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2015

Alexander M. Burdin and Olga A. Sychenko



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# Status of western gray whales off northeastern Sakhalin Island, Russia in 2015

ALEXANDER M. BURDIN<sup>1</sup> AND OLGA A. SYCHENKO<sup>1</sup>

Contact e-mail: [fewr@mac.com](mailto:fewr@mac.com)<sup>1</sup>

<sup>1</sup> Kamchatka Branch of Pacific Institute of Geography, Far East Branch - Russian Academy of Sciences Petropavlovsk-Kamchatsky, RUSSIA

## ABSTRACT

The western gray whale population is critically endangered. The most recent abundance estimate is 174-186 non-calf individuals (Cooke *et al.* 2015). The collaborative Russia-U.S. research program on western gray whales (now called the Russia Gray Whale Project) summering off northeastern Sakhalin Island, Russia, has been ongoing since 1995 and has produced important data used to determine the conservation status of this population. This paper reviews findings from 2015 research activities supported by the International Fund for Animal Welfare and combines such with data from previous years, in some cases dating back to an opportunistic survey in 1994. Photo-identification research conducted off Sakhalin Island in 2015 resulted in the identification of 60 whales, including eight mother-calf pairs and two previously unidentified non-calves. All eight mothers have had previous sightings in the study area and have had multiple calves prior to 2015. When 2015 data are combined with results from 1994-2014, a catalog of 245 photo-identified individuals has been compiled.

## INTRODUCTION

There are presently two distinct gray whale (*Eschrichtius robustus*) populations recognized in the Pacific, these include: (1) the eastern North Pacific population and (2) the western North Pacific. The western population is one of the most endangered baleen whale populations in the world. Recent assessments estimate that 174-186 non-calf individuals remain in this remnant population with the median calf survival rate 0.70 (SE 0.06) and annual non-calf survival rate 0.98 (SE 0.012) (Cooke *et al.* 2015). This small population demonstrates strong seasonal site fidelity to a relatively small summer feeding area off northeastern Sakhalin Island, Russia, indicating this habitat is critical to their survival.

The objective of the research reported here is to monitor the occurrence, abundance and survival of western gray whales by using photo-identification. Since 1997, photo-identification surveys have been conducted annually off northeastern Sakhalin Island during the summer feeding season. In this report, we summarize our 2015 research efforts and also integrate the recent data with data obtained from 1997-2014.

## METHODS

In order to perform inter-annual comparisons, in 2015 we maintained the overall consistency in research design, data collection techniques and data analysis. Additional information, collected during more limited surveys off Piltun in 1994 and 1995 (see Weller *et al.* 1999), is also presented here to better describe inter-annual trends and facilitate a long-term interpretation for some results. Data from these 1994 and 1995 studies include gray whale photographs obtained between 7-12 September 1994 during the filming of a wildlife documentary by H. Minakuchi (for description see Weller *et al.* 1999) and from 14-20 August 1995 during a pilot study to determine the feasibility of conducting boat- and shore-based research in the study area.

### *Study area*

The study area is located near Zaliv Pil'tun (referred to as Piltun Lagoon) on the northeastern coast of Sakhalin Island, Russia (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. A lighthouse, near the lagoon channel, served as the base from which studies reported here were conducted. 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 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.

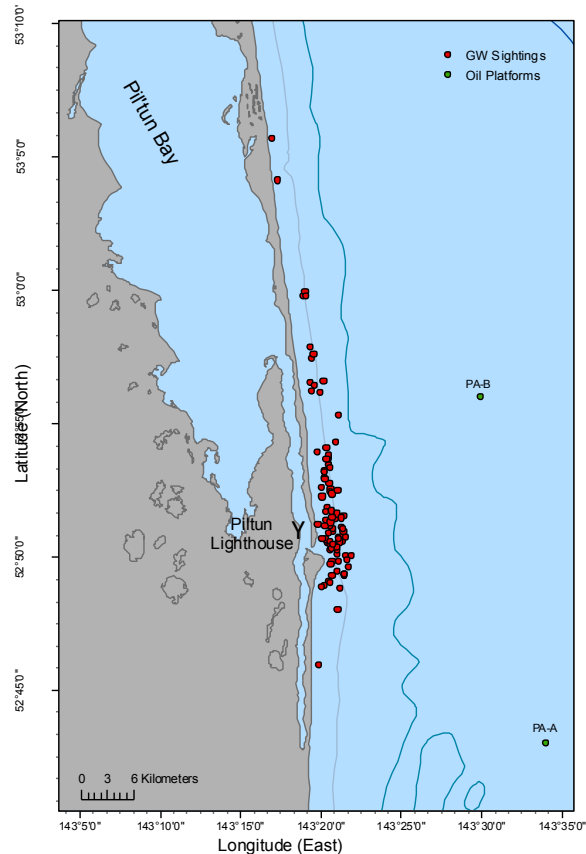


Fig. 1. Gray whales sightings near Piltun lagoon in 2015.

### ***Photo-identification surveys***

Boat-based photo-identification surveys were conducted on all good weather days during the 2015 study period. Photographic surveys involved slow travel in a 4.5 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.

Identical methodology was employed during each survey, with the primary objective of encountering and photographically identifying as many whales as possible. Previous photo-identification data gathered in the Piltun area between 1995 and 2014 used right-side dorsal flank markings for identification and for the sake of intra- and inter-annual reliability, we continued this methodological approach. Attempts were made to photograph the right dorsal flank of each whale, followed by efforts to photograph the left dorsal flank and fluke. 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 our Russia Gray Whale Project (formerly called the Russia-U.S. research program) has been available on request to all interested parties (Weller *et al.* 2006).

## **RESULTS**

### ***Survey effort and photo-identification***

Sixteen photo-identification surveys, with a total of 38.8 hrs spent in direct observation of 114 whale groups, were conducted between 29 June and 17 August in 2015 (Table 1). Twelve surveys were conducted in July and four in August. Between 1994 and 2015, 245 whales have been identified during 447 boat-based surveys off northeastern Sakhalin Island (Table 1). One hundred twenty seven of the whales in the

photo-catalog were animals first identified as calves, while the remaining 118 whales were considered non-calves (i.e. adults or subadults). Not all of these 245 individuals are alive, however.

Table 1. Annual survey effort, groups encountered, and whales identified in 1994-2015.

Year	Sampling Period	Number of Surveys	Observation Hours	Groups 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
Overall		447	964.5	3606	245 *

\* The number of whales identified annually includes resightings of individuals from previous years, resulting in a total of 245 identified individuals. The number of whales identified does not correspond to the size of the population.

Sixty naturally marked individual whales, including 8 calves, were identified during 2015 (Table 1, 2). Of the 52 non-calves identified in 2015, 50 whales (96.1%) had previous sightings in the Piltun area during 1994-2014 photographic efforts (Table 2). The mean pod size for all groups (n=114) encountered during 2015 was  $1.56 \pm 0.882$  ranging from 1 (69 groups, or 60%) to 6 (1 group) individuals per pod. Sighting of the large group occurred on 21 July, and included two mother-calf pairs and two weaned calves feeding and socializing together. In general, all whales observed in 2015 were distributed in water depths ranging from 2.1 to 18.0 m (average  $9.5 \pm 3.04$  m).

Table 2. Annual sighting patterns and resighting percentages, 1994-2015.

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	95.6%
2015	60	8	2	96.1%

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

The number of times individual gray whale were sighted during 2015 ranged from one to seven. Nineteen (32%) individuals were observed only once. One individual, an adult male known from previous years, was seen seven times. Three individuals were photographed six times during the 2015 season. Two of these individuals were a mother and her calf. The third individual was a male named “Ponchik” that has been observed in the Piltun area almost every year of the study. Ponchik was observed entangled in fisheries line in 2013 (Weller et al. 2014) but resighted in 2014 and 2015 without any entangling gear. Of the nine calves identified in 2014, only two were observed in Piltun feeding area in 2015. Also, four whales identified as calves in 2013 were photographed in 2015.

#### ***Mother-calf pairs***

Eight mother-calf pairs were identified in 2015. All eight mothers have been sighted in the study area and had multiple calves prior to 2015. Thus, the total number of observed reproductive females that have been documented since 1995 is 33. The first sighting of a mother-calf pair in 2015 occurred on 2 July.

Based on our photo-ID surveys, mother-calf pairs were observed in proximity to the Piltun lagoon entrance more often than in other parts of our study area when compared to other (non-mother-calf) individuals. This distribution pattern has been observed in previous years as well.

Six mother-calf pairs were identified in July, and two pairs were initially observed in August. Our sighting data showed that out of eight mother-calf pairs, two separated (i.e. weaned) sometime in July and one in August. In five other pairs, calves remained with their mothers at our last sighting, and therefore, no information on weaning time for them was documented (Table 3). The identification of calves every year of our study has allowed us to collect information on age of many individuals, and especially important information on sexual maturity of females. Five females sighted as calves off Sakhalin in earlier years of

our study, have been observed with their own calves. We estimate that they had their first calf at age ranging from 7 to 11.

Table 3. Dates of first and last sightings, and separation dates of 2015 mother-calf pairs.

Mother ID	Calf Field ID	First Seen Together	Last Seen Together	First Seen Separated
056	01	2 July 15	2 August 15	-
007	02	5 July 15	6 July 15	21 July 15
015	03	6 July 15	12 August 15	-
022	04	9 July 15	3 August 15	12 August 15
003	05	10 July 15	10 July 15	21 July 15
107	06	21 July 15	3 August 15	-
001	07	2 August 15	3 August 15	-
092	08	3 August 15	3 August 15	-

## DISCUSSION

A number of biological parameters in concert with a variety of human-related threats as identified during the current long-term study and discussed below, raise concern about the continued ability of the western gray whale population to recover from its highly depleted state and highlight the importance of continuing our long-term research and monitoring program (Blokhin and Burdin 2001).

### *Population size*

Despite the apparent spatial overlap between western and eastern gray whale populations and the potential inter-mixing among individuals, both mitochondrial and nuclear DNA genetic analyses illustrate genetic differences between these two populations suggesting some unknown life history parameter minimizes inter-breeding among these gray whales. Given new information on movements of some western gray whales from Sakhalin feeding grounds to Mexican wintering grounds (Urbán et al. 2013), a reevaluation of the western gray whale population estimate is necessary. However, data we collected during 20 years of research supports the idea that the size of the western gray whale population is extremely small compared to other baleen whale populations. Photo-identification studies off northeastern Sakhalin Island have identified a total of 245 individual whales during 447 surveys conducted between 1994 and 2015. Although our photo-catalog now contains 245 whales, not all of these individuals are assumed to be alive.

### *Reproduction and survival*

In 2015, we did not observe any new (i.e. never before sighted with a calf) reproductive females in the Piltun area, therefore the total number of known reproductive females remains at 33. Compared to other species and populations of large cetacean, the number of breeding females in the western gray whale population is still very low, and the Piltun area still remains the main feeding area for females and calves. The small population size of western gray whales coupled with the low number of reproductive females makes this population highly susceptible to potential extinction.

### *Mother-calf pairs*

Eight mother-calf pairs were identified during the 2015 season. All eight mothers have been sighted in the study area and had multiple calves prior to 2015. The annual return of reproductive females while pregnant, resting and lactating indicates that the nearshore Sakhalin Island feeding area is of significant importance to the continued survival of this population. The behavior of these females indicates that this feeding ground is vital to population survival and growth. Any disturbance preventing, reducing or limiting feeding could

lead to stress and/or compromise the health of these whales that could affect vital life history parameters, such as survival or reproductive success.

### ***Threats to the population***

Sakhalin Island is a region rich with large reserves of offshore oil and gas. Industrial activities on the continental shelf of this region have steadily increased in the past 20 years and continue to expand at a rapid pace. Oil and gas development activities that may negatively impact western gray whales include: (1) disturbance from underwater noise associated with seismic, (2) pipeline dredging, ship and helicopter traffic and platform operations, (3) direct interactions between whales and an oil spill or other waterborne chemicals, ships, and possible entanglements in cables or lines; and (4) habitat changes related to seafloor modifications associated with dredging and sand pumping activities that may adversely impact gray whale prey.

In 2015, Sakhalin-1 and Sakhalin-2 performed large-scale seismic programs both in nearshore and offshore areas off northeastern Sakhalin. The seismic surveys were conducted near gray whale feeding areas (IUCN 2014a, 2014b). This was the most intensive and extensive seismic activity ever conducted in the region, the outcomes of which are yet to be determined with respect to possible impacts on gray whales.

Another significant threat to the western gray whale population involves incidental catches in coastal net fisheries, particularly off Japan (Weller *et al.* 2008). In 2005, three female western gray whales (one mother-calf pair and one yearling) died in fishing nets on the Pacific coast of Japan during their northward migration. Unfortunately, in 2007 another young female western gray whale died after being entrapped in a trap net also on the Pacific coast of Japan (Weller *et al.* 2008). Finally, while nothing is known about net entrapments or entanglements in other regions (e.g., Korea and China) within the range of the population, it is likely that coastal net fisheries outside of Japan also contribute to some level of mortality. In fact, the first entanglement of a gray whale feeding off northeastern Sakhalin was documented in 2013 (Weller *et al.* 2014).

In 2014, eco-tourist activity was observed on the Piltun feeding area. A large (91 m) vessel, anchored within 1 km from shore near the Piltun lagoon entrance, and launched eight small boats with tourists. These boats were observed to approach groups of whales, including mother/calf pairs. All boats were localized within a small distance between each other, consequently observing the same group of whales simultaneously. Western gray whales have been shown to be highly sensitive to nearby vessel activity (Gailey *et al.* 2010, 2014). Such intensive approach of several boats to a whale or group of whales at the same time may increase the disturbance, especially to mother/calf pairs. Based on preliminary observations, there is a necessity of monitoring and managing tourist activities in the area, with the possibility of reducing potential impacts to the lowest level within Piltun feeding area and possibly developing standard protocols of approaching whales.

### ***Fishing activity and entanglement incident***

Increased fishing activity has been developing in proximity to the western gray whale nearshore feeding grounds during the past few years. In 2012, fishing occurred mainly inside of Piltun lagoon; however, the scale of the fishing operation was dramatically smaller compared to 2013. In 2013, a nearshore salmon fishery was established both inside and outside (to the south) of Piltun lagoon. Two set nets ~1.5 km in length were placed perpendicular to the coastline. Such nets drastically increase the potential for gray whale interaction as western gray whales are on average 1.5 km from shore (Gailey *et al.* 2011). In addition, mothers with calves or recently weaned calves occur significantly closer to shore (within 0.8 km, Sychenko 2011). Throughout the 2013-2014 and previous feeding seasons, whales were observed to frequently utilize the area in the proximity of the fishing nets. In addition to the fishing nets, increased anthropogenic activity in relation to the smaller fishing vessels as well as large (> 80 m) vessels was observed. Such large-scale fishery activities in the Piltun area heighten concerns that these operations pose significant risk and may have a direct impact on whales, such as injury or death.

During the 2013 field season, one of the most frequently sighted western gray whales was observed to be entangled with fishing rope wrapped around the caudal end of the fluke with an associated open wound

(Weller *et al.* 2014). The whale with the rope was identified as individual #035 (“Ponchik”) from our photo-catalog of western gray whales. Ponchik is known to be a male who was first sighted in 1995 and frequently encountered in the Piltun area. He is also known to be a father of multiple calves off Sakhalin, and in 2004, he was photo-documented in the northwestern Pacific. In 2013, Ponchik was sighted four times: 9 and 14 July, 22 and 24 August. His entanglement was first observed from photographs taken on 22 August. The photographic evidence was presented to the Western Gray Whale Advisory Panel as well as IUCN and IWC. After considerable deliberations it was concluded that disentanglement efforts were not to be conducted due to logistic difficulties to perform rescue operations and also, giving harsh weather conditions in the Sea of Okhotsk as well as likelihood of finding Ponchik. On a positive note, Ponchik was sighted off Sakhalin in 2014 and 2015 without any evidence of a persistent entanglement and was observed to be in good physical condition.

In 2015, fishing efforts near the Piltun feeding area were dramatically higher than in the past, with fishing nets observed in different coastal locations south of the entrance to Piltun Lagoon. We encountered set nets within approximately 3.5 km, 7 km, 14 km, and 22 km south from the mouth of the lagoon. Some of these nets were several kilometers in length placed perpendicular to the coastline. A few whales were observed feeding in close proximity to these nets, one of which was a known reproductive female.

## **CONCLUSIONS**

In conclusion, given the vulnerability of the western gray whale population to extinction, potential impacts from oil and gas activities, fisheries, and tourist activities off the northeastern Sakhalin Island need to be closely monitored with stringent mitigation measures employed to reduce disturbance to the lowest possible level. Protection of the Sakhalin Island feeding habitat, including the coastal lagoon system that appears integrally related to the high benthic biomass used by the whales in the nearshore area, is clearly paramount to successful conservation of the western gray whale population. The photo-identification research conducted by our program since 1995, and reviewed here, must be continued to further monitor survival of individuals, describe the overall population trend and provide requisite data pertinent to further conservation and protection measures.

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