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NOAA Technical Memorandum NMFS

AUGUST 2017

COLLABORATIVE LARGE WHALE SURVEY 2015: GRAY WHALE PHOTO-IDENTIFICATION CATALOG

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NOAA-TM-NMFS-SWFSC-584

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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COLLABORATIVE LARGE WHALE SURVEY 2015: GRAY WHALE PHOTO-IDENTIFICATION CATALOG

David W. Weller[1], James V. Carretta[1], Susan J. Chivers[1], John K.B. Ford[2], Alexa K. Kownacki[1,3], Aimée R. Lang[1,3], Sergio Martínez-Aguilar[4], Brenda K. Rone[5], Alisa Schulman-Janiger[6]

[1] Marine Mammal and Turtle Division, Southwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 8901 La Jolla Shores Drive, La Jolla, CA 92037 USA
[2] Pacific Biological Station, Fisheries and Oceans Canada, Nanaimo, BC V9T 6N7, Canada
[3] Ocean Associates, Inc. 4007 N. Abingdon Street, Arlington, VA 22207
[4] Departamento de Ciencias Marinas y Costeras, Universidad Autónoma de Baja California Sur (UABCS), Carretera al sur, km 5.5, Apartado Postal 19-B, 23080, La Paz, Baja California Sur, México
[5] Marine Mammal Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 7600 Sand Point Way N.E., Seattle, WA 98115-6349 USA
[6] Mammalogy, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007 USA

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U.S. DEPARTMENT OF COMMERCE
Wilbur L. Ross, Secretary of Commerce

National Oceanic and Atmospheric Administration
Benjamin Friedman, Acting NOAA Administrator

National Marine Fisheries Service
Chris Oliver, Assistant Administrator for Fisheries

Project Overview

In 2015, NOAA Fisheries Southwest Fisheries Science Center (SWFSC) undertook a Collaborative Large Whale Survey (CLaWS) from 9 July through 9 November aboard NOAA Ship *Reuben Lasker*. The survey was a collaborative effort between SWFSC and NOAA Fisheries Alaska Fisheries Science Center. The study was conducted in U.S. and Canadian waters of the eastern North Pacific (ENP) between the Aleutian Islands, Alaska, and San Diego, California (Fig. 1). The survey was separated into five legs, ranging from 15 to 25 days. The fourth leg of the survey occurred in Canadian Pacific coastal waters between 28 September and 22 October and was a collaborative effort with Dr. John Ford of the Cetacean Research Program, Pacific Biological Station, Fisheries and Oceans Canada.

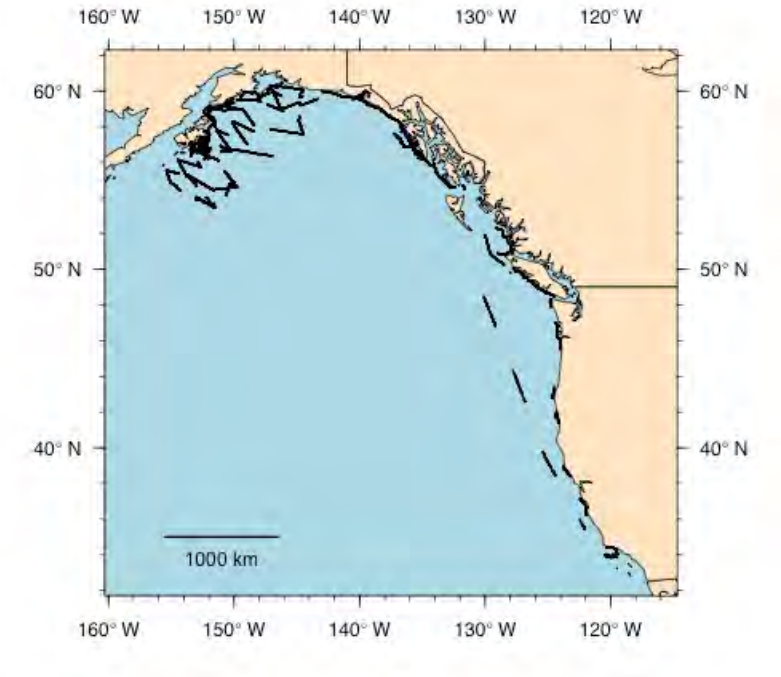

Fig. 1. Study area and survey tracks (dark lines) while “on-visual-effort” during CLaWS 2015.

Background

During summer and fall a small portion of the ENP gray whale population remains south of the customary Arctic feeding grounds. These whales, sometimes referred to as the Pacific Coast Feeding Group (PCFG), summer along the Pacific coast between Kodiak Island, Alaska, and northern California. The PCFG is relatively small in number and utilizes a largely different ecosystem from that of the main ENP population suggesting that it is a distinct feeding aggregation. While these “southern whales” have been the topic of scientific research for several decades, data have been collected in relatively small regional study sites located between 41°N and 52°N.

Rationale

Given the limited photo-identification and biopsy effort north of 52°N, a 2012 NMFS gray whale stock identification workshop emphasized the importance of expanding the spatial and temporal coverage of research effort in this area to better delineate habitat use and define the summer/fall feeding area boundaries[1].

Catalog Description

This catalog provides identification photographs of 131 gray whales (*Eschrichtius robustus*) photographed between central California and Kodiak, Alaska, in 2015 during the CLaWS survey (Fig. 2). The overarching objective of making this catalog openly available is to facilitate regional and international cooperation and collaboration amongst research groups collecting data on gray whales in the North Pacific.

Fig. 2. Gray whale sighting locations during CLaWS 2015.

Study Area and Methods

Study Area — From 9 July to 9 November 2015, NOAA Ship *Reuben Lasker* surveyed Pacific waters between San Diego, California and Kodiak Island, Alaska (Fig. 1).

Sighting Data — A team of three observers stood watch on the flying bridge of the *Reuben Lasker* using 25 x 150 (big-eye) binoculars to search for marine mammals during daylight hours. When marine mammals were sighted, the date, time, position (via 25 x 150 binocular

[1] Weller, D.W., S. Bettridge, R.L. Brownell Jr., J.L. Laake, J.E. Moore, P.E. Rosel, B.L. Taylor, and P.R. Wade. 2013. Report of the National Marine Fisheries Service Gray Whale Stock Identification Workshop. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-507.

bearing/reticle and Latitude/Longitude), species, and number of animals were entered into a computer database running the SWFSC survey software WinCruz.

Gray Whale Photographic and Biopsy Data — When gray whales were sighted and conditions allowed, a 6.7 m rigid hulled inflatable boat (RHIB) was launched from the ship to photograph animals, and collect biopsy and fecal samples. The RHIB was operated by NOAA-trained small boat drivers with no less than 20 years of experience working close to marine mammals. Photographs of gray whales were taken using Canon and Nikon digital SLR cameras and 100-400mm lenses, using JPEG or RAW file formats, at distances of approximately 10-20 m. Efforts were made to document both the left and right lateral sides of individual gray whales whenever possible. Field notes and/or unique crenulations along the dorsal ridge were used to link left and right sides of individuals. Only good to excellent quality images, based on a rating of image focus, angle, contrast and proportion of the target area (i.e. lateral sides) visible in a frame, were used for analysis. Matching was conducted by two analysts and the confirmation of matches was made by a third analyst. The type specimen photographs provided in this PDF catalog have been cropped and resized. These changes resulted in some loss of resolution but the original native resolution images are archived and linked to the catalog so if a potential match is made, it can be confirmed with the original photograph(s).

Biopsy samples were collected from gray whales using a low-powered crossbow that fired a customized dart fitted with a sterilized 7 mm x 40 mm stainless steel biopsy tip. Biopsy samples were stored in liquid nitrogen. Fecal samples were collected opportunistically using a 100 µm mesh net. All biological samples are stored at -80^{o}C in the SWFSC, Marine Mammal and Turtle Molecular Research Sample Collection.

Terms and Definitions

Examples of how to interpret the text box associated with each individual image in the catalog are as follows:

Example 1

150730_1648--SWFSCPhotoID-19925 / S219

150730 = date image was taken in yy/mm/dd format

1648 = cruise number

SWFSCPhotoID = Southwest Fisheries Science Center Photo-Identification

19925 = name/number of image written by camera

S219 = sighting (S), and sighting number (219)

Example 2

150728_150729_150731_150807_150808_1648-SWFSCPhotoID--20006/**S218**/ S229/ S232 (LSK150729.01)/ S271/ S278 (LSK150807.01, .02)/ S344/ S346

150728_150729_150731_150808 = all dates (yy/mm/dd) when images of this whale were taken

1648 = cruise number

SWFSCPhotoID = Southwest Fisheries Science Center Photo-Identification

20006 = name/number of image written by camera

S218 = sighting (S), and sighting number (218). For whales photographed on >1 day, the sighting associated with its catalog photo is bolded (i.e. **S218** in this example)

S229, S232, S271, S278, S344, S346 = additional sightings of this animal

(LSK150729.01) = biopsy sample

LSK = ship (Reuben Lasker)

150729 = date biopsy was collected (yy/mm/dd)

.01 = biopsy number of that day (i.e. this is the first sample from 29 July 2015)

Biopsy Information

Catalog Curator

Please contact dave.weller@noaa.gov for questions about this catalog and/or to request original native resolution images.

Acknowledgements

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facilitating travel and logistics for Leg 4 scientists to meet the ship. The officers and crew of the NOAA Ship Reuben Lasker were extraordinarily helpful and a pleasure to sail with. We gratefully acknowledge and thank all sea-going participants, including: M. Simpson, C. Bryant, S. Yin, H. Colley, A. Martinez, B. Alps, R. Pitman, A. Burke, K. Cates, M. Slack, K. Miller, J. Crance, N. Tucker, T. Johnson, K. Beach, E. Archer, N. Volmer, C. Boyd, E. Watford, A. Baldo, A. Amerson, B. Chen, P. Fiedler, K. Forney, A. Patyten, N. Kellar, A. Van Cise and M. Good. Research activities in Canada were conducted under Fisheries and Oceans Canada Licence Number XMM 7 2015 – Amendment 1. Research activities in the U.S. were conducted under National Marine Fisheries Service Scientific Research Permit No. 14097 issued to the Southwest Fisheries Science Center.

GW0001

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GW0002

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GW0003

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GW0004

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GW0008

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GW0009

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GW0015

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GW0018

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GW0019

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GW0020

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GW0024

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GW0025

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GW0026

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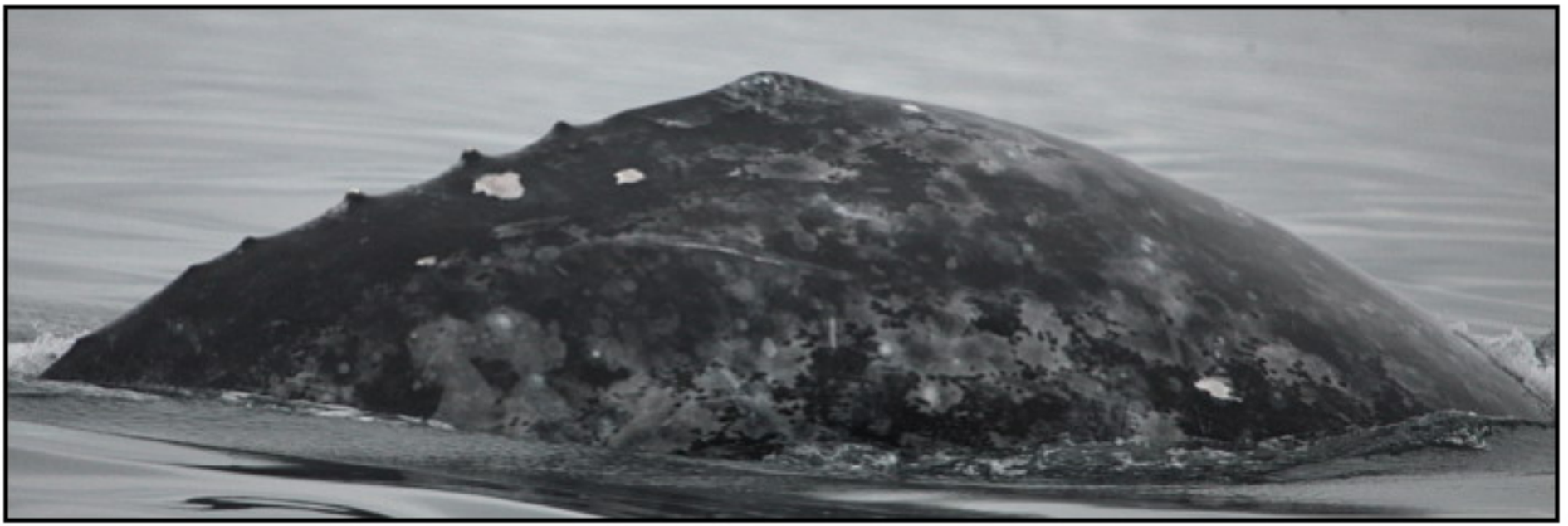

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GW0032

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GW0033

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GW0034

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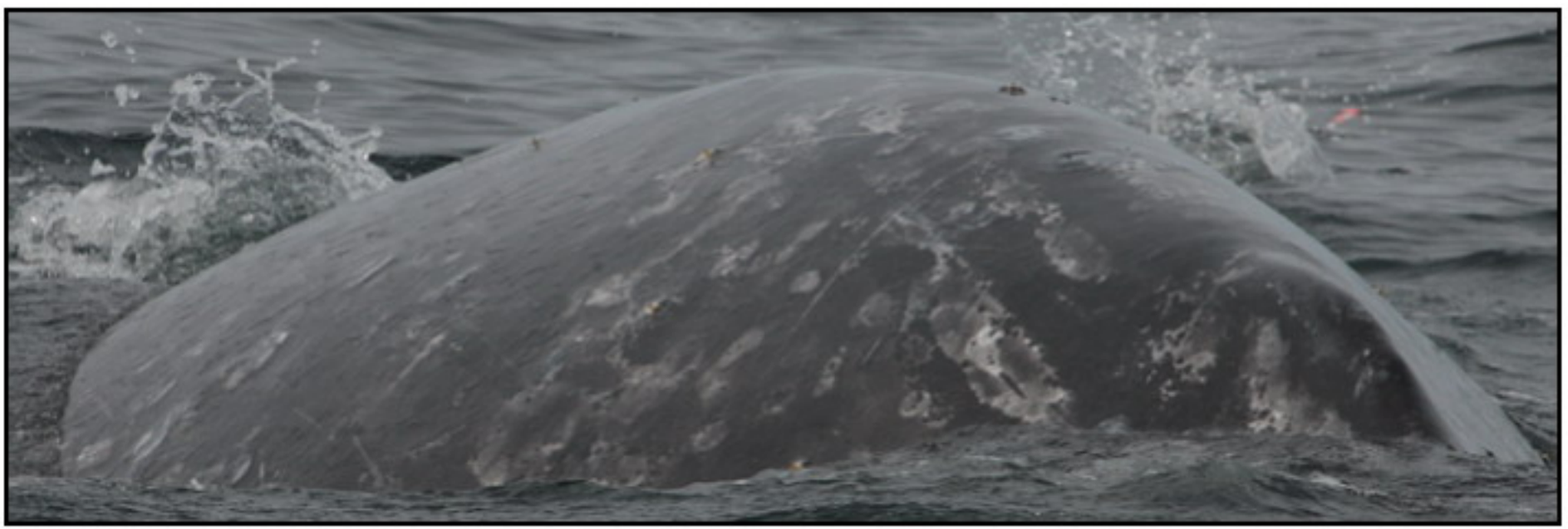

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GW0061

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GW0062

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GW0072

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GW0082

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GW0086

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GW0087

151006_1648-SWFSCPhotoID-7112 / S 1233 (LSK151006.02)

151006_1648-SWFSCPhotoID-7122 / S 1233 (LSK151006.02)

GW0088

151006_1648-SWFSCPhotoID-7156 / S 1233 (LSK151006.03)

151006_1648-SWFSCPhotoID-7138 / S 1233 (LSK151006.03)

GW0089

151006_1648-SWFSCPhotoID-7084 / S 1233

151006_1648-SWFSCPhotoID-7090 / S 1233

GW0090

151013_1648-SWFSCPhotoID-7882 / S 1246 (LSK151013.01)

151013_1648-SWFSCPhotoID-7863 / S 1246 (LSK151013.01)

GW0091

151013_1648-SWFSCPhotoID-7996 / S 1246 (LSK151013.02,03)

151013_1648-SWFSCPhotoID-7964 / S 1246 (LSK151013.02,03)

GW0092

151013_1648-SWFSCPhotoID-8065 / S 1246 (LSK151013.04)

GW0093

151013_1648-SWFSCPhotoID-8026 / S 1246

151013_1648-SWFSCPhotoID-8014 / S 1246

GW0094

151013_151017_1648-SWFSCPhotoID-9167 / S 1246 / **S 1288**

151013_151017_1648-SWFSCPhotoID-9207 / S 1246 / **S 1288**

GW0095

151014_1648-SWFSCPhotoID-8100 / S 1267 (LSK151014.01)

151014_1648-SWFSCPhotoID-8088 / S 1267 (LSK151014.01)

GW0096

151014_1648-SWFSCPhotoID-8162 / S 1267 (LSK151014.02)

151014_1648-SWFSCPhotoID-8129 / S 1267 (LSK151014.02)

GW0097

151014_1648-SWFSCPhotoID-8155 / S 1267

151014_1648-SWFSCPhotoID-8132 / S 1267

GW0098

151015_1648-SWFSCPhotoID-8464 / S 1270 (LSK151015.01,06)

151015_1648-SWFSCPhotoID-8301 / S 1270 (LSK151015.01,06)

GW0099

151015_1648-SWFSCPhotoID-7119 / S 1270 (LSK151015.02)

151015_1648-SWFSCPhotoID-8346 / S 1270 (LSK151015.02)

GW0100

151015_1648-SWFSCPhotoID-8355 / S 1270 (LSK151015.03,05)

151015_1648-SWFSCPhotoID-8363 / S 1270 (LSK151015.03,05)

GW0101

151015_1648-SWFSCPhotoID-8381 / S 1270 (LSK151015.04)

GW0102

151015_1648-SWFSCPhotoID-8272 / S 1270

151015_1648-SWFSCPhotoID-8183 / S 1270

GW0103

151017_1648-SWFSCPhotoID-8891 / S 1288 (LSK151017.01)

151017_1648-SWFSCPhotoID-8748 / S 1288 (LSK151017.01)

GW0104

151017_1648-SWFSCPhotoID-8930 / S 1288 (LSK151017.02)

151017_1648-SWFSCPhotoID-8626 / S 1288 (LSK151017.02)

GW0105

151017_151018_1648-SWFSCPhotoID-8893 / **S 1288** (LSK151017.03) / S 1289

151017_151018_1648-SWFSCPhotoID-9012 / **S 1288** (LSK151017.03) / S 1289

GW0106

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GW0107

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GW0108

151017_1648-SWFSCPhotoID-1297 / S 1288 (LSK151017.06)

151017_1648-SWFSCPhotoID-9128 / S 1288 (LSK151017.06)

GW0109

151017_1648-SWFSCPhotoID-8702 / S 1288

151017_1648-SWFSCPhotoID-8629 / S 1288

GW0110

151017_1648-SWFSCPhotoID-1264 / S 1288

151017_1648-SWFSCPhotoID-9072 / S 1288

GW0111

151017_151018_1648-SWFSCPhotoID-9392 / S 1288 / **S 1289**

151017_151018_1648-SWFSCPhotoID-8981 / **S 1288** / S 1289

GW0112

151017_151018_1648-SWFSCPhotoID-9278 / **S 1288** / S 1289 (LSK151018.03)

151017_151018_1648-SWFSCPhotoID-9419 / S 1288 / **S 1289** (LSK151018.03)

GW0113

151017_151018_1648-SWFSCPhotoID-9323 / S 1288 / **1289** (LSK151018.01)

151017_151018_1648-SWFSCPhotoID-1436 / S 1288 / **1289** (LSK151018.01)

GW0114

151017_1648-SWFSCPhotoID-8869 / S 1288

GW0115

151018_1648-SWFSCPhotoID-9453 / S 1289 (LSK151018.04)

151018_1648-SWFSCPhotoID-9409 / S 1289 (LSK151018.04)

GW0116

151018_1648-SWFSCPhotoID-9524 / S 1289 (LSK151018.05,06)

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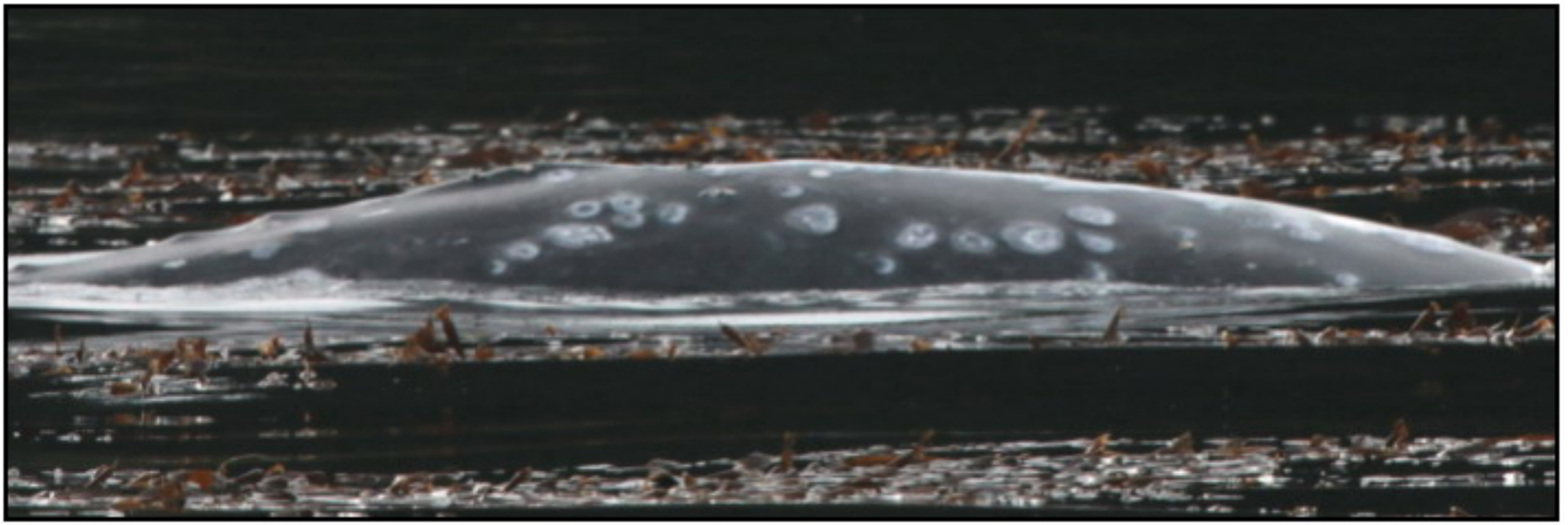

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GW0119

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GW0122

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GW0124

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GW0125

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GW0127

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GW0128

151029_1648-SWFSCPhotoID-3259 / S 1336

GW0129

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GW0130

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GW0131

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GW0132

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GW0133

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GW0134

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GW0135

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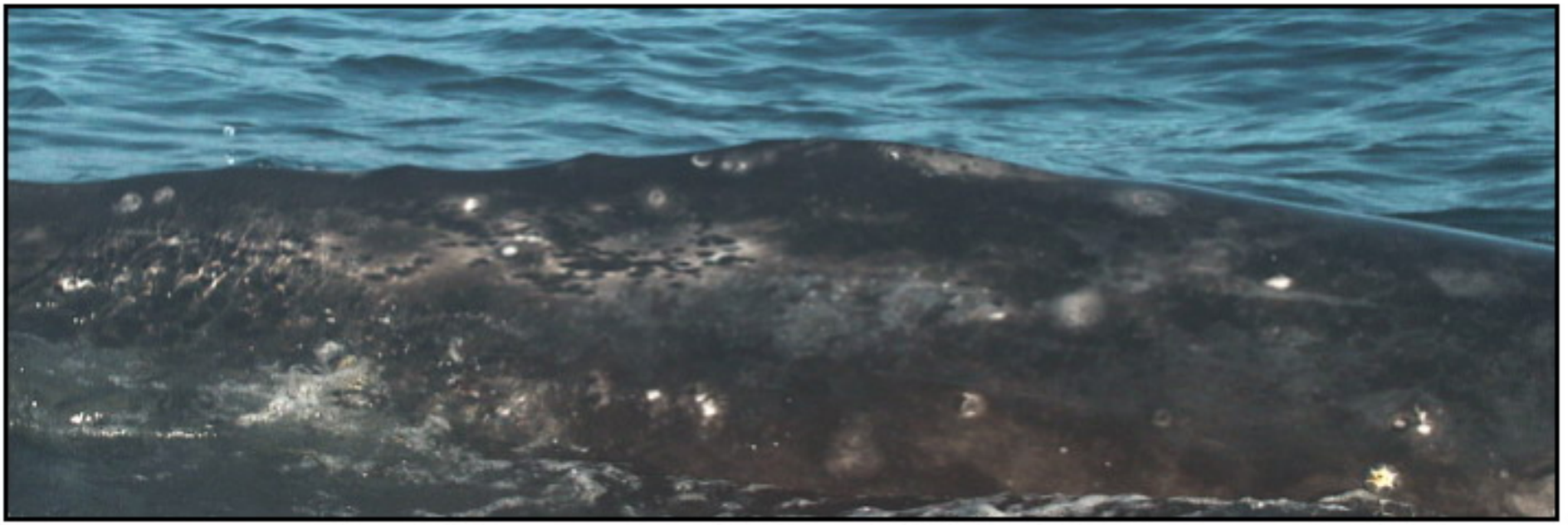
GW0136



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GW0140

151029_1648-SWFSCPhotoID-1795 / S 1336 (LSK151029.05)

TEMPA

151029_TEMP1648-SWFSCPhotoID-5213 / S 1336 (LSK151029.06)

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Appendix 1

Collaborative Large Whale Survey 2015
Gray Whale Sighting Data Contributing to Photo-Identification Catalog

Species	Date	Lat	Lon	LatDD	LonDD	Sighting No.	Best	High	Low
GW	72815	N57:18.64	W152:23.51	57.306400	152.388433	218	4	4	4
GW	72815	N57:18.72	W152:23.41	57.307200	152.387433	219	3	3	3
GW	72915	N57:17.89	W152:25.87	57.292233	152.425367	229	5	5	5
GW	72915	N57:17.76	W152:26.24	57.290933	152.435733	230	1	1	1
GW	72915	N57:17.61	W152:26.71	57.289433	152.440433	231	4	5	4
GW	72915	N57:17.52	W152:27.00	57.288533	152.450000	232	1	1	1
GW	73015	N57:21.75	W152:25.62	57.357500	152.422867	264	3	5	3
GW	73115	N57:17.70	W152:22.18	57.290333	152.368467	271	5	5	4
GW	73115	N57:17.18	W152:22.86	57.285133	152.375267	272	2	2	2
GW	80615	N57:17.90	W152:20.41	57.292333	152.337433	275	1	1	1
GW	80615	N57:17.81	W152:20.41	57.291433	152.337433	276	4	4	4
GW	80715	N57:22.91	W152:28.53	57.375767	152.471967	278	4	4	4
GW	80815	N57:20.01	W152:25.70	57.333433	152.423667	344	3	4	2
GW	80815	N57:19.51	W152:09.77	57.321767	152.157700	346	4	4	4
GW	901215	N57:22.48	W152:08.57	57.380000	152.149167	919	?		
GW	90215	N57:17.70	W152:28.53	57.290333	152.471967	925	5	6	1
GW	90515	N57:14.28	W152:20.86	57.236133	152.341933	980	5	6	3
GW	90615	N57:19.43	W152:23.61	57.320967	152.389433	985	6	7	6
GW	93015	N48:44.85	W125:12.46	48.741833	125.204600	1214	15	20	12
GW	100315	N49:21.87	W126:23.29	49.358700	126.386233	1219	3	3	2
GW	100515	N48:32.55	W124:36.92	48.538833	124.609200	1229	20	26	18
GW	100615	N49:31.71	W126:47.19	49.523767	126.785233	1233	7	8	5
GW	101315	N50:59.82	W127:58.60	50.991533	127.972667	1246	5	6	5
GW	101415	N 53:49.20	W 130.43.34	53.620667	130.720067	1267	6		
GW	101515	N 54:34.64	W 131:00.75	53.939467	131.007500	1270	6		
GW	101715	N50:51.25	W128:23.13	50.852500	128.384633	1288	11	13	9
GW	101815	N50:55.43	W128:10.38	50.920967	128.170467	1289	10	12	8
GW	102015	N48:48.43	W125:23.66	48.804300	125.389933	1292	8	15	6
GW	102115	N 48:30.66	W 124:30.51	48.5066	124.505100	1293	7		
GW	102915	N42:51.06	W124:37.01	42.8516667	124.616944	1336	?		