

**REPORT ON THE PHOTOGRAPHIC COMPARISON OF THE WESTERN AND MEXICAN
GRAY WHALE CATALOGUES.**

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ABSTRACT

Photographs of 217 identified gray whales obtained from the Sakhalin Island, Russia feeding grounds were compared with 6,546 photo-identified individuals from the Baja California Peninsula, Mexico breeding lagoons to identify matches between these two populations. A total of 14 matches of individuals were found, including six males, six females and two of unknown sex. Thirteen whales had sightings prior to and after to their respective sighting in Mexico. Thirteen whales were observed in Laguna San Ignacio and one in Laguna Ojo de Liebre. Eleven of the 14 whales were photographed in Mexico only in one year and the other 3 in two years. Thirteen whales were sighted in Sakhalin in the summer of 2011. Twelve whales were sighted in consecutive seasons, eight of them in three consecutive seasons (summer-winter-summer), three in two seasons (summer-winter), and five in two seasons (winter-summer). Three whales were sighted the same day in Laguna San Ignacio suggesting that these animals were traveling in association with each other. Five females with calves were sighted in the winter in Mexican waters and in the next summer off Sakhalin, three of them without calves suggesting that these females had either separated from their calves or that their calves did not survive. The time between the last sighting in one season and the first one in the next season was $\bar{x}=195.4$ days (n=11, 141-255) during the summer-winter migration, and $\bar{x}=165.6$ days (n=13, 131-213) during the winter-summer migration. The matches made between whales sighted off Sakhalin and the Mexican Pacific are the first results of the multinational collaboration "PACIFIC WIDE STUDY ON POPULATION STRUCTURE AND MOVEMENT PATTERNS OF NORTH PACIFIC GRAY WHALES" initiated under the coordination and support of the International Whaling Commission last year.

INTRODUCTION

Recent results of genetic and photographic identification comparisons between western and eastern North Pacific gray whales (see IWC, 2011) suggest a mixing of these populations during the winter reproductive season, and illustrate the great conservation and management importance of a more

comprehensive examination of gray whale movement patterns and population structure in the North Pacific. The Scientific Committee recommended that a collaborative Pacific-wide study be developed under the auspices of the IWC, recognising that *inter alia* this will contribute to the Committee-endorsed Conservation Plan for western North Pacific gray whales and incorporate previous recommendations made by the Committee. Such a study will involve collaborative analysis and sharing of existing data as well as the collection of new data. This report summarizes the results of the “(Phase 1) photo-identification project”. The purpose of this project was to undertake a comparison of two western gray whale catalogues from Sakhalin Island, Russia with the Mexican gray whale catalogue.

METHODS

The comparison was done based on two catalogues of photo-identified gray whales from Sakhalin Island and one catalogue of gray whales from Laguna San Ignacio and Laguna Ojo the Liebre on the west coast of the Baja California Peninsula, México.

The Sakhalin catalogues

The first step was to compare the two catalogues available at that moment:

1) The Russia-US catalogue (2012).

Burdin, A. M., Weller, D., Sychenko, O., and Bradford, A. 2012. “WESTERN GRAY WHALES OFF SAKHALIN ISLAND, RUSSIA: A CATALOG OF PHOTO-IDENTIFIED INDIVIDUALS”.

205 individuals. Period 1994-2011

2) The IBM catalogue.

Tyurneva, O. Yu. and Yakovlev, Yu. M. 2010. “THE WESTERN PACIFIC GRAY WHALES OF SAKHALIN ISLAND 2002-2008, LEARNING ABOUT A POPULATION OF WHALES THROUGH PHOTOGRAPHS”.

165 individuals. Period: 2002-2008

As result of these comparisons 217 photo-identified gray whales from Sakhalin were used in the comparison with the Mexican catalogue. All are represented by the right-side dorsal flank and 215 are associated with the left-side dorsal flank

The Mexican catalogue

This catalogue includes 6,546 gray whales. 5366 photo-identified in Laguna San Ignacio between 1993 and 2011, and 1180 in Laguna Ojo de Liebre (Scammon’s Lagoon) between 2001 and 2003. Of the 6,546 whales in the catalogue 5,890 are represented by a right-side of the dorsal flank image and 1,837 were associated with a left-side dorsal flank image (Table 1).

Table 1. Number of photo-identified gray whales in the Mexican catalogue. Laguna Ojo de Liebre = LOL, Laguna San Ignacio = LSI.

year	Total photo-id whales	Right and left sides	Only right side	Only left side	Lagoon
2001	398	0	398	0	LOL
2002	462	0	462	0	LOL
2003	320	0	320	0	LOL
1996	157	0	155	2	LSI
1997	310	0	310	0	LSI
1998	392	0	392	0	LSI
1999	253	0	253	0	LSI
2000	448	0	448	0	LSI
2003	247	0	247	0	LSI
2005	438	18	420	0	LSI
2006	249	22	226	1	LSI
2007	495	150	217	128	LSI
2008	358	114	137	107	LSI
2009	662	286	238	138	LSI
2010	750	250	319	181	LSI
2011	607	341	167	99	LSI
Total	6546	1181	4709	656	

RESULTS.

The Sakhalin to Mexico catalog comparison resulted in a total of 14 confirmed matches of individuals, including six males, six females and two of unknown sex. Thirteen whales had sightings prior and after to their respective sighting in Mexico. Twelve whales were observed in Laguna San Ignacio and one (#3) in Laguna Ojo de Liebre. Eleven of the 13 whales were photographed in Mexico only in one year and the other 3 in two years. Thirteen whales were sighted in Sakhalin in the summer of 2011 (Table 2).

All fourteen whales were sighted in consecutive seasons, eight of them in three consecutive seasons (summer-winter-summer), three in two seasons (summer-winter), and six in two seasons (winter-summer). Whale #2, male, was sighted in summer-winter (2006-2007), and summer-winter-summer (2009-2010); the whale #9, female, was sighted in summer-winter-summer (2006-2007), and in the winter-summer (2011); and the whale #11, was sighted in summer-winter-summer (2007-2008), and in the summer-winter (2009-2010) (Table 3).

The whales #5, #6 and #12 were sighted the same day, February 24 2006, and whale # 20 was sighted two days later in Laguna San Ignacio. The whales #5 and #12 were in the same group and #6 in a different group, suggesting that these animals were traveling in association with each other (Table 3).

The six known females were sighted with calves in the winter in Mexican waters and in the next summer in their feeding grounds, three of them without calves (Table 3), suggesting that these females had either separated from their calves (e.g. weaned) or that their calves did not survive (e.g., due to predation).

The female #7 was observed with calf on March 11, 2009 in Laguna San Ignacio and 122 days later, on July 11, off the Kamchatka Peninsula where she stayed with her calf at least until September 2. The female #14 was observed with calf on February 17, 2011 in Laguna San Ignacio and 140 days later in Sakhalin Island.

The time between the last sighting in one season and the first one in the next season was $\bar{x}=195.4$ days (n=11, 141-255) during the summer-winter migration, and $\bar{x}=165.6$ days (n=13, 131-213) during the winter-summer migration. The shorter time between Laguna San Ignacio and Sakhalin was of the whale #13, of unknown sex, with 131 days followed by the whale #4, a male, with 139 days, and the whales #8, #11, and #14, mothers with calves, with 144,143, and 140 days respectively (Table 3).

Table 2. Sighting summary information for 13 gray whales matched between Sakhalin and Mexico. * = With calf.

#	Russia-US		IBM		UABCS		Russia-US Sex
	No.	Years	No.	Year(s)	No.	year(s)	
1 ¹	20	97,02-04,07,09,11	80	06,07	06-0209-D-LSI	06	M
2 ¹	52	98,99,00,01,02,03,05,06,08,09,10,11	26	02,05,08	07-0328-I-LSI, 10-0639-D-LSI	07,10	M
3	27	95,97,98,99,00,01,02,04,05,06,07,09,10,11	2	02,05	02-0336-D-LOL	02	M
4	91	00,05,07,08,09,11	137	07	11-0273-D-LSI	11	M
5	28	97,98,99,00,01,03,04,05,06,07,09,11	59	05,07	06-0131-D-LSI	06	M
6	69	98,00,01,02,03,04,08,09,11	113	04,05,07	06-0176-D-LSI	06	M
7 ¹	42	97,98,99,00,03,04,05,11	90	03,05,09* ²	09-0696-D-LSI-M	09*	F
8 ¹	63	97,98*,00,01,02,05,07,08,10,11*	47	03,05,07	08-107-I-LSI-M	08*	F
9	103	01,02,04,05,11	119	05,06,07	07-0457-D-LSI, 11-0526-D-LSI-M	07,11*	F
10	29	97,98,00,01,02,03,04,05,07,09,10,11	28	03,05	10-0739-D-LSI-M	10*	F
11	85	99,01,02,04,05,08*,09,11	51	04,05,07	08-0051-D-LSI-M, 10-0396-D-LSI	08*,10	F
12	94	00,03,04,05,07,11	57	03,06,07,08	06-0132-D-LSI	06	U
13			166	09	09-0506-D-LSI	09	U
14	3	97,99,04,05,06,09	114	05,06,07,08,11*	11-0505-D-LSI-M	11*	F

¹Reported in Weller *et al.* 2011, ²Observed only off Kamchatka

Table 3. Gray whales sighted in consecutive seasons.

#	Sakhalin (Summer)		Mexico (Winter)	Sex	Summer	Days	Winter	Days	Summer
	RusUS	BMI							
1	20	80	06-0209-D-LSI	M			26-Feb-2006	213	27-Sep-2006
2	52	26	07-0328-I-LSI, 10-0639-D-LSI	M	22-Aug-2006 07-Aug-2009	181 217	20-Feb-2007 13-Mar-2010	177	06-Sep-2010
3	27	2	02-0336-D-LOL	M	31-Jul-2001	217	06-Mar-2002	150	03-Aug-2002
4	91	137	11-0273-D-LSI	M			01-Mar-2011	139	18-Jul-2011
5	28	59	06-0131-D-LSI	M	07-Aug-2005	200	24-Feb-2006	179	22-Aug-2006
6	69	113	06-0176-D-LSI	M	23-Ags-2005	184	24-Feb-2006		
8	63	47	08-107-I-LSI-M	F	09-Sep-2007°	201	29-Mar-2008*	144	20-Aug-2008°
9	103	119	07-0457-D-LSI, 11-0526-D-LSI-M	F	17-Oct-2006''	141	08-Mar-2007° 08-Mar-2011*	189 170	13-Sep-2007'' 25-Aug-2011°
10	29	28	10-0739-D-LSI-M	F	07-Aug-2009°	219	14-Mar-2010* 29-Mar-2010*	176	06-Sep-2010°
11	85	51	08-0051-D-LSI-M, 10-0396-D-LSI	F	16-Sep-2007'' 24-Jul-2009	163 255	26-Feb-2008* 06-Mar-2010*	143	19-Jul-2008*
12	94	57	06-0132-D-LSI	U	06-Sep-2005	171	24-Feb-2006	203	16-sep-2006
13		166	09-0506-D-LSI	U			04-Mar-2009	131	113-Jul-2009
14	3	114	11-0505-D-LSI-M	F			17-Feb-2011*	140	07-Jul-2011*

*with calf

°without calf

“presence of calf unknown

DISCUSSION

The 14 individuals sighted in Mexican waters represent close to 10% of the western gray whale population based on the population assessment of an estimate of 130 individuals (90% Bayesian CI = 120-142) (Cooke *et al.* 2008). If we combine these matches with the six matches found off the coast of Vancouver Island reported by Weller *et al.*, (2011), presumably during their migration from the breeding lagoons along the Mexican coast, and the two genetic matches noted by Lang *et al.*, (2011) with whales sampled in southern California, a total of 22 whales identified as part of the western gray whale population have migrated, at least in some years, to the eastern North Pacific during the winter breeding season.

The presence of three of these whales the same day in Laguna San Ignacio, two in the same group, indicate that these whales may travel in association or in groups, as Weller *et al.*, (2011) observed based on six matches off Vancouver Island, British Columbia, Canada. This also suggests that these whales may stay together in groups while on the breeding grounds.

The sex of the whales (six males, six females and two of unknown sex) indicates that both sexes, in approximately equal numbers, migrate to Mexican waters during the winter breeding season.

The sighting of females without their calves on the Russian feeding grounds suggests a high mortality of the calves, based on the small sample of four mothers with calf sighted in Laguna San Ignacio and the next summer off Sakhalin and one off Kamchatka (i.e., only a 50% survivorship). The long distance of their migratory destination compared to the Bering and Chukchi Seas could be an important factor in the survivorship of the calves. Alternatively, these females may have separated from their calves as the normal weaning process when the calves were of sufficient age to begin foraging for themselves.

The number of days between the last photograph of the season and the first one of the next season represents the maximum migration time and depends on the presence of the whale, the chance to find and photograph it, and the field work seasons of the different research teams. The shorter times observed between Laguna San Ignacio and Sakhalin, 131-143 days, could be close to the real migration times of these whales.

The matches made between whales sighted off Sakhalin and the Mexican Pacific are the first results of the multinational collaboration “PACIFIC WIDE STUDY ON POPULATION STRUCTURE AND MOVEMENT PATTERNS OF NORTH PACIFIC GRAY WHALES” initiated under the coordination and support of the International Whaling Commission last year. Additional comparisons and analyses of photographs from the Western and Eastern gray whales are ongoing and will include photographs from the IBM Sakhalin catalogue 2008-2011, IBM Kamchatka catalogue, and from Laguna San Ignacio and Bahia Magdalena winter aggregation and breeding areas, obtained during the winter 2012.

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