

## Investigations on Eastern gray whales *Eschrichtius robustus* in Mechigmsky Bay, 2007-2010

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### ABSTRACT

**Key words:** gray whale, distribution, number, harvest, sex-age and size structure, physiological state, fatness index, prey structure

In 2007-2010, significant variations in number of gray whales present in Mechigmsky Bay as well as their irregular distribution were found.

Aboriginal harvest data analysis has shown abnormal distribution of whales in different physiological state: in the western part of the bay small immature animals were feeding, in the eastern part – mature whales mostly.

Information on gray whale biology coming annually from harvest in Mechigmsky Bay can not answer all questions about population parameters such as abundance and distribution. However, the absence of skinny whales and the nutritional state of examined animals evidence stable feeding conditions for gray whales along the Chukotka Peninsula in the recent years.

### Результаты исследования серого кита (*Eschrichtius robustus*) восточной популяции у берегов Чукотского полуострова в 2007-2010 гг.

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### РЕФЕРАТ

СЕРЫЙ КИТ, РАСПРЕДЕЛЕНИЕ, ЧИСЛЕННОСТЬ, ВСТРЕЧАЕМОСТЬ, ПРОМЫСЕЛ, ПОЛОВОЗРАСТНОЙ И РАЗМЕРНЫЙ СОСТАВ, ФИЗИОЛОГИЧЕСКОЕ СОСТОЯНИЕ, ПИТАНИЕ, УПИТАННОСТЬ

Проведенные в 2007-2010 гг. исследования подтвердили неравномерность распределения серых китов и существенного колебания их числа в Мечигменском заливе.

Анализ промысловых данных также показал отсутствие равномерности в размещении китов разного физиологического состояния по акватории залива: в западной части кормятся преимущественно молодые животные, в восточной части – половозрелые киты.

Собираемая ежегодно информация по биологической характеристике китов, добываемых в Мечигменском заливе, не позволяет делать какие-либо выводы по состоянию численности и другим параметрам популяции серого кита. Однако отсутствие худых особей и характер упитанности добытых и осмотренных нами животных может свидетельствовать о стабильных условиях нагула серого кита у берегов Чукотского полуострова на протяжении последних лет.

Since 1969, gray whales off Chukotka Peninsula were harvested by the whaling vessel “Zviozdnyy”. Annually the biggest number of animals was landed for Lorino village at Mechigmsky Bay coast (Blokhin, 1999a). Considering this, we chose Lorino as the main point to collect harvest monitoring data. After the moratorium of commercial whaling and switching over to aboriginal whaling in 1994 (Blokhin, 1999a, 2001), the areas where whales were harvested and monitored significantly converged. The water area of constant presence of gray whales off Chukotka Peninsula is Mechigmsky Bay, where they appear in June after ice melting and stay up to ice consolidation in November. Our researches conducted from 1984 have

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shown that the gray whales number in the coastal waters of the bay varies significantly not only throughout a season, but also between years (Blokhin, 1986; 1996). Despite of whaling area contraction it is still actual and important to continue the gray whale harvest monitoring. Its result along with coastal counts data can help to see in time the rapid changes in the number and structure of population of gray whales feeding off Chukotka peninsula. In 2007-2010, we continued gray whale investigations in the area, where unfortunately, only small part of the bay close to Lorino village was covered by coastal observations.

The main goal of our investigation was to collect data on number and distribution of whales in the Mechigmsky Bay, as well as a sex-age, a size structure and a physiological state of animals summering there. It was also important to determine body conditions of gray whales foraging in the bay and to collect a data on unknown biological aspects. Results of this study can help to determine possible changes in structure and numbers of gray whales that summers off Chukotka Peninsula.

## MATERIAL AND METHODIC

Visual surveys on Gray whales were conducted in Mechigmsky Bay coastal waters from July to October (Fig. 1). We observed the animals from the coast that was 25 meters (82 ft) high above the sea. From that view point in normal weather conditions, a whale blow could be seen at the distance up to 10 km (5.4 nautical miles). Thus, only small part of Mechigmsky Bay coastal waters within a radius about 10 km (5.4 miles) was observed. The research area was divided into 5 sectors (Fig. 2). The sea was scanned in the morning and only when the weather was perfect: waves up to 1-2 balls and full visibility. Observations were made with Steiner Skipper 7x50 binoculars with HD stabilized compass and lasted for 40-50 minutes.

Examination of harvested Gray whales was conducted in Lorino village (Chukotsky District of Chukotka Autonomous Okrug, Russia; Fig. 1). The majority of landed whales were hunted in 3 separate areas of the bay: eastern (E), central (C) and western (W) (Fig. 1). All whales were investigated when cut in vicinity of Lorino village.

We collected the following data from each animal:

1. Sex;
2. Zoological length (from the snout to fluke crotch by projection);
3. Weight and size of ovaries and testes;
4. Physiological state [whale was regarded as mature in males with a body length  $\geq 11.1$  m (36.4 ft) and females  $\geq 11.5$  m (37.7 ft)];
5. Stomach fullness (full, half-full, with few food remains, empty);
6. Blubber thickness (at the level of the fin end) and a general body condition;
7. Chin patches' number;
8. Presence and size of a "Sebaceous gland";
9. Morphometry measurements "Snout-eye" and "Fin girth and length";
10. Presence of unusual odor and taste of blubber and meat.

In 4-years period we investigated 137 landed Gray whales (table 1).

Data on whaling in other villages of Chukotka in 2007-2010 was kindly given by Chukotka Department of Agriculture&Fisheries and Chukotka Department of Natural Resources.

One of important parameters to characterize the feeding conditions on the Gray whale foraging grounds is fatness index, i.e. blubber thickness related to whale length. Gray whale yearlings are known to have the highest fatness index (Blokhin, 1999b) if compare to the whales of other ages and body conditions (except pregnant females). Sufficient variations in the body length of young animals cause difficulties in telling yearling from the others on the basis of their size only. We have suggested the way to make distinguishing more reliable. We regarded as yearlings the whales less than 9 meters (29.5 ft) long and without light oval/round skin spots after ectoparasites. We also took into account the fatness index, which often exceeds 1% for yearlings (Blokhin, 1999b).

## RESULTS AND DISCUSSION

### Gray whale numbers and distribution

#### *Coastal counts*

In Mechigmsky Bay coastal waters in ice free period Gray whales were constantly present in 2007-2010. However their number varied throughout the years (Table 2), the maximum (18.9 whales per count) was in 2009 and the minimum was in 2008 (6.6). Number of Gray whales varied in different months. Thus, the average number of whales per count was almost equal in July and September, 2008 (8 and 7, respectively); while in August it decreased to 4.2 animals (Table 2). In 2007, the minimum of Gray whales was observed in September (Table 2). Although small number of whales in the bay, the sightings' number changed significantly during several days. For instance, on 27<sup>th</sup> of July, 2007 we recorded 15 animals, on 30<sup>th</sup> – 3, and on 17<sup>th</sup> and 18<sup>th</sup> of August – 18 and 1 whale correspondingly.

Gray whale distribution in Mechigmsky Bay coastal waters was also uneven and varied in different months, i.e. the majority of whales stayed in 4<sup>th</sup> and 5<sup>th</sup> sectors in July, 2008 (70.8%) and in 3<sup>rd</sup> sector in October, 2008 (71.4-86.7%).

Analyzing the general pattern of Gray whale distribution in Mechigmsky Bay, we can conclude that in 2007-2008 animals were more regularly observed in 2<sup>nd</sup> and 3<sup>rd</sup> sectors, in 2010 – they spent more time in 4<sup>th</sup> and 5<sup>th</sup> sectors (Table 2). Besides in 2007-2008 the majority of them stayed further than 5 km offshore, in 2009-2010 we found 33.5-52.0% of whales less than 5 km close to shore.

Gray whales in the bay followed the same general pattern of behavior. They did not make long distance travels staying in one site, were feeding and diving periodically showing flukes.

Thus, our coastal surveys in 2007-2010 proved significant variations in Gray whale numbers and their irregular distribution in Mechigmsky Bay coastal waters (Blokhin, 1984, 1996). The behavior of Gray whales in 2007-2010 was typical for feeding animals and similar to that, observed in the previous seasons. To all appearances, this water area is an important foraging ground for Gray whales.

#### **Investigation of landed whales**

##### *Gray whale harvest in 2007-2010*

In 2007-2010 the Chukotka Department of Agriculture&Fisheries distributed the Federal permit among 20 coastal Native villages of Chukotka to kill 135 Gray whales every year (Fig. 3). Due to objective reasons some of villages did not develop their quota (Table 3). In the 4-year period 496 Gray whales were harvested, the highest portion of 44.4% (220 whales) was landed in Lorino village. At the second place (12.9% - 64) is Inchoun village (fig. 3, Table 3).

##### *Morphophysiological characteristics*

The sex ratio of harvested Gray whales was almost equal (Table 1). The harvest was based on immature animals, third part of which was yearlings, but none of them were followed by females and there was no milk in yearlings' stomachs also. An average length of females was 9.7 meters (32 ft), males – 9.4 meters (31 ft).

However morphophysiological features of gray whales taken in Mechigmsky Bay varied in years. For example, in 2007 females dominated (61.5%); the majority of them (87.5 %) were immature and about half of them were yearlings (Table 1). In 2008 immature females made up 42.9 % from the total of caught whales and therefore there was the highest average length of females (11 meters - 36 ft). The percentage of yearlings varied from lowest 14.3% in 2008 and the highest 41.1% in 2007 (Table 1). Subadult males' portion significantly decreased from 53.3% in 2008 to 5.6% in 2010.

Gray whales bigger than 12.1 m were more often (27.5%) harvested in 2008 (Table 1).

In 2007, 2009 and 2010 gray whales were hunted mainly in the western part of the bay, while in 2008 they were harvested throughout the whole area (Fig. 4, I). The smallest whales were caught in the western part (Fig. 4, III) and therefore there was the highest percentage of subadults and yearlings among them (Fig. 4, IV-V).

Thus the harvest monitoring data (Fig. 4, IV-V) confirmed the uneven distribution of different-sized whales in Mechigmsky Bay. Domination of immature animals in the western part of the bay is determined, first of all, by its shallow waters. The first months and years of their life the benthophages gray whales may favor areas with small depths and better feeding conditions.

Among 11 examined mature females 4 were pregnant; the sex and size of their embryos were as follows: 2007 - female 150 cm (16<sup>th</sup> of August), male 190 cm (5<sup>th</sup> of September); 2008 - female 234 cm (4<sup>th</sup> of September) and female 270 cm (16<sup>th</sup> of September).

#### *Stomach fullness and fatness index*

The stomach fullness was increasing constantly from 2007 to 2010, and the majority of gray whales stomachs were full and half-full (Fig. 6), which can evidence the good feeding conditions for whales in Mechigmsky Bay.

As subadults made the majority of whales in the harvests we discuss the fatness index data of only this age category. Yearlings are known to have the highest fatness index in summer in comparison with the other age groups (Blokhin, 1999a) and this was confirmed by 2007-2010 monitoring data (Fig. 6). The fatness of yearlings and subadult whales varied between years; however, those variations did not show any directed trend in the last 10-15 years (Fig. 7). This can also evidence relatively stable feeding conditions for the discussed age group of gray whales in the Chukotka Peninsula coastal waters.

#### *“Stinky” gray whales*

Recently, the problem of “stinky” gray whales taken in Chukotka Peninsula waters has been discussed actively, because their blubber and meat have specific medicine scent and taste and eating them causes poisoning. “Stinky” gray whales were documented in previous years, however not much attention was paid to this phenomenon. Since 2004, data on “stinky” gray whales from harvests were collected annually.

It is also worth mentioning that the highest number of “stinky” Gray whales harvested in Mechigmsky Bay was in 2008 (Table 5).

Data on different organic compounds in “stinky” Gray whales, as well as suggestions concerning the reasons of unusual smell were published in 2 papers in 2007 and presented to SC IWC (Ilyashenko, 2007; Rowles, Ilyashenko, 2007). This problem has not been completely resolved. Analysis of available data in 2004-2010 cannot correlate between the presence of unusual scent/taste on the one side and the sex, size of whale and the time of whaling on the other (Table 5).

### **CONCLUSION**

Investigations conducted in 2007-2010 confirmed that the Mechigmsky Bay is a very important feeding area for gray whales in the Russian Far East waters. Harvest monitoring data has shown that immature gray whales (7.5-9.5 meters long) forage predominantly in the western part and mature – in the eastern part of Mechigmsky Bay.

Annually collected data on biology of gray whales harvested in Mechigmsky Bay are not sufficient to assess numbers and some other parameters of the Eastern stock. However, the fatness index evidences stable feeding conditions for whales in Chukotka Peninsula sea waters in recent years. Study of gray whales in Mechigmsky Bay fills in the gaps in our knowledge about their biology and provides data that can support scientifically based decisions on whale resources conservation. However, it is very important to note that the modern aboriginal gray whale harvest, though based on subadult animals, does not negatively affect the modern state of the Eastern gray whale stock in Russian waters.

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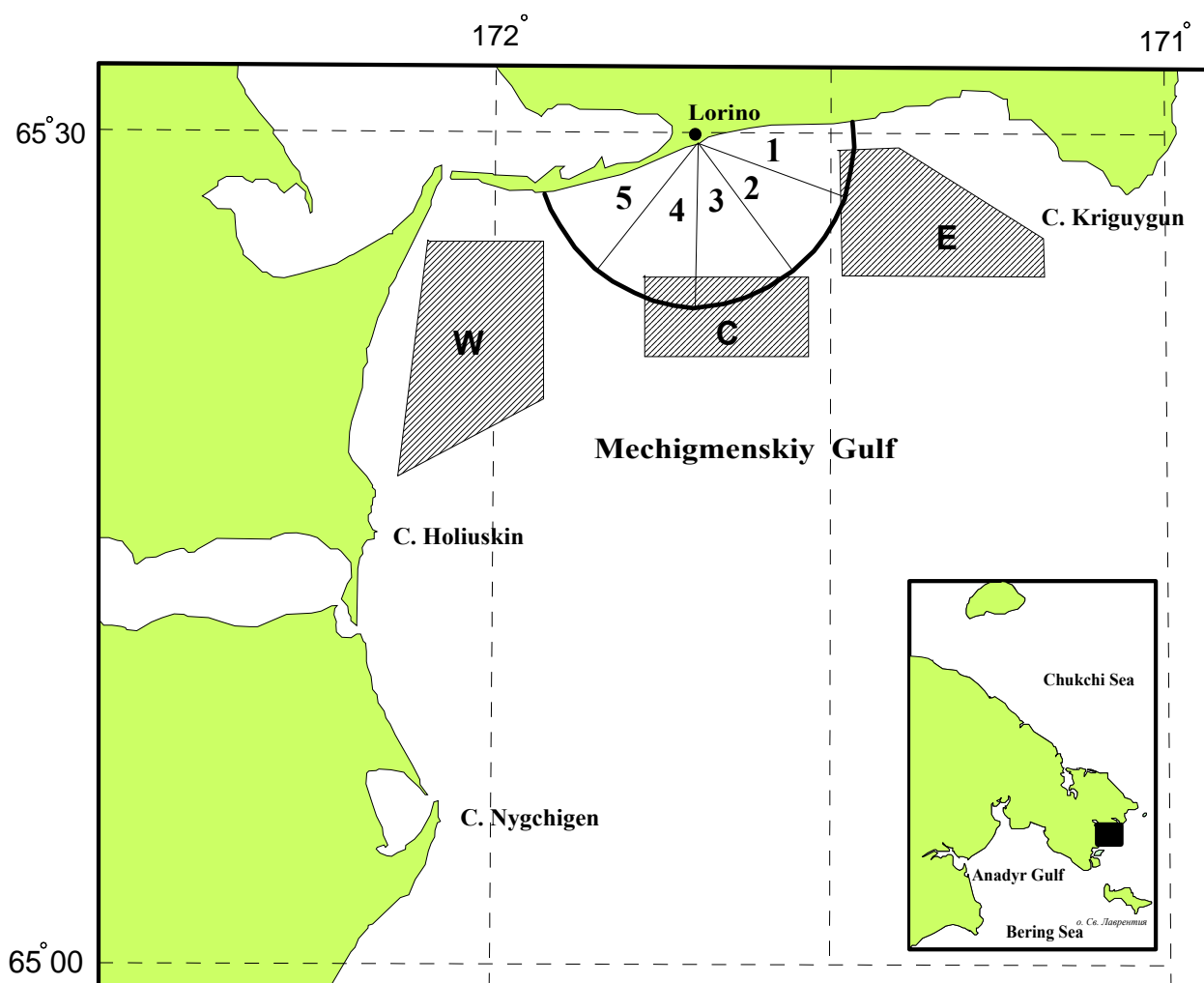


Fig. 1 - Main regions of Gray whale harvest in Mechigmenskiy Bay and observation water area covered from the coastal observation point in Lorino, 2007-2010: **1-5** – sectors of counts; **E** – eastern; **C** – central and **W** – western regions of harvest

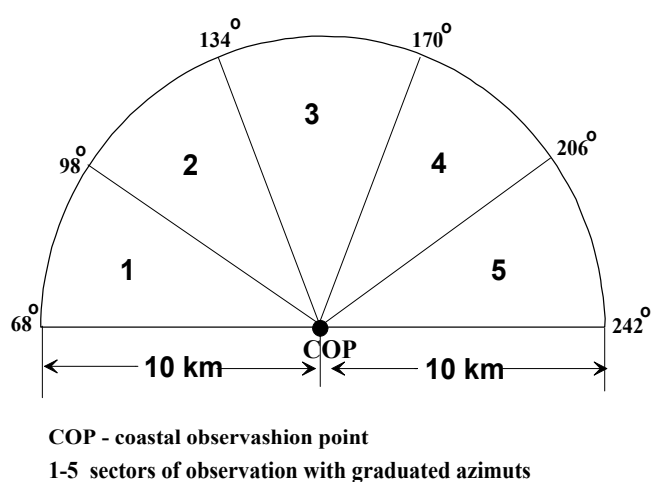


Fig. 2 – Scheme of observation sectors for gray whales in Mechigmenskiy Bay, 2007-2010



Fig. 3 – Location of coastal native whaling villages of Chukotka having quota for gray whale harvest in 2007-2010

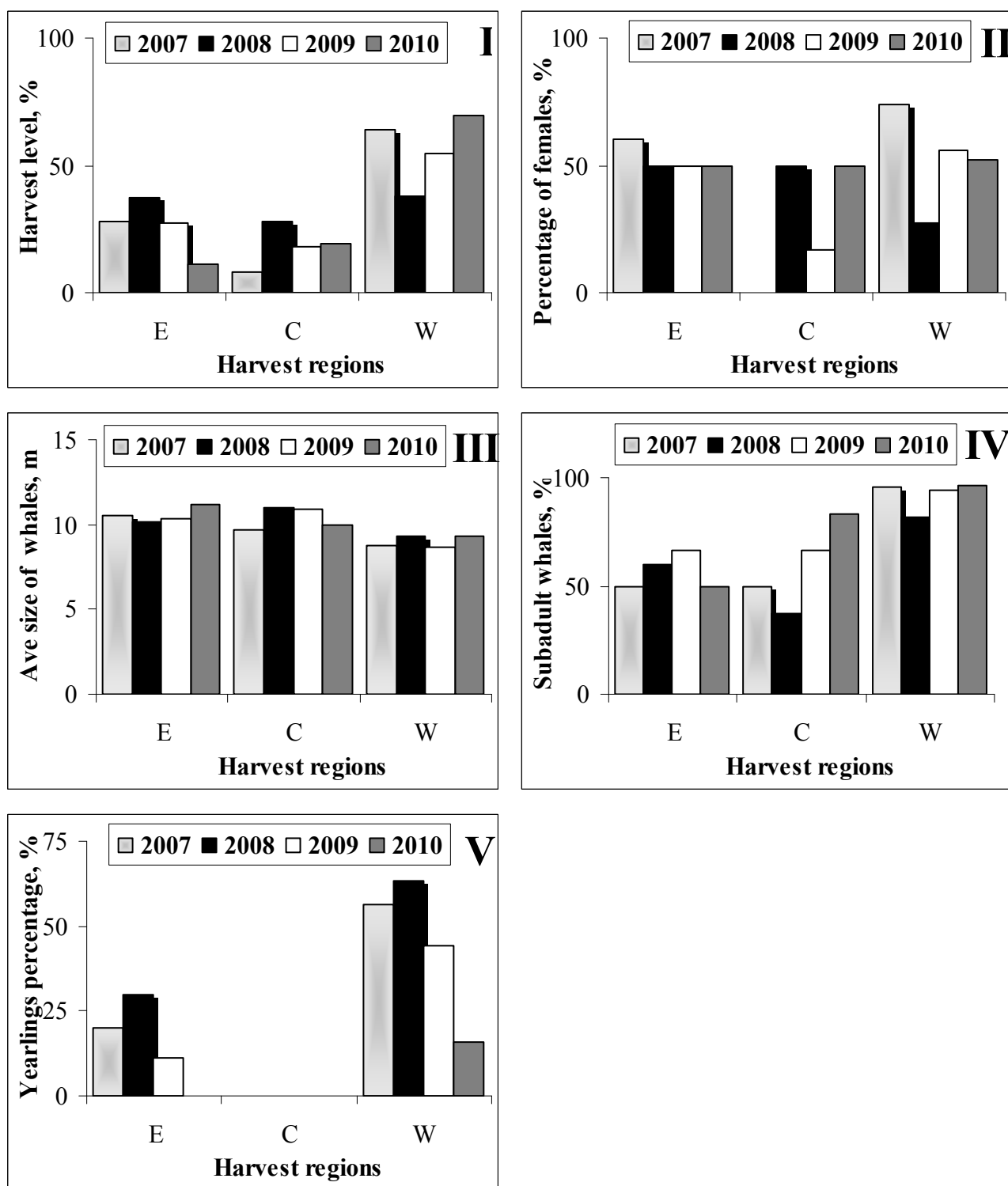


Fig. 4 – Parameters of gray whale harvest in different regions of Mechigmsky Bay (Fig. 1) in 2007 (n=39) и 2008 (n=29):

I – harvest level; II – percentage of females; III – average size of harvested whales; IV – percentage of subadult whales; V – percentage of yearlings

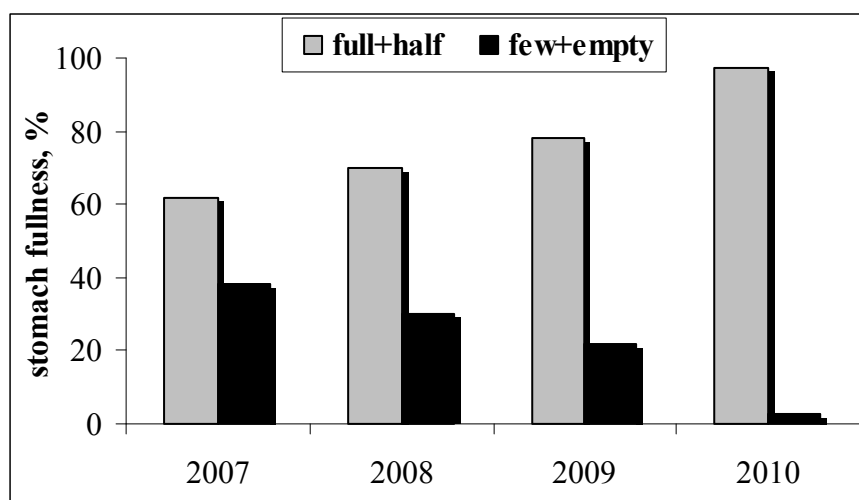


Fig. 5 – Gray whales stomach fullness in Mechigmentsky Bay, 2007-2010

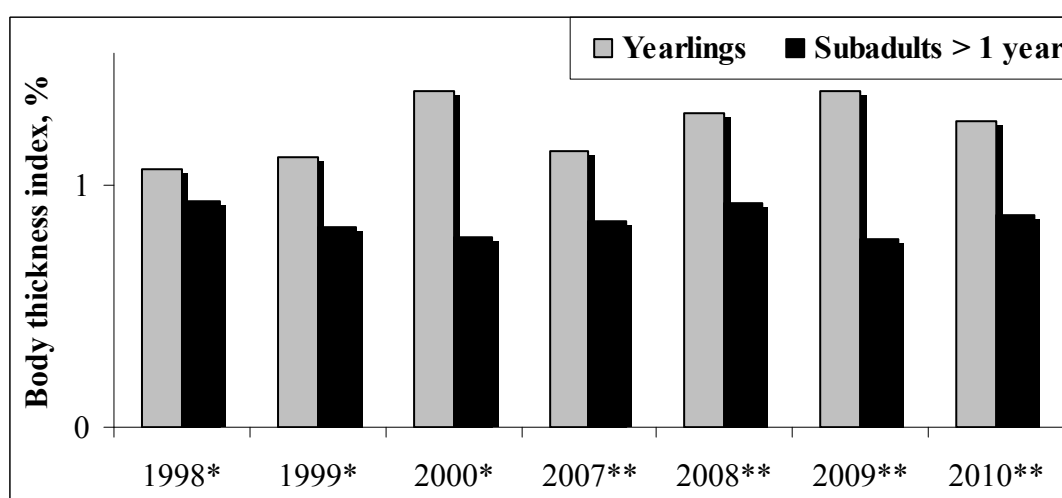


Fig. 6 – Gray whales body thickness index in Mechigmentsky Bay, 1998-2000 and 2007-2010 (\* - August, \*\* - July-September)

Table 1 - Sex, size and physiological conditions of gray whales, landed in Mechigmentsky Bay 2007-2010

	2007	2008	2009	2010	2007-2010
Landed whales	126	127	115	118	<b>496</b>
Observed whales	39	29	33	36	<b>137</b>
<b>Females</b>					
% in harvest	61.5	48.3	42.4	50	<b>51.1</b>
% subadults	87.5	42.9	92.8	94.4	<b>81.4</b>
% yearlings	41.7	14.3	28.6	16.7	<b>27.1</b>
% pregnant*	67.0	25.0	0	100	<b>38.5</b>
% barren*	33.0	75.0	100	-	<b>61.5</b>
Ave length, meters	9.3	11.0	9.1	9.5	<b>9.7</b>
<b>Males</b>					
% in harvest	38.5	51.7	57.6	50	<b>48.9</b>
% subadults	60.0	80.0	68.4	72.2	<b>70.1</b>
% yearlings	33.3	53.3	26.3	5.6	<b>28.4</b>
Ave length, meters	9.8	9.3	8.7	9.8	<b>9.4</b>

Note: \*- from adults



Table 2 - Frequency of gray whale sightings (%) in different sectors of Mechigmsky Bay in July-September, 2007-2010

Year	Number of observation days	Number of counted whales	Sightings of whales in different sectors (fig. 1)					Ave number of whales per year
			1	2	3	4	5	
2007	23	158	5.7	46.2	33.5	10.8	3.8	6.9
2008	32	211	2.3	18.5	55.5	9.0	9.0	6.6
2009	17	322	10.6	35.7	17.1	29.8	6.8	18.9
2010	14	161	8.7	23.0	12.4	32.9	23.0	11.2

Table 3 – The number of harvested gray whales by Chukotka Native villages in 2007-2010

Native villages (fig. 3)	# of harvested gray whales			
	2007	2008	2009	2010
Billings	0	0	0	0
Ryrkajpij	0	1	0	0
Vankarem	3	2	2	0
Nutepel'men	1	1	3	0
Neshkan	0	0	4	5
Enurmino	4	4	3	4
Inchoun	15	16	19	14
Uelen	6	12	8	9
Lavrentia	16	10	6	9
Lorino	57	61	50	52
Yanrakinnot	4	4	4	4
New-Chaplino	5	4	6	7
Syreniki	6	4	4	4
Nunligran	3	2	0	3
Enmelen	2	4	2	5
Konergino	0	0	0	0
Egvekinot	2	0	0	0
Uel'kal	2	1	3	1
Mejnypil'gyno	0	0	0	1
Khatyrka	0	1	1	0
<b>TOTAL</b>	<b>126</b>	<b>127</b>	<b>115</b>	<b>118</b>

Table 4 - Size structure of gray whales, landed in Mechigmsky Bay, 2007-2010, %

Size groups, meters	2007 n=39	2008 n=29	2009 n=33	2010 n=36
7.6-8.0	12.8	10.3	6.1	5.6
8.1-8.5	28.2	24.1	24.2	13.9
8.6-9.0	17.9	13.8	18.2	22.2
9.1-9.5	10.3	3.4	15.2	8.3
9.6-10.0	2.6	6.9	12.1	22.2
10.1-10.5	5.1	0	3	2.8
10.6-11.0	0	0	0	5.6
11.1-11.5	2.6	3.4	3	8.3
11.6-12.0	7.7	6.9	9.1	2.8
12.1-12.5	7.7	17.2	3	5.6
12.6-13.0	2.6	10.3	6.1	2.8
13.1-13.5	2.6	3.4	0	0

Table 5 - Statistics of “Stinky whale” sightings in the gray whale harvest in Lorino village, 2004-2010

Year	Date	Sex	Length, m	Year	Date	Sex	Length, m
2004*	18.06	♂	12.2	2007***	15.08	♀	10.4
	20.07	♂	10.5		16.08	♀	13.0
	20.07	♂	11.6	2008***	31.07	♂	8.1
	27.08	♀	11.8		6.08	♂	8.05
	4.09	♀	10.8		7.08	♂	8.9
	10.09	♀	13.5		12.08	♀	12.4
2005**	15.08	♀	9.0		29.08	♀	12
	19.08	♀	11.1		3.09	♀	9.7
	19.10	♀	11.0		3.09	♂	11.05
	29.10	♀	13.1		4.09	♀	12.3
2006**	9.07	♀	8.1	2009 *** (n=33)	31.05	♂	8.3
	9.07	♂	9.1		21.07	♂	8.2
	11.07	♀	12.9	2010*** (n=36)	No data		
	24.11	♂	10.0				

Note: \* - data T. Rowles, V. Ilyashenko, 2007; \*\* - Alexei Otttoy's verbal note; \*\*\* - our data

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