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GRAY WHALE RESEARCH IN 2021 OFF NORTHEASTERN SAKHALIN ISLAND AND EASTERN KAMCHATKA, RUSSIA

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ABSTRACT

In 2021, 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 (A. Burdin, PI). In Sakhalin work was conducted from 7 July to 8 September during which time 20 boat surveys were completed. A total of 146 whale groups were encountered (with repeated sightings) and 42 unique whales were identified. Fourteen mother-calf pairs and three new whales at the age 1+, previously not seen in the study area, were observed in the nearshore Piltun feeding area. Thus, our catalog of whales summering off Sakhalin between 1994-2021 includes 331 individuals. In comparison to 2020 the general distribution of whales was similar, but more whales were observed north of the Piltun Lagoon mouth, and more whales were observed feeding in deeper waters than usual. The total number of gray whales using the study area was higher than in 2020 (42 and 32 respectively). In 2021, studies of gray whales in the Kamchatka Peninsula (Olga Bay, Kronotsky Gulf), were conducted on 23 August. We encountered 9 whales of which 3 were from the Sakhalin catalog and were previously observed in the Piltun feeding area. All these animals were not observed in 2021 in the Piltun area during our study. Thus, the results of the 2021 research indicate the relative stability of whale numbers in the Piltun feeding area and confirming its primary importance for mother-calf pairs as well as newly weaned animals.

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

INTRODUCTION

In 2021 the monitoring of western gray whale was continued off north-eastern Sakhalin Island and south-eastern Kamchatka coast (Kronotsky Gulf, Olga Bay). Recent assessment indicated that the number of whales feeding off Sakhalin numbered ~191 whales of age one or older in 2018 and the Sakhalin/Southeast Kamchatka feeding aggregation is estimated to have increased at a rate of ~5% per year during the last quarter century (Cooke et al., 2019). The small number of gray whales observed feeding in NE Sakhalin Island in the mid-late 1990s were initially listed as a Critically Endangered subpopulation by the IUCN (Reilly et al., 2008). But continuing population growth of whales visiting both known Sakhalin feeding grounds, was recently revised to Endangered (Cooke et al., 2019). Nevertheless 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 elevated status in terms of the need to conserve gray whales in the national territorial waters of these countries.

Since 1997, photo-identification surveys off NE Sakhalin in the nearshore feeding (i.e. in proximity to Piltun Lagoon) have been conducted annually during the western gray whale feeding season. The total number of gray whales identified between 1997-2021 is 331, but this number does not imply that all of these whales are alive. The nearshore feeding ground remains the main feeding ground for mother-calf pairs within the population and annual monitoring of gray whale visiting this area is very important to assess population status. The objective of our study remains the same as in previous years - to monitor feeding gray whales in NE Sakhalin and better understand the population ecology of western gray whales through the identification of individuals. These long-term data are essential to

understand the population status, reproductive/survival rates, spatial/behavioral ecology, as well as factors that maybe influencing survival of this population.

In this report, we summarize our 2021 research efforts on western gray whales observed off Sakhalin Island and Kamchatka Peninsula, Russia, and integrate the recent data with data obtained from 1997-2021 (and in some cases back to 1994).

METHODS

In 2021 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

Because of the range limitations of working from our inflatable research vessel, our study area in 2021 was similar in area to what we have surveyed since 1995 and covered about 90 km zone near Piltun Lagoon on the northeastern coast of Sakhalin Island, Russia (Fig. 1) both to north and south of the lagoon mouth where located our base camp. Our small boat surveys were carried out from July 5 to September 10 (Tab. 1). The lagoon is approximately 80-90 km long and 15 km across at its widest point but whales are not found within the lagoon itself. 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.

We also continued research efforts off the Eastern Kamchatka coast, where gray whales have been reported since the mid-1990s. We conducted cetacean surveys in Avachinsky and Kronotsky Gulf of Eastern Kamchatka Peninsula. The main gray whale concentration was in Kronotsky Gulf in Olga Bay - the northward part of Kronotsky Gulf (fig 2).

Photo-identification surveys

Photographic surveys involved slow travel in a 5.2 m outboard-powered inflatable boat. To photograph whales we used a Nikon D750 digital camera with a 100-400 mm Nikon lens. The routine procedure of measures of environmental conditions, like water depth, salinity, and whale group size and position, 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 2021 study period. Previous photo-identification data gathered in the Piltun area between 1995 and 2020 used right-side dorsal flank markings for identification (Brownell et al., 1997; Weller et al., 1999, 2006), 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 is maintained by the Russia 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 2021 we had relatively good weather conditions and no weather related limitations. Despite COVID-related restrictions in 2021, the time of field work was similar to the before COVID time and continued from early July to beginning of September (8 weeks). We were able to conduct 20 photo-identification surveys conducted between 5 July and 10 September with a total of 91 hrs spent in direct observation of 146 whale groups (Table 1). Between 1994 and 2021, 331 western gray whales have been identified during 552 boat-based surveys off northeastern Sakhalin Island (Table 1). One hundred eighty seven of the whales in the photo-catalog were animals first identified as calves, while the remaining 144 whales were considered non-calves (i.e. adults or subadults). However, not all of these 331 individuals are considered to be alive (Table 2, Fig.4).

Mother-calf pairs

Fourteen mother-calf pairs (MC) were identified in 2021 (table 3). Compared to the previous years of observation, usually calves separated in late July to early August, but in 2021 some mother-calf pairs separated later in the end of August, so the first MC pair was seen in time of our first survey at July, 10 (separated around July, 20) and another MC pair (first seen at August, 11) was last seen together at August, 20. 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 whales.

DISCUSSION

Shift of distribution.

In our 2021 field observations we found that despite significant survey effort gray whale numbers in the Piltun lagoon area was reduced compare with previous years (by 20 surveys in 2014 and 2021, 78 and 42 whales respectively) (Fig.3), and that general distribution of gray whales in the Piltun lagoon area was similar to that observed in 2020, but more whales were observed north to the Piltun lagoon mouth and more whales observed feeding in deeper waters than usual. 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 fragile yet encouraging recovery of the western gray whale population and highlights the importance of continuing our long-term research and monitoring program.

Evidence of gray whale strike by vessel.

During the 2021 field work in the Piltun feeding area a gray whale calf (Catalog No 319) with the characteristic scars on the dorsal side of the body was observed from 18 July to 20 August. (Fig. 6) The scars had a multiple, evenly located parallel character, which is typical after collision with the propeller of a vessel. Damage to soft tissues was noted and at the time did not appear to present direct threat to the animal. At each subsequent encounter, the animal was photographed, behavior noted and its location in the study area noted. Analysis of the photos showed that for the one month this calf was observed, there was no significant regeneration of wounds.

The appearance of injured calf is the real confirmation that the collision of gray whales of the western population is of great concern. The commencement of the encounters with this whale is important in the following years to analyze the pace of healing of such wounds. Fixation of the appearance of anthropogenic scars (as a result of the collision of gray whales with ships or obtained as a result of entanglement in fishing gear) is necessary for an objective assessment and confirmation of risks for the western population of gray whales, which in the Russian Federation is listed in the Red Book (Category of Freight Status 1 "Threat to disappearance"), and is recognized as a priority category (I) according to the "degree and priorities of the accepted and planned environmental measures".

Kronotsky Gulf (Eastern Kamchatka) survey 2021

In 2021 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 Ogl 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 August 23, we encountered only 9 whales, of which 3 adult whales were from the Sakhalin catalog, and were previously celebrated in the Piltun feeding area. No one from this whales were seen in Piltun lagoon area in July-September 2021. One whale (#135 -Muhamor) have been seen in Olga Bay at July, 12 and August, 13 2020 and in August, 23 2021. This whale first was seen in Piltun area in 2004 and in 2016. A second opportunistic survey was done by our colleagues from the Kronotsky State Preserve, on October, 22. They counted 8 gray whales but no photographs were collected.

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Table 1. Annual survey effort, groups encountered, and whales identified in 1994-2021.

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
2021	07/05 - 09/10	20	91	146	42
Overall	1994-2021	552	1331,9	4420	331

* The number of whales identified annually includes resightings of individuals from previous years, resulting in a total of 331 identified individuals. The number of whales identified does not correspond to the size of the population.

Table 2. Annual sighting trends and resighting percentages, 1994-2021

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%
2021	42	14	3	89.3%

* 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 2021.

Female ID	Calf ID	First Time Seen Together	Last Time Seen Together
134	315	10.07.2021	20.07.2021
043	316	11.07.2021	11.07.2021
003	317	11.07.2021	26.07.2021
099	318	15.07.2021	27.07.2021
141	319	11.07.2021	30.07.2021
204	320	11.07.2021	18.07.2021
150	321	14.07.2021	15.07.2021
076	322	15.07.2021	07.08.2021
065	323	20.07.2021	26.07.2021
155	324	26.07.2021	07.08.2021
001	325	10.08.2021	10.08.2021
092	326	11.08.2021	20.08.2021

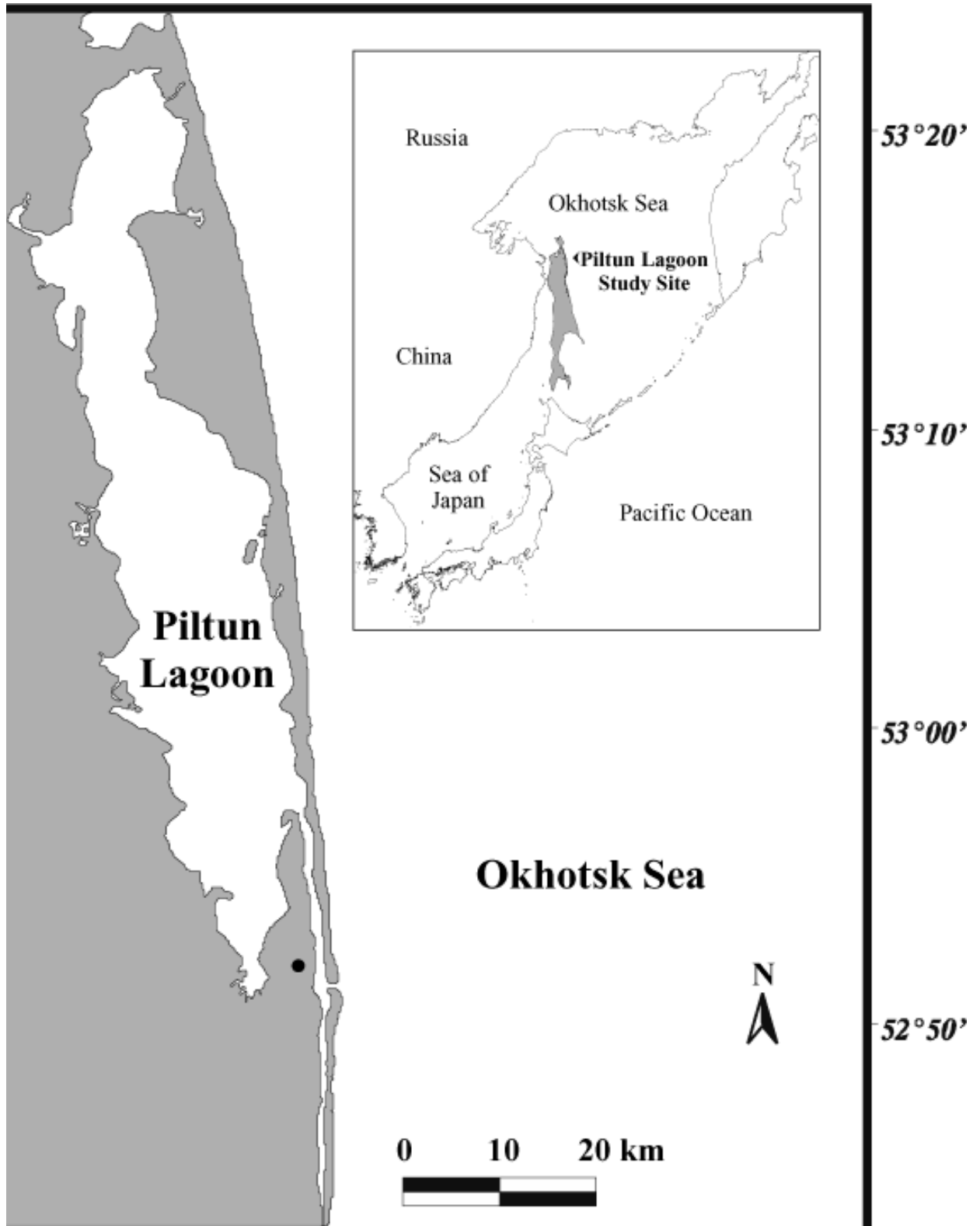


Fig.1 Russian Far East. Sakhalin Island and study area (inset block).

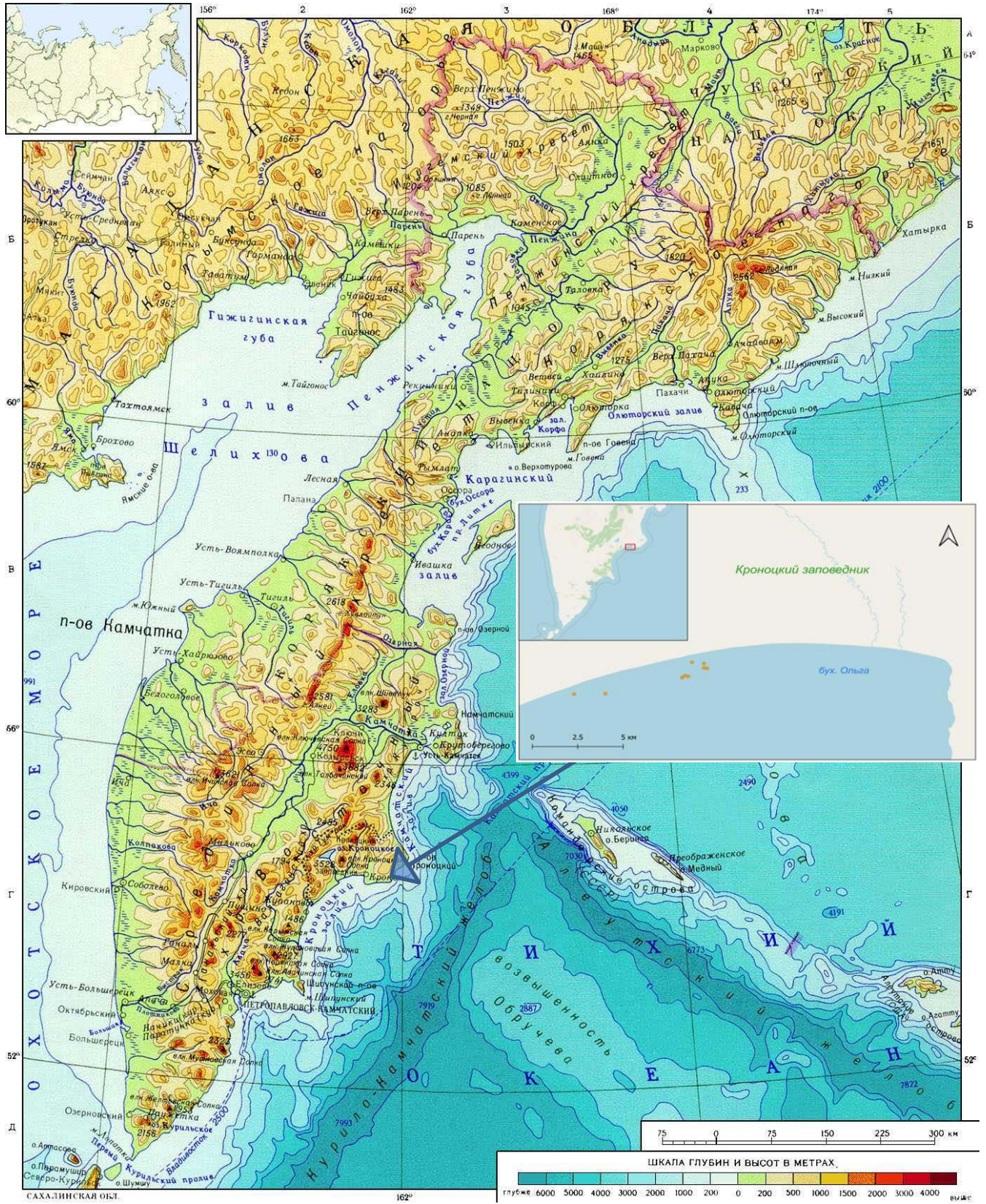


Fig. 2. Gray whale survey in eastern Kamchatka in 2021.

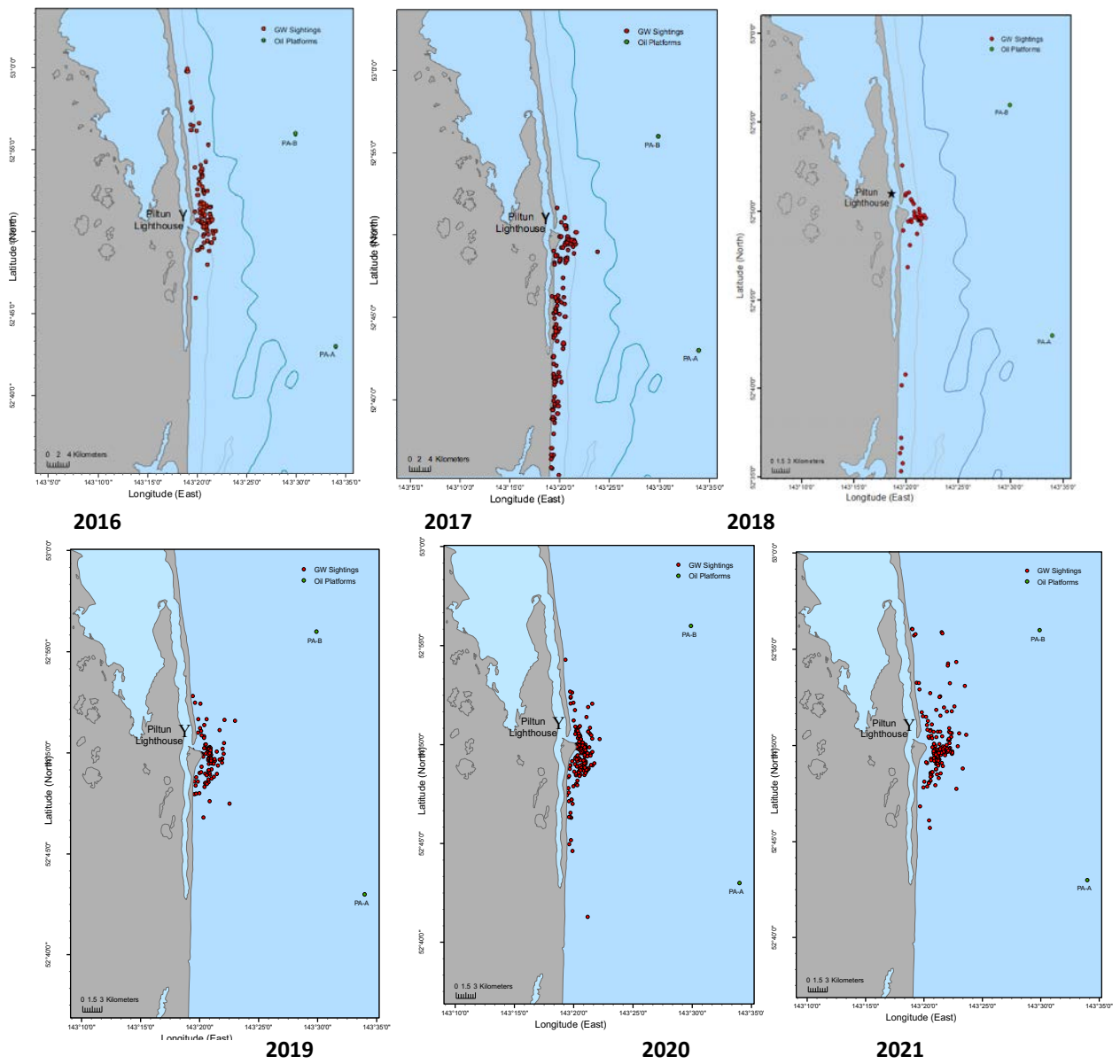


Fig 3. Changes in gray whale distribution in the Piltun lagoon area 2016-2021.

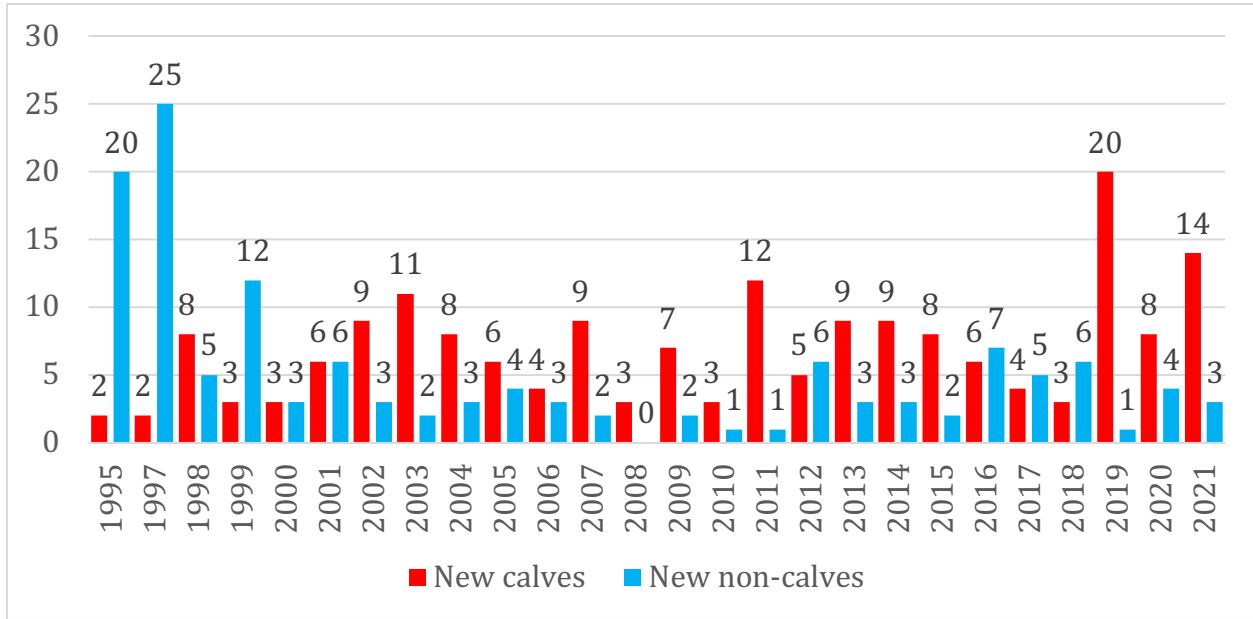


Fig. 4. New gray whale non-calves and calves observed off Piltun Lagoon area in 1995-2021

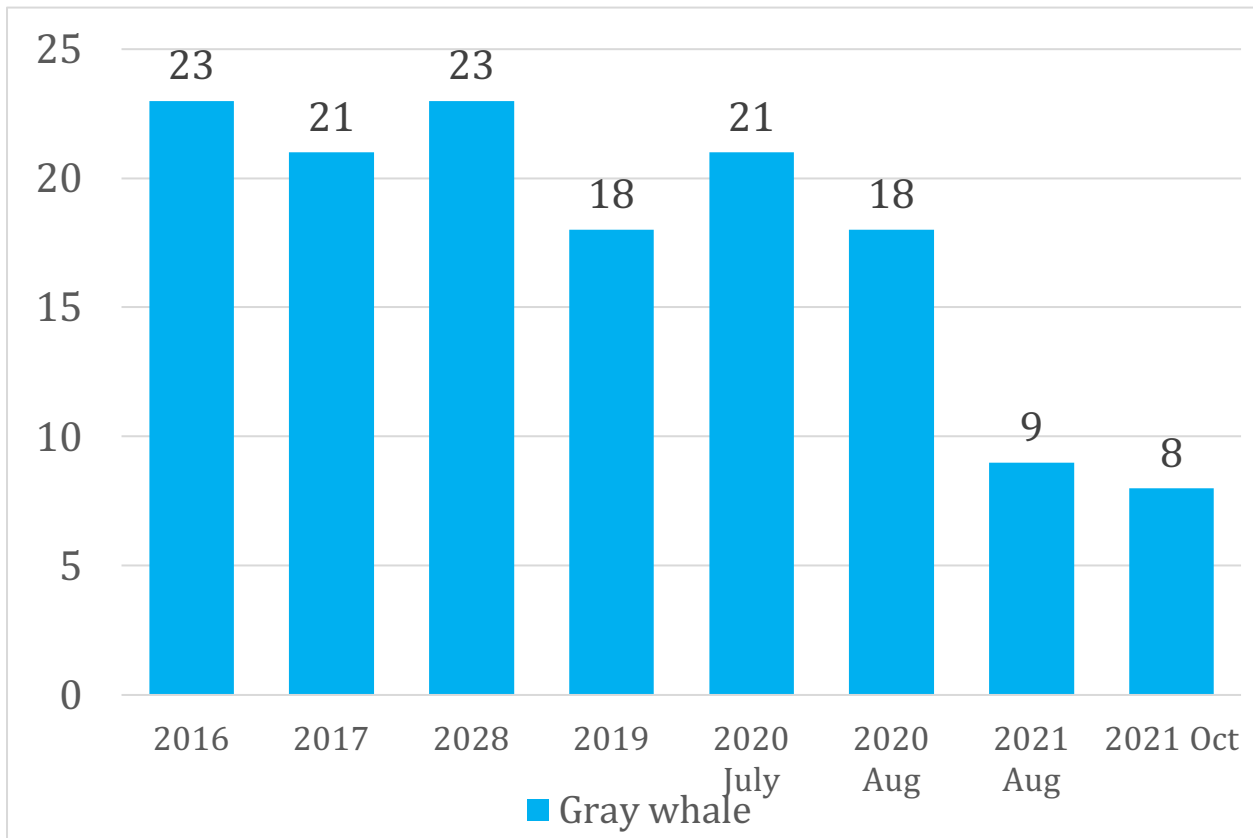


Fig. 5. Simultaneous gray whale counts in the Olga Bay, Kronotsky Gulf, Eastern Kamchatka, Russia



Fig. 6. Calf No 319 injured by vessel propeller 2021.