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filed report**

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GRAY WHALE RESEARCH OFF NORTHEASTERN SAKHALIN ISLAND AND EASTERN KAMCHATKA, RUSSIA: 2020 FIELD REPORT

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ABSTRACT

In 2020, research on western gray whales off northeastern Sakhalin Island and off the southeastern coast of Kamchatka (Kronotsky Bay) was conducted by the Russian Gray Whale Project. In Sakhalin work was conducted from 27 July to 8 September during which time 17 boat surveys were completed. A total of 122 whale groups were encountered (with repeated sightings) and 32 unique whales were identified. Eight mother-calf pairs and four new whales at the age 1+, previously not seen in the study area, were observed in the Piltun feeding area. Thus, our catalog of whales summering off Sakhalin between 1994-2020 includes 314 individuals. The distribution of whales was similar to 2019, but in the period of our work all whales were concentrated only in the area off the mouth of Piltun Lagoon. In addition, the total number of gray whales using the study area was lower than in 2019 (32 and 49 respectively). In Kronotsky Gulf of the Kamchatka Peninsula (Olga Bay), studies of gray whales were conducted on 12 July and 13 August. We encountered 21 and 18 whales (including 2 calves) respectively, of which 8 adult whales (including 2 females) were from the Sakhalin catalog and were previously observed in the Piltun feeding area. Female No. 149 (calf No. 310) was photographed in Olga Bay on 12 July and on 4 August resighted off the Piltun Lagoon area (~ 800 nautical miles in 23 days). Whale No. 260 observed in Olga Bay on 12 July was sighted off Piltun on 24 August. The remaining animals (both unknown and those from the Sakhalin Catalog) were not observed in 2020 in the Piltun area. The whale No. 135 from the Sakhalin catalog was met in Olga Bay twice in 12 July and 13 August. The same whale was observed on 9 September in the Avacha Gulf (eastern Kamchatka). This data once again confirms the importance of NE Sakhalin as the main feeding area for gray whale females with dependent calves and yearlings after weaning, as well as the stable connection between feeding (Sakhalin) and transit (Eastern Kamchatka) areas. The absence of some whales from the Sakhalin catalog which were found off the Kamchatka coast in the Piltun feeding area for several years indicates the possibility of the existence of unknown feeding areas (except for offshore feeding area opposite the Chaivo Lagoon) or simply that they were off Sakhalin but missed by our sampling efforts. Thus, the results of the 2020 research indicate an overall decrease in the number of gray whales off the Piltun feeding area and some changes in the distribution of animals off the NE coast of Sakhalin Island.

KEYWORDS: WESTERN GRAY WHALE; RUSSIA; POPULATION BIOLOGY; BEHAVIOR; CONSERVATION

INTRODUCTION

In accordance with the provisions of Russian Federation legislation in 2020, the western gray whale population was officially designated as a priority Category 1 (endangered) population in the Red Book of the Russian Federation, and is recognized as a priority category (I) according to the "Degree and Priority of Conservation Measures Adopted and Planned" (Order of the Ministry of Natural Resources of Russia No. 162 (Order of the Russian Ministry of Natural Resources and Environment No. 162 of 24.03.2020)). In Japan, South Korea, Canada, Mexico and the USA, this population has also been given high status in terms of the need to conserve gray whales in the national territorial waters of these countries.

The estimated number of gray whales (not including first year calves) that feed off Sakhalin in summer and fall according to the population model was 240 (SE 8) in 2018 (Cooke et al., 2019). Based on photo-ID data, not all of these animals may come to Sakhalin Island for feeding each year. The Sakhalin/Southeast Kamchatka feeding aggregation is estimated to have increased at a rate of ~5% per year during the last quarter century. The number of reproductive females was estimated to be 51-70 in 2016, with varying numbers of new calves (from 2 to 20) being produced on Sakhalin each year.

In addition, occasional incidental sightings of gray whales have been noted in other areas of the Sea of Okhotsk, including the Shantar Islands region, the Magadan coast and western Kamchatka, as well as along the southeast coast of Kamchatka. Some of these individuals are also known to be regularly or occasionally sighted off Sakhalin, but there are also whales that have not been identified as belonging to the Sakhalin feeding aggregation by either photographs or genetic analysis.

The objective of our study is to better understand and monitor the population ecology of western gray whales through the identification of individuals. Since 1997, photo-identification surveys have been conducted annually during the western gray whale feeding season. These data are essential to understand the population status, reproductive/survival rates, spatial/behavioral ecology, life history parameters as well as factors that maybe influencing survival of this population. In this report, we summarize our 2020 research efforts on western gray whales observed off Sakhalin Island and Kamchatka Peninsula, Russia, and also integrate the recent data with data obtained from 1997-2019.

METHODS

In 2020 we maintained the overall consistency in research design, data collection techniques and data analysis used since 1997 to allow for directly compatible inter-annual comparisons.

Study area

Our study area is near Zaliv Piltun (referred to as Piltun Lagoon) on the northeastern coast of Sakhalin

Island, Russia and small boat surveys were carried out from July 27 to September 8 (Fig. 1). The lagoon is approximately 80-90 km long and 15 km across at its widest point. A single channel connecting the inner lagoon with the Okhotsk Sea occurs at 52° 50' N and 143° 20' E, and has considerable biological influence on the surrounding marine environment. The nearshore marine environment of the study site is mostly sand substrate, characterized by a gradually sloping and broad continental shelf. Water depths within 5 km of shore are mostly shallow and less than 25 m deep. Despite the similarity of Piltun Lagoon to the coastal lagoons used during the winter by eastern gray whales off Baja California, Mexico, whales do not enter this lagoon.

We also expanded our research efforts to Eastern Kamchatka coast, where gray whales have been reported since the mid-1990s. We conducted two cetacean surveys in Avachinsky and Kronotsky Gulf of Kamchatka Peninsula. The main gray whale concentration was in Kronotsky Gulf in Olga Bay - the northward part of Kronotsky Gulf.

Photo-identification surveys

Photographic surveys involved slow travel in a 5.2 m outboard-powered inflatable boat. To photograph whales we used a Nikon D7000 digital camera with a 100-400 mm Nikon lens. Measures of environmental conditions, water depth, geographic position, and group size were recorded for each group photographed. For gray whale identification we used the common photo ID distinctive body markings, such as natural coloration and pigmentation patterns, as well as scars, that are unique to an individual and can be used for individual recognition. Boat-based photo-identification surveys were conducted on all good weather days during the 2020 study period. Previous photo-identification data gathered in the Piltun area between 1995 and 2019 used right-side dorsal flank markings for identification (Brownell et al., 1997; Weller et al., 1999, 2006a), and for the sake of intra- and inter-annual reliability, we continued this methodological approach. The majority of whales identified to date now have images of right and left flanks as well as ventral surface of flukes in the photo-identification catalog allowing for useful identification images to be collected from nearly any body region. Since May 2006, the western gray whale photo-identification catalog compiled by the Russia-U.S. research program now called (since 2015) the Russian Gray whale project or RGWP is available on request to all interested parties (Burdin et al., 2016, 2017, 2018).

RESULTS

Survey effort and photo-identification

Compared with the previous years, in 2020 we had relatively good weather conditions and no weather related limitations. Because of COVID restrictions in 2020, the time of field work was reduced to 6 weeks. Despite the time limitation we were able to conduct 17 photo-identification surveys conducted between 27 July and 08 September with a total of 62.5 hrs spent in direct observation of 122 whale groups (Table 1). Between 1994 and 2020, 314 western gray whales have been identified during 532 boat-based surveys off northeastern Sakhalin Island (Table 1). One hundred seventy-three of the whales in the photo-catalog were animals first identified as calves, while the remaining 141 whales were considered non-calves (i.e. adults or subadults). However, not all of these 314 individuals are considered to be alive (Table 2, Fig.3).

Mother-calf pairs

Eight mother-calf pairs were identified in 2020. Six females (No. 007, 008, 019, 022, 056 and 106) have been sighted in the study area and had multiple calves prior to 2020. Two females – No. 149 and 175 were seen with a calf for the first time. These two new mothers contribute to the total number of known

reproductive females – n=54 females documented since 1995. Female No. 175, was first identified as calf in 2009 (Table 3)

As in previous years mother-calf pairs were observed in proximity to the Piltun lagoon entrance more often than in other parts of our study area and compared to other (non-mother-calf) individuals.

Because of COVID restrictions our field work started later and the first sighting of a mother-calf pair in 2020 occurred on 27 July. Compared to the previous years of observation, usually calves separated in late July to early August, but in 2020 some mother-calf pairs separated later in the end of August.

DISCUSSION

Shift of distribution.

In our 2020 field observations we found that despite significant survey effort gray whale numbers in the Piltun lagoon area was reduced compare with previous years, and that general distribution of gray whales in the Piltun lagoon area was similar to that observed in 2019. That said, no whales have seen south on the close proximity on the Piltun lagoon mouth (Fig. 2). When our study started in 1997 and until 2015, whales were distributed mostly close or northward of the Piltun lagoon mouth. We suggest that the cause of reduced gray whale numbers is due to possible changes in the benthic communities due to both natural factors but also as a result of intensive anthropogenic activity related with offshore oil development in proximity to gray whale feeding areas.

A number of biological parameters in concert with a variety of human-related threats as identified during the current long-term study, raise concern about the ability of the western gray whale population to continue to recover and highlights the importance of continuing our long-term research and monitoring program.

Kronotsky Gulf (Eastern Kamchatka) survey 2020

In 2020 we conducted two photo-ID survey of gray whales and other cetaceans off the Eastern Kamchatka coast on a chartered vessel. We surveyed Avachuskiy Gulf north from Petropavlovsk-Kamchatsky and Kronotsky Gulf up to Ogla Bay. The purpose of this survey was to study the critical summer habitats of the Red Book species of cetaceans in the eastern coast of Kamchatka coastal waters.

On July 12 and August 13, we encountered 21 and 18 whales (including 2 calves) respectively, of which 8 adult whales (including 2 females) were from the Sakhalin catalog, and were previously celebrated in the Piltun feeding area. Female No. 149 (calf No. 310) was photographed in Olga Bay on July 12 and on 4 August resighted off the Piltun Lagoon area (~ 800 nautical miles in 23 days). Whale No. 260 observed in Olga Bay on 12 July was sighted off Piltun on 24 August.. The remaining animals (both unknown and those from the Sakhalin Catalog) were not observed in 2020 in the Piltun area. The whale No. 135 from the Sakhalin catalog was met in Olga Bay twice in July 12, and August 13. The same whale was observed on September 9 in the Avacha Gulf (eastern Kamchatka) (Fig. 4).

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Table 1. Annual survey effort, groups encountered, and whales identified in 1994-2020.

Year	Sampling Period	Number of Surveys	Observation Hours	Group Encountered	Whales Identified
1994	09/07 - 09/12	1			9
1995	08/15 - 08/19	5	10:1	23	28
1997	07/09 - 09/08	22	33:4	114	47
1998	07/06 - 09/29	35	50:5	125	54
1999	06/29 - 10/13	56	122	434	69
2000	06/25 - 09/16	40	56:5	365	58
2001	06/25 - 09/25	49	101:8	448	72
2002	07/01 - 09/25	36	75:6	411	76
2003	07/15 - 09/13	22	41:7	219	75
2004	07/29 - 09/12	21	33:8	194	94
2005	07/04 - 09/09	20	40:9	160	93
2006	07/23 - 08/25	10	24:1	96	79
2007	07/26 - 09/09	20	32:2	187	83
2008	07/08 - 08/21	12	47:0	38	45
2009	06/24 – 08/26	17	67:0	126	82
2010	08/09 - 08/26	4	11:5	40	42
2011	06/28 - 08/26	14	32:7	83	82
2012	06/24 - 08/30	11	48:8	78	88
2013	07/07 – 08/24	16	54:4	148	94
2014	07/08 – 08/23	20	41:7	203	78
2015	07/02 – 08/14	16	38:8	114	60
2016	07/06 – 08/21	15	15:2	135	56
2017	07/04 – 08/25	15	18:3	118	49
2018	07/08 – 09/08	8	34:2	42	25
2019	07/04 - 09/08	30	114:5	251	49
2020	07/27 - 09/08	17	62:5	122	32
Overall	1994-2020	532	1240,9	4274	314

* The number of whales identified annually includes resightings of individuals from previous years, resulting in a total of 314 identified individuals. The number of whales identified does not correspond to the size of the population.

Table 2. Annual sighting trends and resighting percentages, 1994-2020

Year	Whales Identified	Number of Calves	New Non-Calves	% Non-Calves Previously Identified
1994	9			
1995	28	2	20	23.1%
1997	47	2	25	44.4%
1998	54	8	5	89.1%
1999	69	3	12	81.8%
2000	58	3	3	94.5%
2001	72	6	6	90.9%
2002	76	9	3	95.5%
2003	75	11	2	96.9%
2004	94	8	3	96.5%
2005	93	6	4	95.4%
2006	79	4	3	96.0%
2007	83	9	2	97.3%
2008	45	3	0	100.0%
2009	82	7	2	97.6%
2010	42	3	1	97.4%
2011	82	12	1	98.6%
2012	88	5	6	92.7 %
2013	94	9	3	96.5 %
2014	78	9	3	84.6 %
2015	60	8	2	96.1 %
2016	56	6	7	86.0%
2017	46	7	5	80.0 %
2018	23	5	6	66.7%
2019	49	20	1	96.5%
2020	32	8	4	84.6%

* Data from 1994 and 1995 were opportunistic and pilot in nature (respectively) and are thereby viewed as incomplete for some of the reported values.

Table 3. Dates of first sightings of mother-calf pairs in summer 2020.

Female ID	Calf ID	First Time Seen Together	Last Time Seen Together
056	304	29.07.2020	31.07.2020
008	305	29.07.2020	30.08.2020
175	306	29.07.2020	30.07.2020
019	307	30.07.2020	23.08.2020
022	308	30.07.2020	31.07.2020
106	309	04.08.2020	06.08.2020
149	310	04.08.2020	4.08.2020
007	311	06.08.2020	21.08.2020

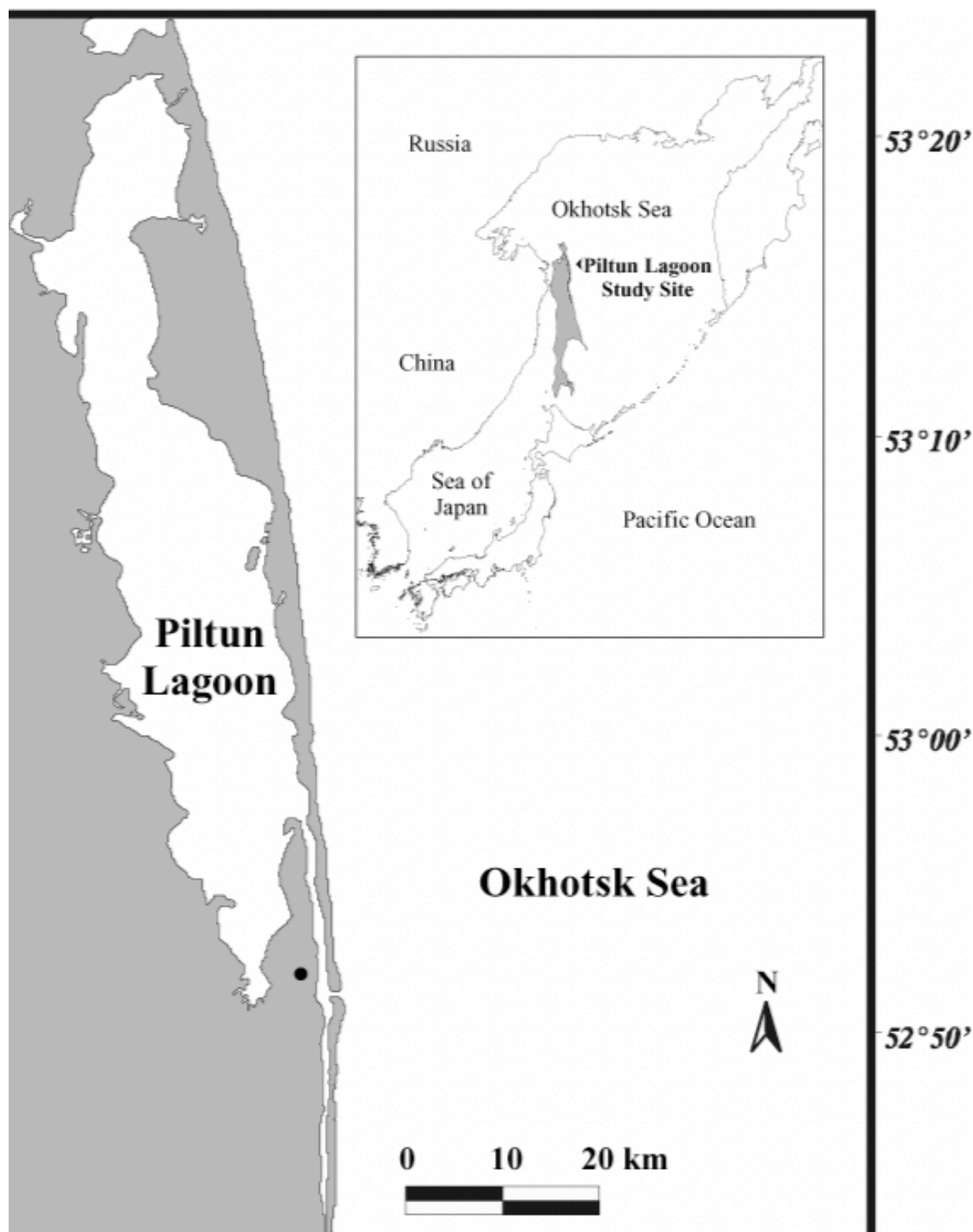


Fig.1 Study area. Black dot is the Piltun lighthouse.

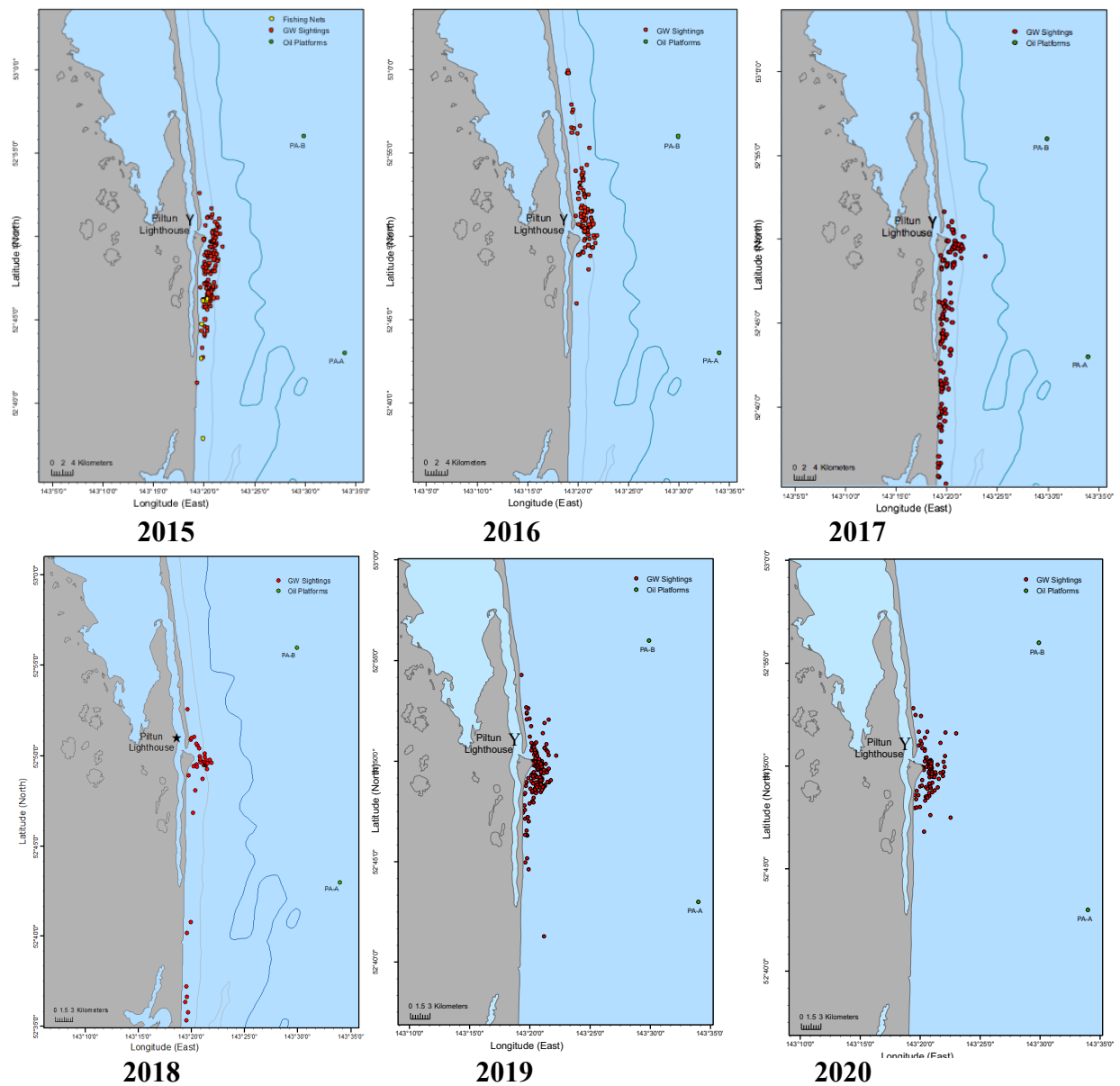


Fig 2. Changes in gray whale distribution in the Piltun lagoon area 2015-2020.

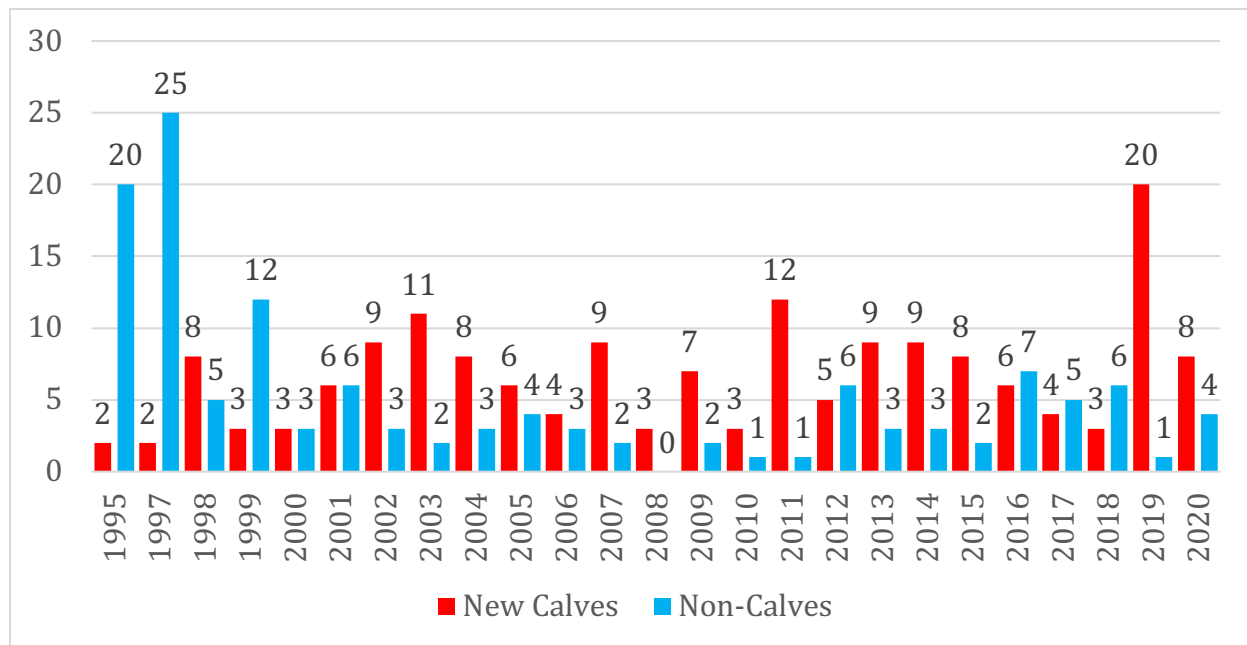


Fig. 3. New gray whale non-calves and calves observed in Piltun lagoon area in 1995-2020

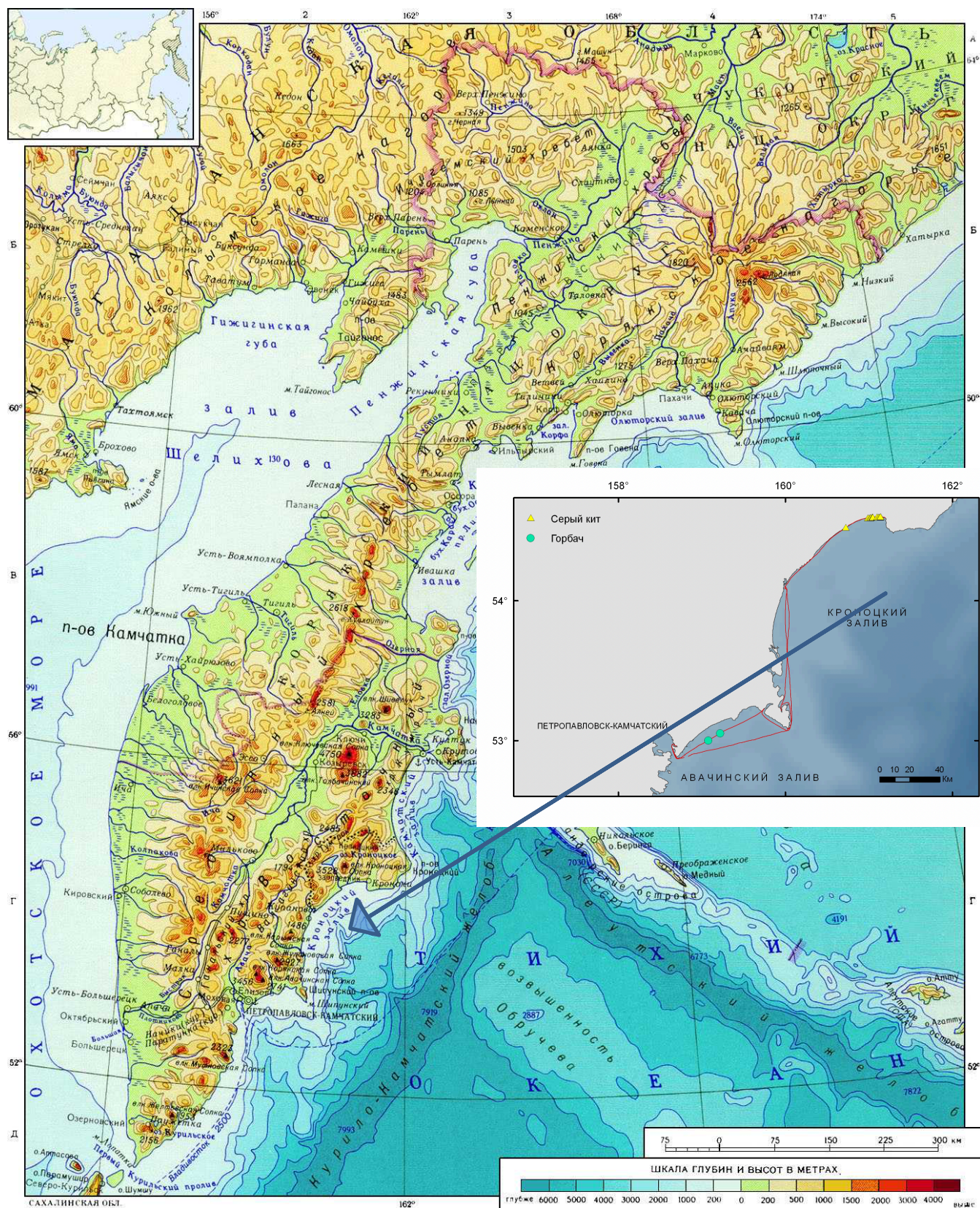


Fig. 4. Marine mammals survey in eastern Kamchatka in 2020.