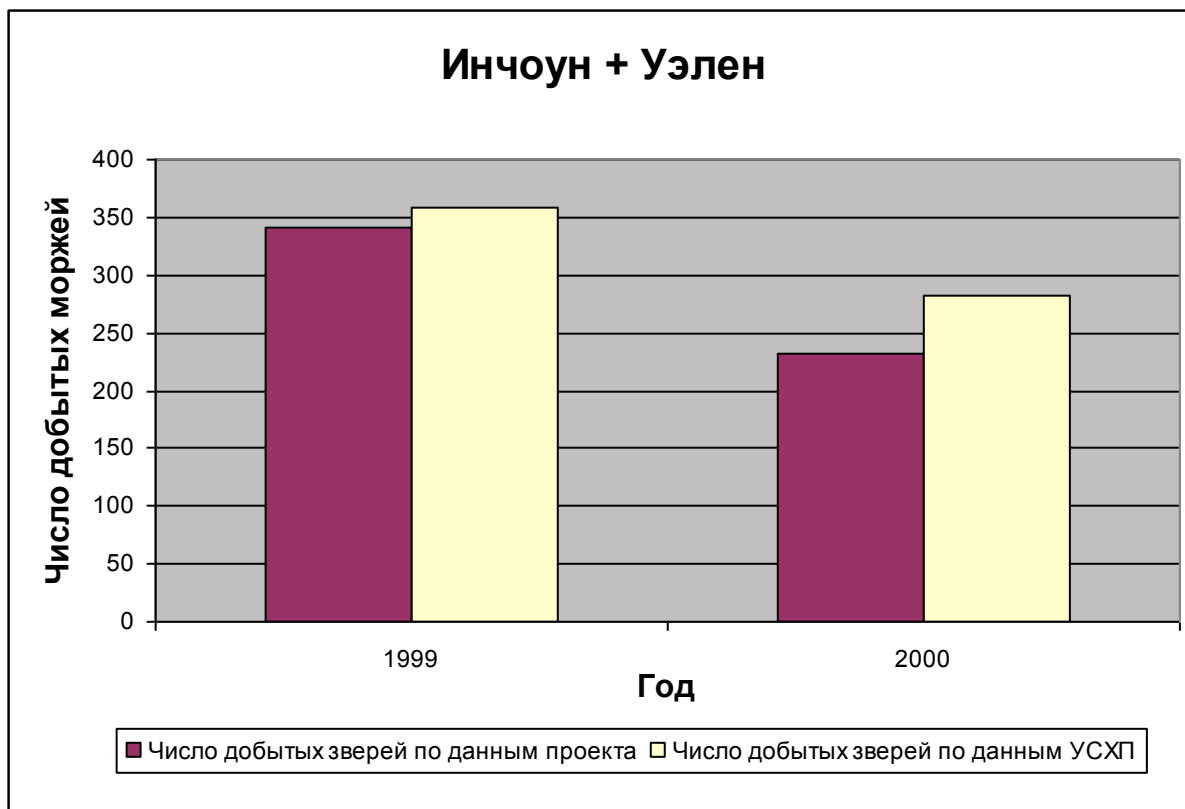


Fig. 7. INCHOOUN and UELEN: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

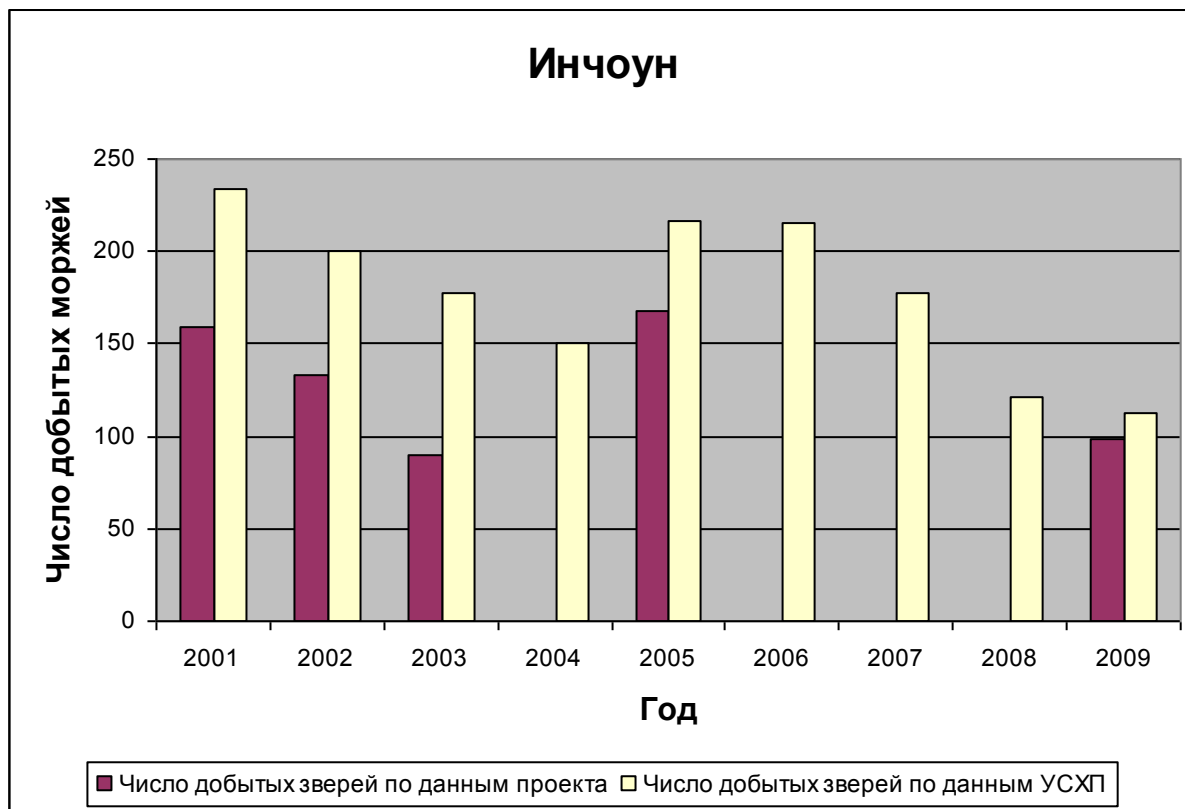


Fig. 8. INCHOOUN: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

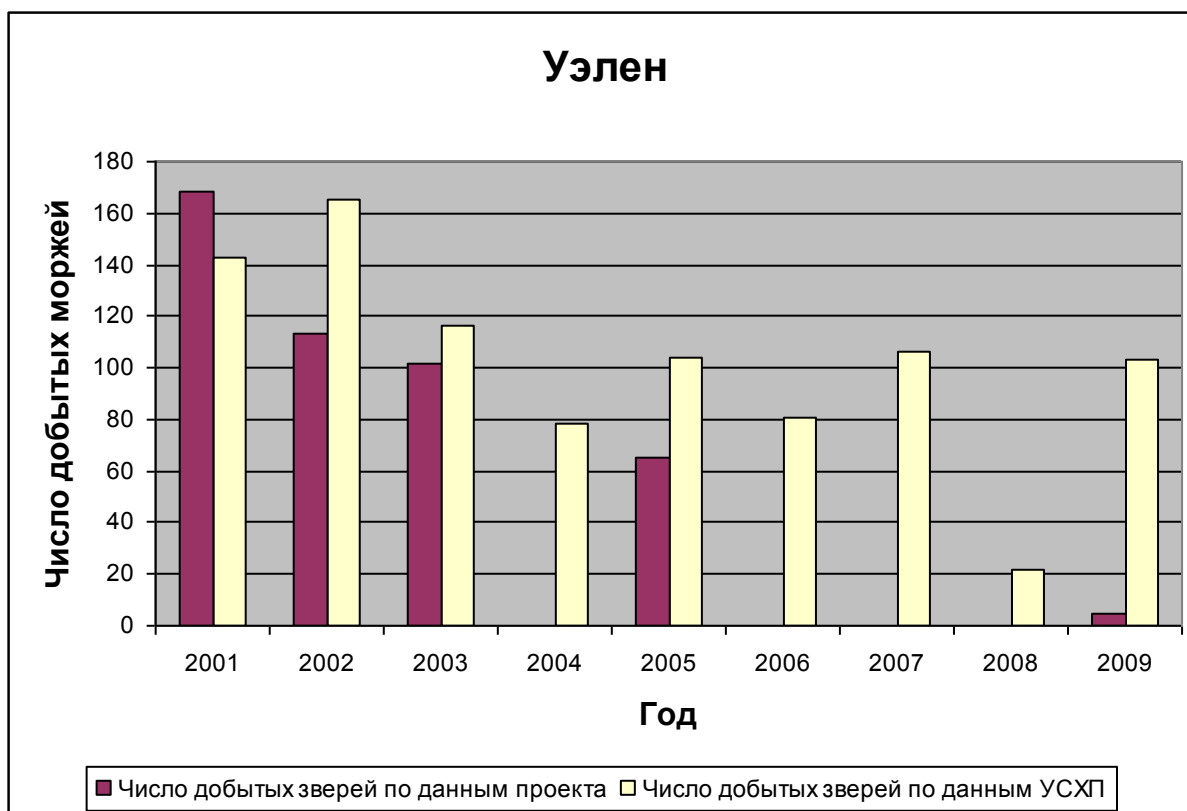


Fig. 9. UELEN: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

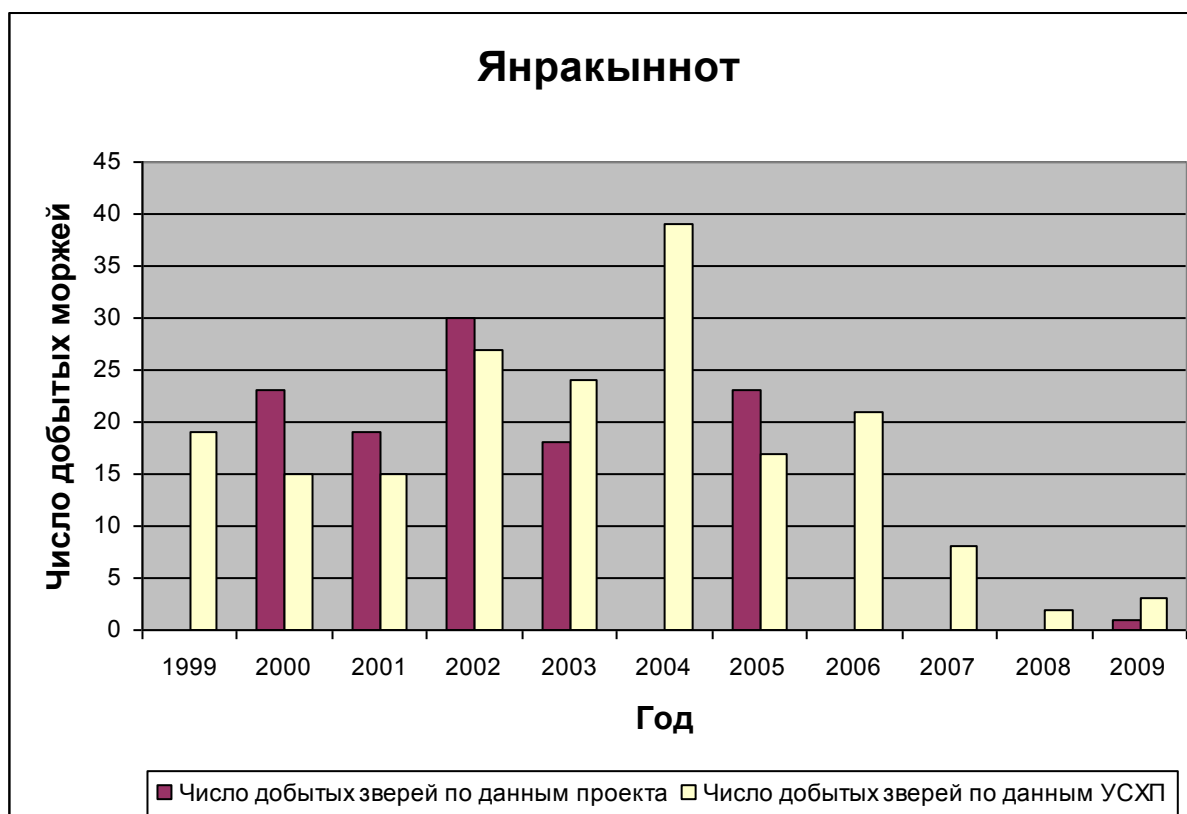


Fig. 10. YANRAKYNNOT: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

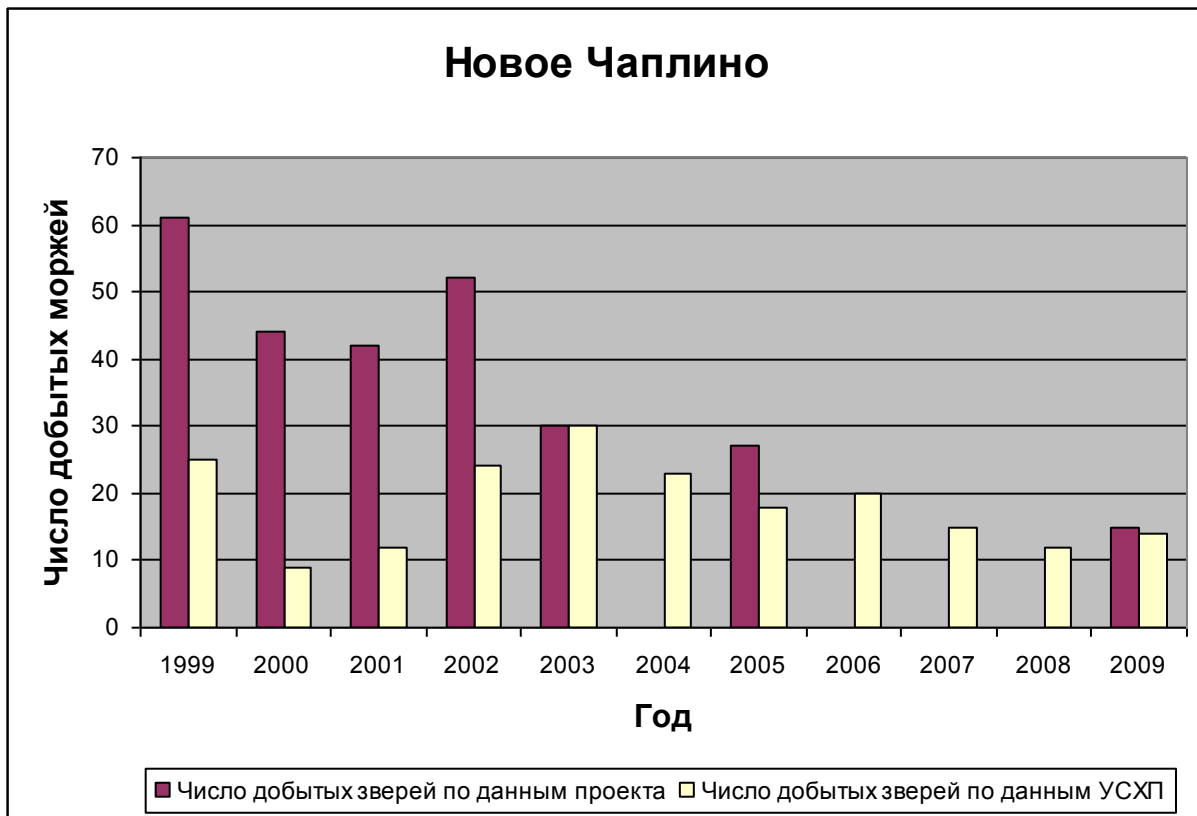


Fig. 11. NEW CHAPLINO: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

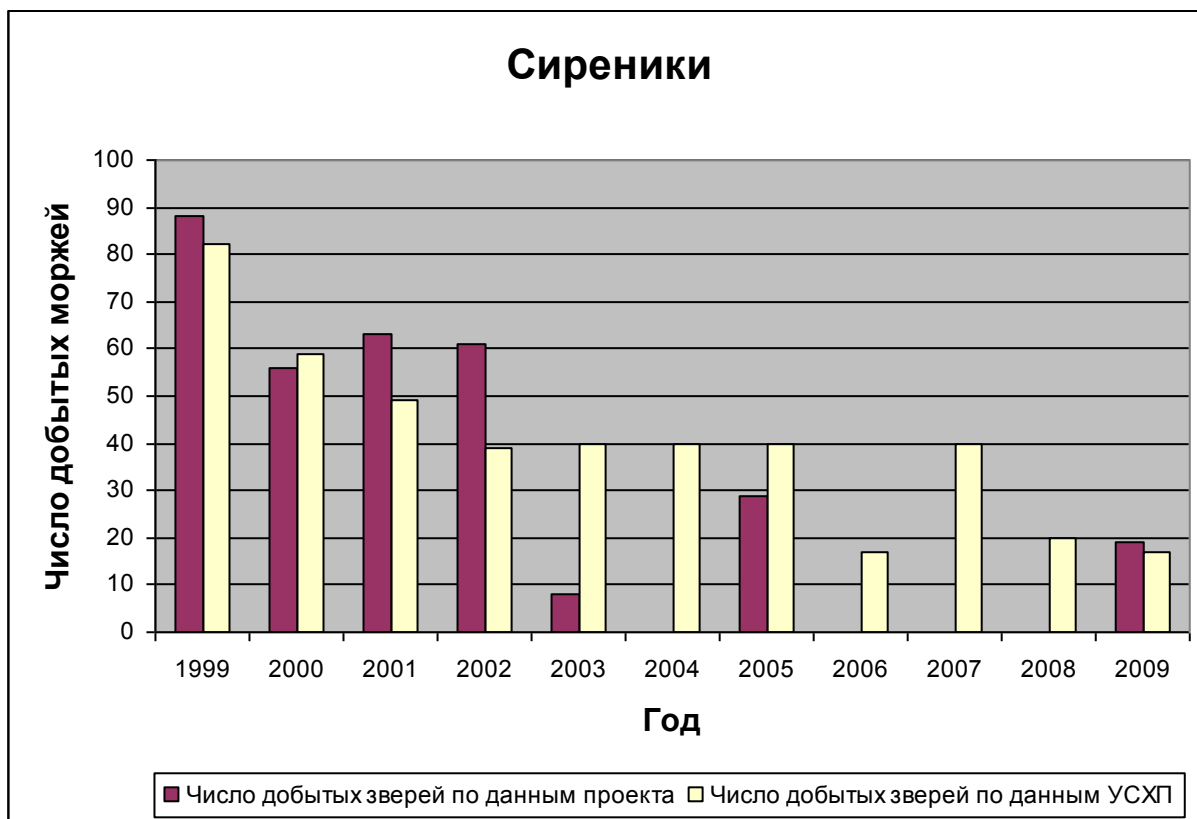


Fig. 12. SIRENIKI: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

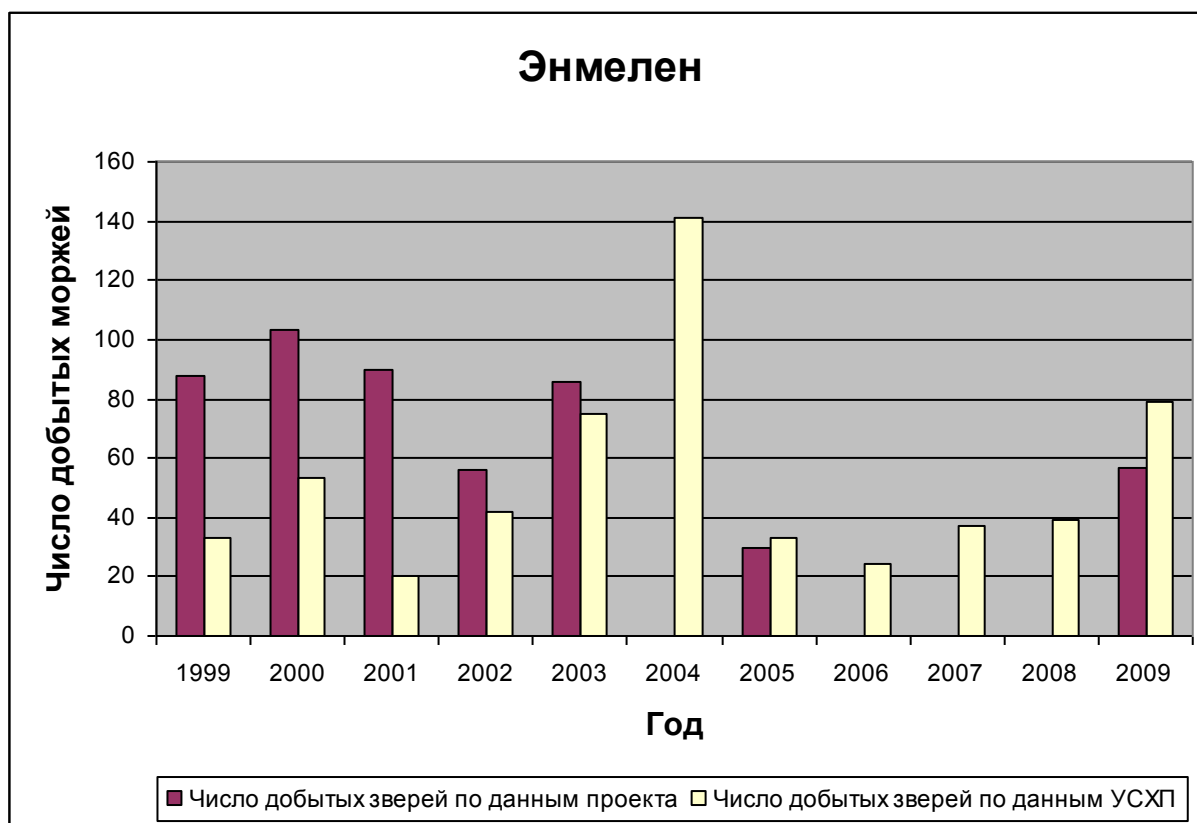


Fig. 13. ENMELEN: (1) Animals taken according to the local monitoring data; (2) Animals taken according to the DAP records. Vertical axis – annual catch; horizontal axis – years.

Appendix 1

Combined report card based on the walrus harvest monitoring in _____ community during (the month of) _____ of 2004.

Community	Total of harvested walrus	Males						Females						Sex unknown	Total walrus lost	Number of hunting trips
		New-born	One-year-old	Sub-adults	Adults	Unkno wn	Total	New-born	One-year-old	Sub-adults	Adults	Unkno wn	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 taken during the 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 card based on the walrus harvest monitoring in _____ District during the month of _____ 2003.

Community	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 FOR THE DISTRICT																
ADDITIONAL INFORMATION:																

District Coordinator _____
 Date _____

(Name)

Comment:
 The report cards must be sent to project supervisors by the 10th of the following month.