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CETACEAN STRANDINGS ON THE COAST OF THE KALAMITA GULF (BLACK SEA)

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We report the results of a program of monitoring of cetacean strandings which has been conducted on the south-western coast of Crimea: data were collected from the 12 km long coastline of the Kalamita Gulf (Black Sea) between Novofyodorovka and Nikolaevka in 2008–2013. In total, 186 stranded cetaceans (134 harbour porpoises, 39 bottlenose dolphins and 13 common dolphins) were recorded. The coast of Kalamita Gulf is characterized by the unusually high rate of cetacean strandings (at least, 3 strandings per km per year). Harbour porpoises mainly stranded in June and July (the median date for neonate strandings was June 28), while bottlenose dolphins uniformly occurred during the warm season with a slight peak in April. The greatest number of porpoise strandings fell on 2012, and bottlenose dolphins on 2013. In the age structure of both species, neonates and calves (age class 0) and yearlings dominated which is an indirect evidence for population growth. A specific feature of the sample was the presence of animals with the marks of ship collisions.

Keywords: cetaceans, harbour porpoise, bottlenose dolphin, common dolphin, mortality, seasonal occurrence.

INTRODUCTION

Analysis of cetacean strandings is an important source of information on cetacean distribution, seasonal occurrence, morphology, life history and even some population parameters [1]. An accurate record of strandings in certain coastal areas (ideally covering a substantial portion of the coastline) is the necessary precondition for further biological and biogeographical studies. In the Black Sea region, the most detailed recent data specified by a regional aspect have been already published for the southern Sea of Azov [2], Black Sea coast of Taman Peninsula [3], some areas of the Crimean south-eastern coast [4, 5] and Turkish western Black Sea coast [6, 7]; and some general data for the northern Black Sea [8, 9]. Some estimates has been provided using questionnaire surveys [10].

Here we report the results of a program of monitoring of cetacean strandings which has been conducted on the south-western coast of Crimea.

MATERIALS AND METHODS

Data were collected from regular field excursions along the 12 km long coastline of the Kalamita Gulf (Black Sea) on the south-western coast of Crimea between

Novofyodorovka and Nikolaevka in 2009–2013; some data were also obtained in 2008 (Fig. 1).

The following items were recorded for each of the findings, if available (see also [11]): date, location (geographical coordinates), physical conditions of the coast and weather, stage of preservation of a carcass, post mortem findings, by-catch and ship collision marks, species, sex, state of sexual maturity, pregnancy and/or lactation, body length and other body measurements, age or age category (neonates, calves born during the current year, yearlings, adult = sexually mature animals).

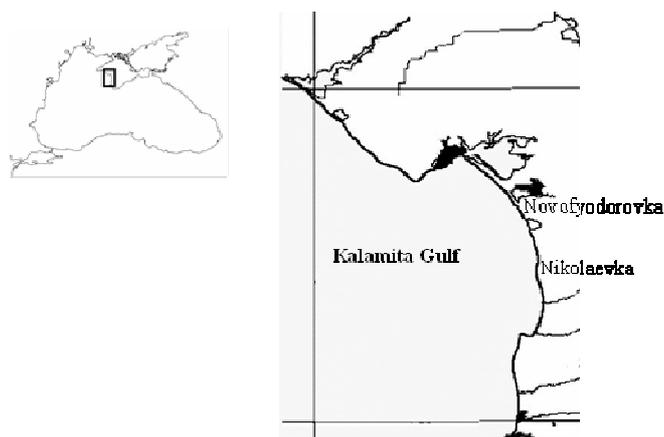


Figure 1. The region of study.

RESULTS AND DISCUSSION

General remarks

In total, 186 stranded cetaceans were recorded (180 specimens during 2009–2013). Thus, an average stranding rate was as high as 3 strandings per km per year. This is the highest rate ever recorded on the Black Sea coast in a mid-term run (excluding mass stranding events). For example, it generally varied within 0.5 to 1.5 strandings per km per year in various areas of the northern coast of the Black Sea and the Sea of Azov [2–4] and reached 2.3 strandings per km per year on the Turkish coast of the south-western Black Sea [7]. The actual stranding rate is suggested to be even higher, given that a large part of the monitoring area is the beach of the accumulative origin with a very high decomposition rate: 50% of carcasses of harbour porpoises are completely decomposed, buried or removed within 16 days [11]. Thus, we confirm the prediction made by Gol'din and Gol'din [10] who hypothesized high importance of the Kalamita Gulf coast for cetacean monitoring, based on results of questionnaire survey.

The most part of findings tends to the accumulative bars of coastal lakes Kyzyl-Yar and Bogaily. It can be partly explained by the robustness of these coasts to the wave activity and by general accumulative processes.

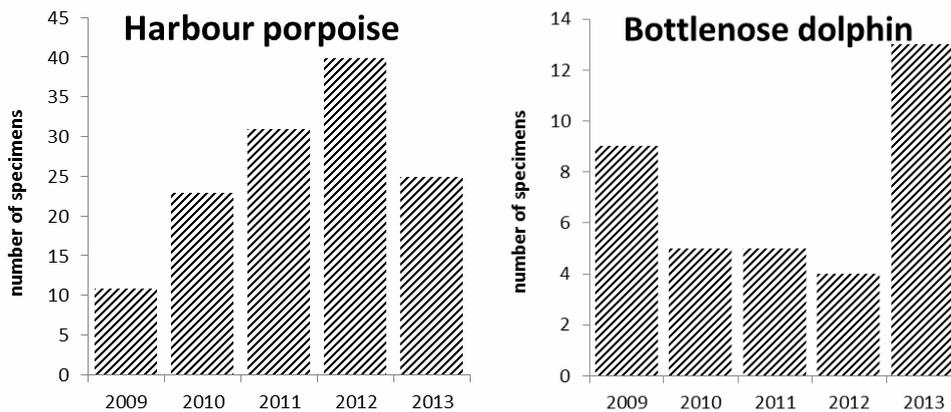


Fig. 2. Annual dynamics of strandings of harbour porpoises and bottlenose dolphins.

Harbour porpoise *Phocoena phocoena*

134 strandings (71.5% of all strandings) were recorded by us. The greatest number of strandings (40) was recorded in 2012, and the smallest number (11) was in 2009 (Fig. 2). The high prevalence of strandings in 2012 followed the general tendency of mass mortality in the northern Black Sea [12]: 32 dead porpoises (among them, 9 neonates) were found on June 11, 2012. Thus, the stranding rate was 2.17 specimens per km per year (1.87 without year 2012). The strandings were recorded all year round; however, 72% of porpoise strandings fell on two months, June (48) and July (49) (Fig. 3). This seasonality coincided with the occurrence of stranded neonates: 29 of 31 neonates (94%) were found in June and July, with the median date of June 28 (Fig. 4). A single pregnant female was recorded on June 7, 2009.

Sex ratio of stranded porpoises was close to 1:1 (53:47%). In age structure, neonates contained the largest portion (30 specimens, 23%), and combined neonates and calves (age class of 0 years) took 28% of the sample. Ratio of the age classes of 1 and 0 years was 0.315, a very low index. Body size categories generally met the values known for the Black Sea [13]; however, neonates were particularly small (49–80 cm, 64 cm on average) (Table 1).

By-catch marks were found on 10 animals; however, the most of carcasses were significantly decomposed, so many of them could also be by-caught. A single live stranding was recorded on July 25, 2009, in Nikolaevka: the wounded animal was later washed off to the sea.

The most unusual pattern of porpoise strandings was its seasonal shift: all previous records concerning western or south-western Crimea [8, 9, 13] reported the peak of strandings in May and June, the peak of births in the late May to early June and the peak of by-catch in turbot gillnets in May and June, the month earlier than in our observations. However, Birkun et al. [14] reported the peak of by-catches in turbot gillnets in June which meets to our data: it is even closer, if someone considers the time lag between the death and carcass stranding and the advance decomposition stage of many carcasses. Interestingly, the peak of mortality in turbot gillnets is not directly associated with the fishing effort (April-June), but it meets the peak of neonate strandings, which, in its turn, was later than 10–15 years ago and was similar to that in the Sea of Azov and Turkish

Black Sea western coast [7, 13]. We did not record the peak of by-catches in dogfish gillnets in August [14] due to dogfish catch restrictions after 2010.

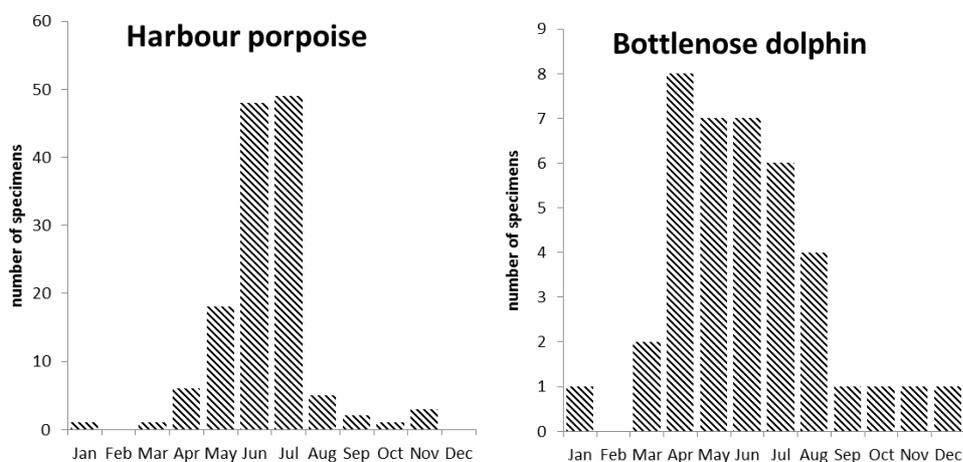


Fig. 3. Seasonal distribution of strandings of harbour porpoises and bottlenose dolphins.

Table 1
Body size of harbour porpoises stranded on the coast of the Kalamita Gulf.

Age class	n	Mean length, cm	±SD, cm
Neonates	21	64	9.5
Adult females	7	134.5	3.0
Adult males	6	125.5	3.5

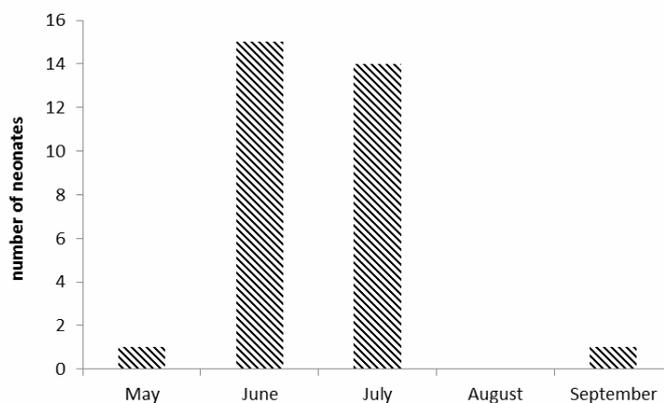


Fig. 4. Seasonality of neonate strandings of harbour porpoises on the coast of the Kalamita Gulf.

Bottlenose dolphin *Tursiops truncatus*

In total, 39 stranded animals were found (21% of all strandings). The greatest number of strandings (13) was recorded in 2013: the unusually high mortality of bottlenose dolphins in 2013 was observed along the entire Crimean coast [12]. Another peak of strandings fell on 2009, the year of high mortality of the Black Sea cetaceans [6, 12] (Fig. 2). The findings were recorded all year round, and the most of them fell on the warm season (April to August) with a clear spring aspect in April (Fig. 3). This seasonality confirms the hypothesis by Gladilina et al. [15] on the Kalamita Gulf as a wintering area for bottlenose dolphins.

Sex ratio was female-biased (64%); however, the differences in sex distributions were not statistically significant. Neonates contained 22% of the strandings, and the age class 0 took 28%. One year old animals contained 13.5%. In total, almost half of the sample was presented the youngest age classes: which is an unusually high percentage. The oldest animal was 35 years old. In a few cases, an adult female was found near a neonate or a calf. A single pregnant female was recorded on May 21, 2012.

Four dolphins had marks, which could be interpreted as by-catch signs [16]. In addition, a dolphin with the marks of ship collision was found by E. Kushnir and K. Vishnyakova [17] in December 2008 in Nikolaevka.

Common dolphin *Delphinus delphis*

13 specimens were found during the study, 8 of them in 2011–2012. The findings came from all months, except winter (however, winter records of stranded animals were made by E. Gladilina on the neighbouring coast near Kacha). The most of animals were adult males. In general, no neonates or yearlings were found, and adults contained 70% of findings: their body length varied within 149–195 cm. No mass mortality events were recorded. No by-caught animals were found; however, two animals with the marks of ship collision were recorded, one in March 2011 by E. Kushnir and K. Vishnyakova, and another one in May 2012.

The ratio of numbers of recorded strandings of harbour porpoises, bottlenose dolphins and common dolphins is 10 : 3 : 1. This ratio is close to the data reported by Gol'din and Gol'din [10]: now harbour porpoises contain even a somewhat greater portion of strandings. The portion of harbour porpoises is substantially greater than reported by other studies in the northern Black Sea [5, 8, 9] and close to the data from the Turkish coast [7]. It can be explained by the better recovery rate of porpoise remains in our study and the study by Tonay et al. [7].

CONCLUSIONS

The coast of Kalamita Gulf is characterized by the unusually high rate of cetacean strandings (at least, 3 strandings per km per year, but possibly even twice higher). Harbour porpoises (71.5%), bottlenose dolphins (21%) and common dolphins (7.5%) were recorded during the period of observations. Harbour porpoises mainly stranded in June and July, while bottlenose dolphins uniformly occurred during the warm season with a slight peak in April. The greatest number of porpoise strandings fell on 2012, and

bottlenose dolphins on 2013. In the age structure of both species, neonates and calves (age class 0) and yearlings dominated which is an indirect evidence for population growth.

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Приведены результаты программы мониторинга выбросов китообразных на юго-западном побережье Крыма: данные были собраны с 12-километровой полосы берега Каламитского залива (Черное море) между Новофедоровкой и Николаевкой в 2008–2013 годах. Всего было выявлено 186 выброшенных китообразных (134 морских свинок, 39 афалин и 13 обыкновенных дельфинов). Побережье Каламитского залива характеризуется необычайно высокой частотой выбросов (не менее 3 выбросов на км в год). Выбросы морских свинок преимущественно происходят в июне и июле (средняя дата (медиана) выбросов новорожденных – 28 июня), в то время как выбросы афалин равномерно распределяются в течение теплого сезона со слабым пиком в апреле. Наибольшее число выбросов морской свинок отмечено в 2012 году, афалины – в 2013 году. В возрастной структуре обоих видов преобладают новорожденные с сеголетками (возрастной класс 0) и годовики, что служит косвенным доказательством роста популяций. Особенность исследованной выборки – наличие животных со следами столкновения с судном.

Ключевые слова: китообразные, морская свинья, афалина, обыкновенный дельфин, смертность, сезонная динамика.

Гольдин П.С. Викиди китоподібних на узбережжі Каламітської затоки (Чорне море) / П.С. Гольдин, К.Г. Кирух, К.О. Вишнякова, О.В. Гладіліна // Вчені записки Таврійського національного університету ім. В.І. Вернадського. Серія „Біологія, хімія”. – 2014. – Т. 27 (66), № 2. – С. 55-61.

Наведено результати програми моніторингу викидів китоподібних на південно-західному узбережжі Криму: дані були зібрані з 12-кілометрової смуги берега Каламітської затоки (Чорне море) між Новофедорівкою та Ніколаєвкою в 2008-2013 роках. Всього було виявлено 186 викинутих китоподібних (134 морських свині, 39 афалін і 13 звичайних дельфінів). Узбережжя Каламітської затоки характеризується надзвичайно високою частотою викидів (не менш ніж 3 викидів на км на рік). Викиди морських свинок переважно відбуваються в червні та липні (середня дата (медіана) викидів новонароджених – 28 червня), в той час як викиди афалін рівномірно розподіляються протягом теплого сезону зі слабким піком у квітні. Найбільше число викидів морської свині відзначено в 2012 році, афаліни – в 2013 році. У віковій структурі обох видів переважають новонароджені з цьогорічними (віковий клас 0) і годовики, що є непрямим доказом зростання популяцій. Особливість дослідженої вибірки – наявність тварин зі слідами зіткнення з судном.

Ключові слова: китоподібні, морська свиня, афаліна, звичайний дельфін, смертність, сезонна динаміка.

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