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INTERNATIONAL
WHALING COMMISSION

Summary of Glacier Bay National Park long term humpback whale monitoring data for NOAA consideration of Unusual Mortality Event in Hawaii – Winter 2016-2017

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Migratory humpback whales (*Megaptera novaeangliae*) from the Hawaii Distinct Population Segment use southeastern Alaska as summer feeding habitat, including the waters in and around Glacier Bay National Park and Preserve (GBNPP). In 2016, GBNPP completed the 32nd consecutive year of consistent long term monitoring of humpback whale population characteristics in Glacier Bay and Icy Strait (GB-IS). Annual reports describing methods, whale and calf counts (Table 1), residency, prey and human interaction observations are available at <https://www.nps.gov/glba/learn/nature/whales.htm>

We attach our annual report for 2015 as well as a recent publication summarizing 30 years of whale monitoring data, to provide essential context for the following *preliminary* summary of our team's observations in summer 2016.

In our June-August monitoring period in 2016, we documented approximately 165 unique whales* in GB-IS. We documented just one mother/calf pair, resulting in the lowest crude birth rate (1 calf / 164 whales = 0.6%) ever documented in the study. This follows a previous record low crude birth rate of 3.0% in 2015 (Neilson et al. 2016). In addition, over the past few years, several whales that historically have resided in GB-IS for 20 days or more were identified on just one day, or not identified at all, indicating a break in their strong site fidelity to GB-IS (Gabriele et al. 2017). Possible reasons for the observed declines in whale numbers, reproduction and site fidelity include shifts in whale prey and anomalously warm ocean temperatures in the northeastern Pacific in 2014-2016. While slowing population growth and reproduction are among the hallmarks of populations approaching carrying capacity, breaks in multiple decades of site fidelity are not, leading us to believe that changes in the marine ecosystem are the most plausible cause of the decline. Note, however, that breaks in site fidelity are indistinguishable from mortality at this point. If the missing whales never re-appear in future years, this would indicate a mortality event that would likely exceed the normative value of 94-98% annual survival rate for this population (Mizroch et al. 2004, Saracco et al. 2013). Given the remarkably low numbers of whales noted by several Hawaii research groups in 2015-2016, which could indicate that many whales failed to migrate to the breeding grounds, we anticipate low calf numbers again in 2017 in southeastern Alaska.

*Photographic analysis for 2016 is nearly complete, but still in progress.

Gabriele, C. M., Neilson, J. L., Straley, J. M., Baker, C. S., Cedarleaf, J. A., & Saracco, J. F. (2017). Natural history, population dynamics, and habitat use of humpback whales over 30 years on an Alaska feeding ground. *Ecosphere*, 8(1).

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Mizroch, S. A., Herman, L. M., Straley, J. M., Glockner-Ferrari, D. A., Jurasz, C., Darling, J., & vonZiegesar, O. (2004). Estimating the adult survival rate of central North Pacific humpback whales (*Megaptera novaeangliae*). *Journal of Mammalogy*, 85(5), 963-972.

Neilson, J. L. and C. M. Gabriele. 2016. Humpback whale monitoring in Glacier Bay and adjacent waters 2015: Annual progress report. Natural Resource Report NPS/GLBA/NRR—2016/1354. National Park Service, Fort Collins, Colorado.

Table 1. Humpback Whale Count and Effort Data for GBNPP Monitoring (June-Aug 1985-2016)

Year:	# Calves	Crude Birth Rate (%)	Total # Whales	Glacier Bay Effort (hrs)	Icy Strait Effort (hrs)	GB+IS Effort (hrs)
1985	2	4.9	41	234	92	326
1986	8	17.4	46	-	-	-
1987	4	6.7	60	-	-	-
1988	8	14.8	54	199	108	307
1989	5	12.2	41	231	123	354
1990	6	12.2	49	215	115	330
1991	4	7.5	53	256	100	356
1992	12	18.2	66	248	71	319
1993	3	6.0	50	192	62	254
1994	9	15.0	60	169	92	261
1995	3	5.3	57	167	90	258
1996	6	7.7	78	259	116	374
1997	9	11.0	82	327	90	417
1998	8	8.7	92	344	64	408
1999	9	8.5	106	318	64	382
2000	3	3.3	90	321	84	405
2001	12	12.0	100	236	76	312
2002	11	12.9	85	297	68	365
2003	7	6.0	117	283	101	384
2004	16	11.5	139	373	74	447
2005	10	6.8	146	216	56	272
2006	13	8.6	151	197	85	282
2007	17	10.6	161	206	117	323
2008	15	9.4	160	187	117	304
2009	12	6.6	182	179	107	286
2010	21	10.9	193	194	99	293
2011	11	5.0	221	189	110	299
2012	16	7.7	209	144	129	273
2013	10	4.1	241	208	102	309
2014	14	8.0	175	177	110	287
2015	5	3.0	166	188	63	251
2016	1	0.6	165	157	76	233
1985-2015 average:	9.3	9.1	112.0	189.5	99.5	289.0
1985-2015 stdev:	4.8	3.9	60.0	60.3	20.9	55.6