RESULTS OF HUMPBACK WHALE POPULATION MONITORING IN GLACIER BAY AND ADJACENT WATERS: 2007

Janet L. Neilson and Christine M. Gabriele

Glacier Bay National Park & Preserve
P.O. Box 140, Gustavus, AK 99826 USA

INTRODUCTION

This report summarizes the findings of the National Park Service's (NPS) humpback whale monitoring program during the summer of 2007, the twenty-third consecutive year of consistent data collection in Glacier Bay and Icy Strait. Each summer, Glacier Bay National Park & Preserve (GBNPP) biologists document the number of individual humpback whales in Glacier Bay and Icy Strait, as well as their residence times, spatial and temporal distribution, reproductive parameters and feeding behavior. These data are used to monitor long-term trends in the population's abundance, distribution and reproductive parameters. Photographic identification data are also shared with other researchers studying North Pacific humpback whales. In addition, Park biologists use whale distribution data on a daily basis to make recommendations regarding when and where GBNPP "whale waters" vessel course and speed restrictions should be implemented in Glacier Bay.

METHODS

The methods used for population monitoring have been described in previous reports. The primary techniques have not changed significantly since 1985, allowing for comparison of data between years. The specific methods used in 2007 are outlined below.

Vessel Surveys: We conducted surveys in Glacier Bay and Icy Strait from May 16 through October 19, 2007. We searched for, observed and photographed humpback whales from the *Sand Lance*, a 5.8-meter motorboat equipped with a single four-stroke Johnson 140 HP outboard engine and based in Bartlett Cove. To minimize the potential impact that monitoring efforts might have on whales, we typically did not conduct surveys in the same area on consecutive days.

Between June 1 and August 31 we surveyed the main body of Glacier Bay (a rectangle defined by four corners: Bartlett Cove, Point Carolus, Geikie Inlet and Garforth Island) 3 – 4 days per week (Fig. 1), focusing the day's effort in a particular part of the study area. We surveyed the West Arm of Glacier Bay (to the mouth of Tarr Inlet) a few times per summer and the East Arm of Glacier Bay infrequently. We surveyed Icy Strait approximately once per week, with the greatest survey effort focused along the shoreline of Chichagof Island from Pinta Cove to Mud Bay and in Park waters around Point Carolus. Glacier Bay is the main area of NPS management concern with regard to whales, but descriptions of the whales' use of Icy Strait provide essential context for the Glacier Bay results because whales frequently move between these areas and because Park waters include portions of Icy Strait. Several Icy Strait surveys included Dundas Bay, Idaho Inlet, Lemesurier Island and Pleasant Island.

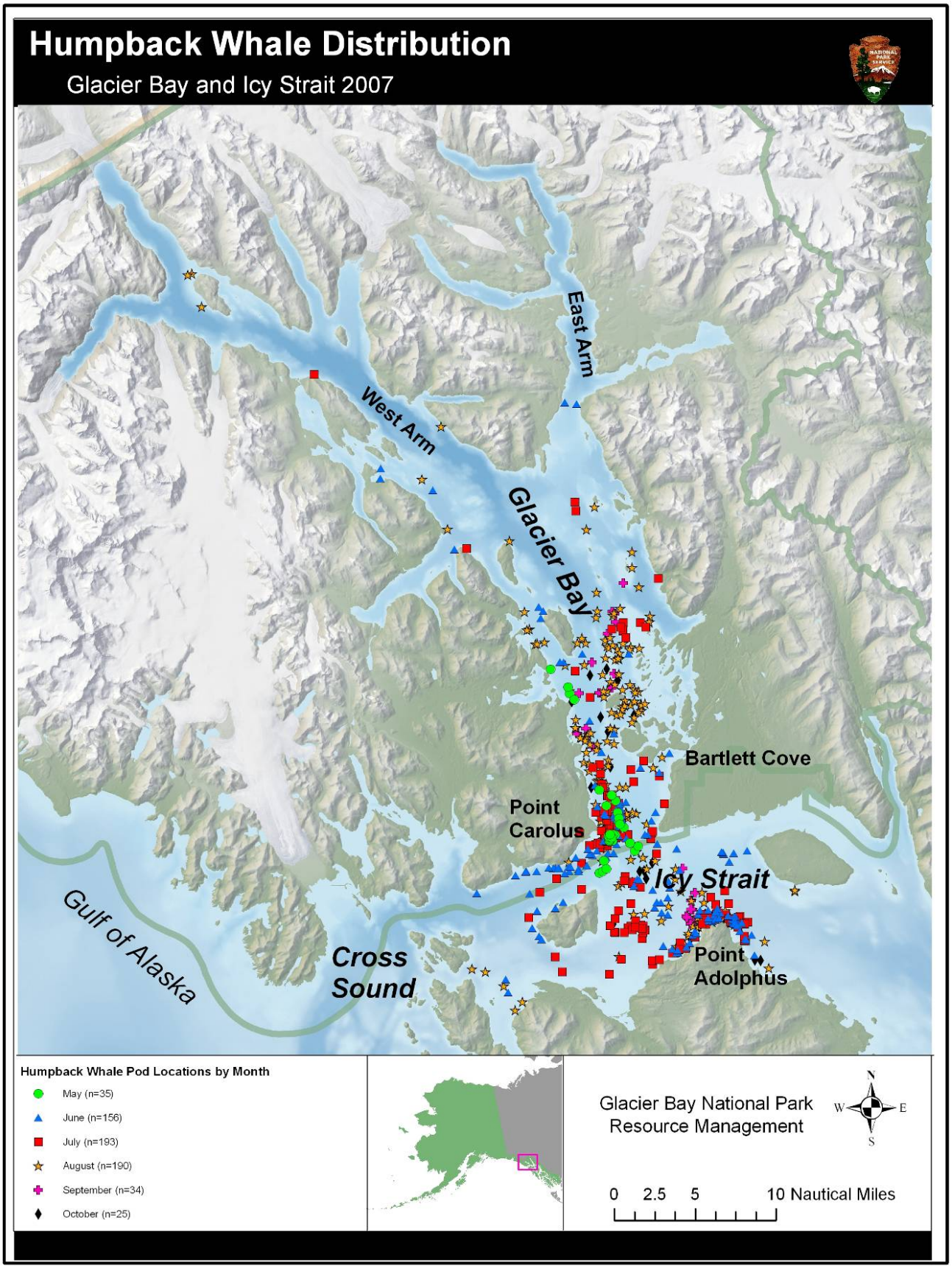

Figure 1. Study area in Glacier Bay and Icy Strait showing distribution of humpback whale pods in 2007. Each symbol represents a pod containing one or more whales.

In 2007 we changed the way that we calculate survey effort and we made these changes retroactive to 2005. Therefore, 2005 and 2006 effort statistics have been recalculated and are different than previously reported (Neilson and Gabriele 2005, Neilson and Gabriele 2006). Prior to 2005, we defined survey effort hours as our total time on the water, including transit time to the portion of the study area that was the day's focus. Beginning in 2005, we began logging the amount of time that we were on effort (*e.g.*, excluding transit time), thus we re-defined survey effort hours as only those hours that we spent actively surveying for whales. In addition, prior to 2005, in counting the number of days of survey effort, we counted any time that we spent in Glacier Bay as one Glacier Bay survey "day", even if we were just transiting through Glacier Bay off effort *en route* to Icy Strait. Beginning in 2005, days in which there was transit time but no survey effort in Glacier Bay were not counted as a Glacier Bay day, although days in which there was survey effort in both Glacier Bay and Icy Strait were still counted as one Glacier Bay day and one Icy Strait day.

We defined a pod of whales as one or more whales within five body lengths of each other, surfacing and diving in unison. Upon locating a pod, we recorded the latitude and longitude coordinates of their initial location, determined with a GPS. We recorded on field datasheets all information pertaining to the pod, including the number of whales, their activity (feed, travel, surface active, rest, sleep, unknown), sketches of the markings on their tail flukes and dorsal fin, photographs taken, whale identity (if known), water depth, temperature and any prey patches observed on the echo-sounder. If the whales were feeding we categorized their feeding behavior as sub-surface, vertical lunge, lateral lunge, bubblenet, other bubble, flick or unknown.

Individual Identification: The ventral surface of each whale's flukes has a distinct, stable black and white pigment pattern that allows for individual identification (Jurasz and Palmer 1981; Katona *et al.* 1979). For some whales, the shape and scarification of the dorsal fin also serve as unique identifiers (Blackmer *et al.* 2000). We took photographs of each whale's flukes and dorsal fin with a Nikon D100 digital camera equipped with a 100-300 mm zoom lens. We compared fluke and dorsal fin photographs to previous NPS photographs and to other available fluke catalogs (Appendix 1) to determine the identity and past sighting history of each whale.

We referred to many whales by a permanent identification number common to the combined catalogs of Glacier Bay National Park & Preserve and University of Alaska Southeast researcher Jan Straley (Straley and Gabriele 2000). We also referred to those whales first photo-identified by Jurasz and

Palmer (1981) by their nicknames (Appendix 2). We only assigned calves a permanent identification number if we obtained adequate photographs of the calf's flukes and the calf was sighted on more than one day. For whales that had not been previously identified in Glacier Bay and Icy Strait, we assigned temporary identification numbers. We replaced these temporary numbers with permanent identification numbers if we identified the whale on more than one day or if the whale was identified elsewhere by another researcher. Photographic and sighting data were added to a relational database containing Glacier Bay and Icy Strait whale sighting histories from 1977 to 2007. We also printed and catalogued the best 2007 identification photograph (fluke or dorsal fin) of each individual.

Whale Counts: We analyzed the 2007 photographs and then counted the number of distinct individual whales in the sample. We made separate counts of Glacier Bay and Icy Strait for the dedicated monitoring period (June 1 – August 31) and for a 'standardized period' (July 9 – August 16) (after Perry *et al.* 1985). Although the standardized period is substantially shorter than the current NPS monitoring period and the beginning and ending dates have no particular biological significance, we continue to use the standardized period because it provides the only valid means of comparing whale counts in 1982 – 1984 to subsequent years (Gabriele *et al.* 1995).

We defined the following age classes: calves (less than one year old), juveniles (age 1 – 4 years, as determined by prior sighting history) and adults (age ≥ 5 years). We also determined the number of whales that were 'resident' in Glacier Bay, Icy Strait and the combined area. We defined a whale as resident if it was photographically identified in the study area over a span of 20 or more days (after Baker 1986).

Genetics: We opportunistically collected sloughed skin on the sea surface with a small dip net when whales breached or performed other surface active behavior. We stored these sloughed skin samples in plastic canisters filled with dry table salt (NaCl). We archived half of each skin sample at GBNPP (in dry salt) and sent the other half to be archived (in DMSO or frozen at -80^{o} F) at the National Marine Fisheries Service Southwest Fisheries Science Center where they are available on request to other scientists studying a variety of topics.

RESULTS AND DISCUSSION

Vessel Surveys: We searched for, observed and photographed humpback whales for a total of 323 hours in the combined Glacier Bay/Icy Strait study area (Table 1). Compared to 2005 and 2006, this

Table 1. Monthly & Annual Survey Effort, 1985 – 2007.

YEAR	MAY # survey days		JUNE # survey days		JULY # survey days		AUG # survey days		SEPT # survey days		TOTAL # SURVEY DAYS (June 1 - August 31)		TOTAL # SURVEY HOURS (June 1 - August 31)		
	GB	IS	GB	IS	GB	IS	GB	IS	GB	IS	GB	IS	GB	IS	GB + IS
1985	0	0	10	7	11	4	10	3	0	1	***31***	***14***	*234*	*92*	***326***
1986	0	0	13	5	17	3	6	6	0	2	***36***	***14***	-	-	-
1987	3	2	12	5	12	7	5	7	1	2	***29***	***19***	-	-	-
1988	0	0	11	5	12	7	12	5	7	3	***35***	***17***	*199*	*108*	***307***
1989	3	1	17	6	14	6	16	7	1	4	***47***	***19***	*231*	*123*	***354***
1990	6	4	16	5	18	6	14	8	0	0	***48***	***19***	*215*	*115*	***330***
1991	7	3	14	7	17	6	13	4	6	3	***44***	***17***	*256*	*100*	***356***
1992	3	2	19	4	17	5	12	4	7	1	***48***	***13***	*248*	*71*	***319***
1993	2	1	10	3	13	3	7	5	1	1	***30***	***11***	*192*	*62*	***254***
1994	1	0	9	5	10	4	13	8	1	1	***32***	***17***	*169*	*92*	***261***
1995	3	2	10	4	11	4	10	7	2	2	***31***	***15***	*167*	*90*	***258***
1996	4	2	11	5	17	10	16	3	3	1	***44***	***18***	*259*	*116*	***374***
1997	5	2	17	4	21	7	19	6	9	4	***57***	***17***	*327*	*90*	***417***
1998	10	4	20	3	23	6	12	4	5	2	***55***	***13***	*344*	*64*	***408***
1999	4	1	16	4	18	6	18	3	5	1	***52***	***13***	*318*	*64*	***382***
2000	1	0	21	8	21	5	23	6	5	1	***65***	***19***	*321*	*84*	***405***
2001	3	1	17	6	14	5	20	5	6	2	***51***	***16***	*236*	*76*	***312***
2002	3	1	19	6	19	4	18	2	4	2	***56***	***12***	*297*	*68*	***365***
2003	5	0	20	7	19	5	16	5	3	1	***55***	***17***	*283*	*101*	***384***
2004	6	2	21	3	19	5	21	5	8	2	***61***	***13***	*373*	*74*	***447***
2005	1	0	16	5	17	3	12	3	4	3	***45***	***11***	*216*	*56*	***272***
2006	2	2	14	6	15	7	16	7	5	1	***45***	***20***	*197*	*85*	***282***
2007	4	2	15	10	14	7	14	6	5	2	***43***	***23***	*206*	*117*	***323***
2005-2006 average survey effort:											45.0	15.5	206.5	70.5	277.0

Note: The dashed line highlights a change in the way survey effort was calculated beginning in 2005. Total # survey hours are not available for 1986 & 1987.

total is above average for the study area. The overall increase in effort is attributable to an above-average amount of survey effort in Icy Strait. The main reason for this increase was the unprecedented number of whales in Icy Strait, including a prolonged aggregation of whales centered around Point Carolus. Although we strive to maintain a comparable level of survey effort each year, it inevitably fluctuates as a result of inter-annual variability in uncontrollable factors such as weather, availability of staff and the frequency of unexpected events that detract from our ability to conduct surveys (*e.g.,* mechanical difficulties and marine mammal strandings).

Whale Counts: For the fifth year in a row we documented a record high number of whales in the study area as a whole (n = 161, Fig. 2, Appendix 3), with a total count 9% higher than in 2006. In Icy Strait,

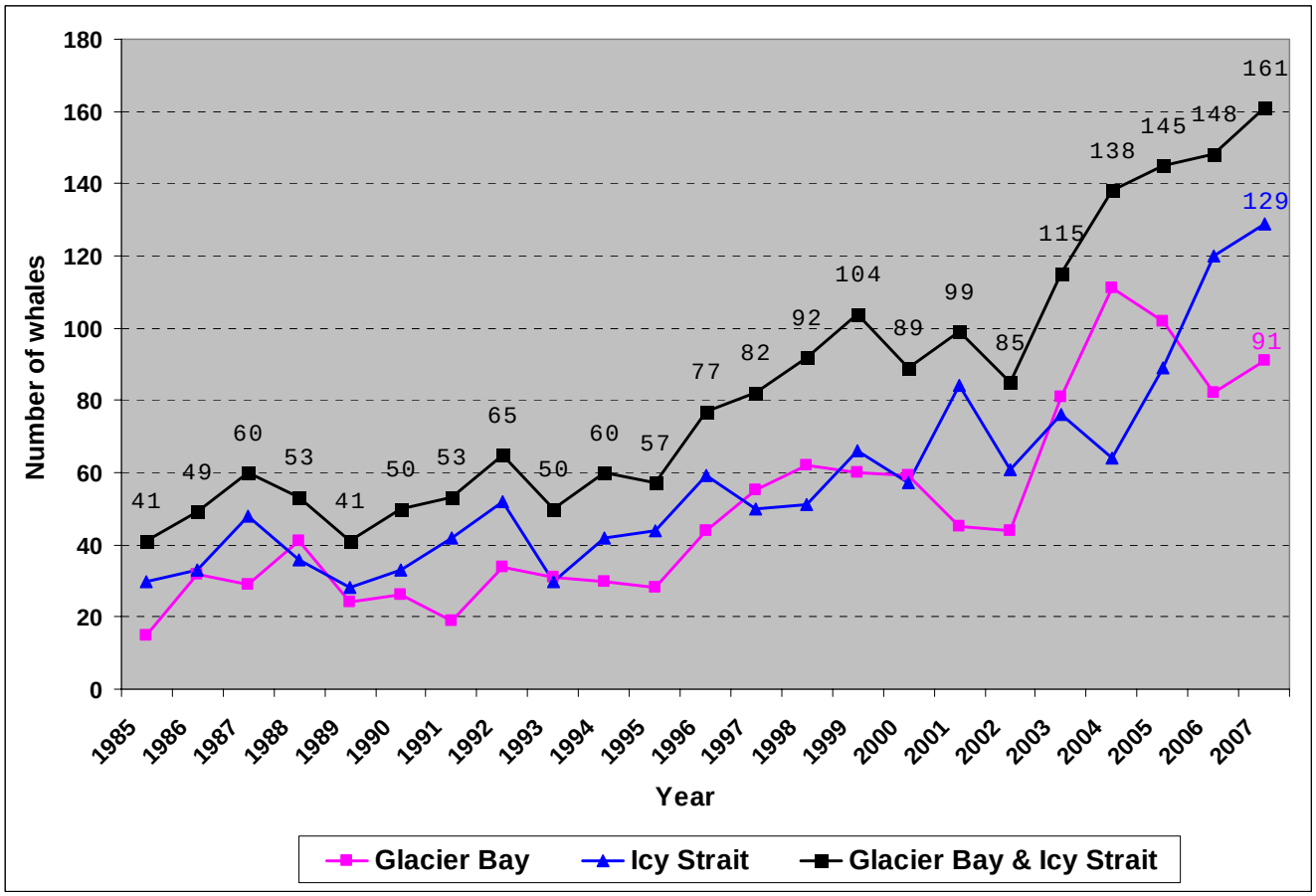

Figure 2. Number of individual whales documented in Glacier Bay and Icy Strait, 1985 – 2007.

the number of whales (n = 129) was at a record high for the third year in a row. In Glacier Bay, the number of whales (n = 91) was higher than in 2006, but lower than in the two record-breaking years of 2004 and 2005. Overall the humpback whale population in southeastern Alaska is growing and the current rate of increase for humpback whales in the North Pacific is estimated to be approximately 5% per year (Calambokidis *et al.* 2008).

Whale #183 was sighted in the study area for the first time since 1982, although this whale has been sighted elsewhere in southeastern Alaska in recent years (J. Straley Investigations, unpublished data). Fifteen (9%) of the whales that we documented in the study area in 2007 had not been sighted previously in Glacier Bay or Icy Strait. The percentage of "new" whales in the study area (9%) was

slightly below the 1985 – 2006 average (12%). Similar to recent years, two of the 15 whales had been sighted elsewhere in southeastern Alaska and 13 whales had never been documented in southeastern Alaska. One more new whale was observed in Icy Strait outside of the regular June through August monitoring period.

Seasonal Distribution: NPS law enforcement rangers made the year's first whale sighting report in mid-March near the entrance to Berg Bay (M. Seraphin and T. Bruno, pers. comm.). For most of April, people out on the water had few if any whale sightings in Glacier Bay and Icy Strait, but whales were sighted in low numbers at Hugh Miller Inlet and Adams Inlet. A concentration of whales near Point Carolus was first reported in early May by Park staff and Superintendent Tomie Lee, marking the start of a whale aggregation that lasted until mid-September in that area. The main whale concentration was just outside the mouth of Glacier Bay proper, from Point Gustavus and Point Carolus west to the "Salt Chuck". At times there were at least 30 whales using this area, and several whales flowed in and out of lower Glacier Bay with the changing tide. The second major whale concentration in Glacier Bay began in August, when whales moved further into the Beardslee Entrance and Flapjack Island area. During this time, additional whales were distributed between Willoughby Island, the Marble Islands and Sandy Cove, and remained in the area until early September.

Whale monitoring surveys ceased in October, but an uncommonly large number of November sightings were made possible by Park staff trips to Russell Island and Blue Mouse Cove. There were whale sightings at Blue Mouse Cove, Whidbey Passage, Hugh Miller Rocks, Willoughby Island and Reid Inlet. The year's final whale sightings were made in early December, when Ranger Maya Seraphin sighted whales at the mouth of Bartlett Cove and in Fingers Bay. Underwater sound monitoring in outer Bartlett Cove documented whale vocalizations in November and early December.

Whale sightings in the West Arm of Glacier Bay (not typically covered by whale monitoring surveys, so these sightings originated from Park rangers and researchers onboard cruise ships) were sparse but occurred regularly at the following locations: Gloomy Knob, Hugh Miller Inlet, Lone Island, Reid Inlet, Ptarmigan Creek, Tlingit Point, Rendu Inlet and occurred occasionally at Composite Island, Jackie Point, Jaw Point, Russell Island, Tarr Inlet and the mouth of the West Arm.

Whale distribution in Icy Strait appeared to be strongly influenced by the concentration of whales near Point Carolus in May. In June and July, whales were distributed into the middle of Icy Strait, in North

Passage and off the west side of Lemesurier Island. Also in June and July, we observed numerous whales around Point Adolphus, including six cow/calf pairs. In August and September whales were still relatively numerous near Point Adolphus, but appeared to have moved slightly north (offshore) of the Point. Several whales were present in our final 2007 surveys of Point Adolphus and the middle of Icy Strait in October.

Whale Waters: The length of whale waters vessel speed restrictions in lower Glacier Bay (125 days) was the second longest since 1985. The duration of these speed restrictions varies greatly from year to year depending on whale use in this area, with a significantly shorter duration in 2006 (22 days) but similar durations in 2003 (134 days) and 2005 (124 days). For the third year in a row, an unusually large aggregation of whales centered around Point Carolus in Park waters in Icy Strait and resulted in a 13-knot speed limit in that area from May 31 – September 14 (107 days). In addition, similar to in 2004, a high number of whales in northern Beardslee Entrance necessitated temporary whale waters there from August 25 – October 2 (39 days).

Residency: Thirty-five (38%) of the 91 whales that entered Glacier Bay between June 1 and August 31, including three cow/calf pairs, remained 20 or more days, or long enough to be considered resident (Appendix 2). The proportion of Glacier Bay residents in 2007 was higher than in 2006 (24%) but below the historic average (1990 – 2006 average = 46%). Sixty-six (51%) of the 129 whales that we identified in Icy Strait, including six cow/calf pairs, remained long enough to be considered resident. The proportion of Icy Strait residents in 2007 was lower than in 2006 (58%) but above the historic average (1990 – 2006 average = 41%). Thirty (19%) of the 161 whales that we sighted in Glacier Bay/Icy Strait were resident in the combined Glacier Bay/Icy Strait study area. Eighteen whales were resident in more than one area (*e.g.,* resident in Icy Strait and then resident in Glacier Bay). Notably, 13 (72%) of these whales started out as residents in Icy Strait or Glacier Bay/Icy Strait and then moved into Glacier Bay later in the summer to become Glacier Bay residents. Overall, 113 whales (70%) were resident in Glacier Bay, Icy Strait or the combined area.

We identified 37 (23%) of the whales in the study area, including three mother/calf pairs, on just one day: 13 in Glacier Bay and 24 in Icy Strait. These single sightings occurred over a broad range of dates, indicating that it was not a single pulse of whales arriving in the area. We documented four more whales on just one day outside of the June 1 – August 31 monitoring period. The proportion of whales sighted on one day in the study area varies each year, with a range of 16% – 43% since 1994.

Reproduction and Juvenile Survival: We documented a record number of mother/calf pairs (n = 17) in 2007 (Table 2) with a crude birth rate (10.6%) similar to the historic average (10.2%) (Table 3).

Table 2. Mother-Calf Pairs, 2007

	Mother ID#	Calf ID#	Documented in:
1.	155	2032	IS
2.	250	250_calf_2007	GB & IS
3.	353	2035	IS
4.	535	2036	GB & IS
5.	581	2037	IS
6.	587	2038	IS
7.	1014	2028	GB
8.	1302	2029	GB & IS
9.	1421	1421_calf_2007	IS
10.	1428	2030	GB & IS
11.	1460	2031	GB & IS
12.	1473	1473_calf_2007	GB
13.	1479	1479_calf_2007	IS
14.	1593	2033	IS
15.	1671	2034	GB
16.	1812	1812_calf_2007	IS
17.	1903	1903_calf-2007	IS

Notes: GB = Glacier Bay; IS = Icy Strait. Only calves whose flukes were photographed received an identification number.

Female #353 (born 1984) had a new calf for the second year in a row. Annual birth intervals in humpback whales are relatively rare (Baker *et al.* 1987) and since 1985 only four other females in the study area have been documented giving birth in successive years; two of the females had a calf two years in a row and two females had a calf three years in a row (Straley *et al.* 1994). Interestingly, one of the females who had a calf three years in a row is #581. In 2007, not only was #581 a grandmother (she is whale #353's mother), but she also returned with her own new calf, making her the most prolific female known in the study population with a total of 11 calves since 1984.

Females #1421 and #1428 (both born in 1997) returned to the study area with their first known calves; previously their sex was unknown. Female #1421's mother (#587) was already known to be a grandmother and also had a calf. Females #1473, #1671, #1812 and #1903 (all ages unknown) were

Table 3. Reproduction and known age whales in Glacier Bay and Icy Strait, 1982 – 2007.

Year:	# Calves	# Calves Photo ID'd	% Calves Photo ID'd	Crude Birth Rate (%)	# Known Age Whales	Total # Whales
1982	6	3	50	-	-	-
1983	0	0	0	-	-	-
1984	7	5	71	17.9	-	39
1985	2	1	50	4.9	3	41
1986	8	5	63	16.3	2	49
1987	4	3	75	6.7	5	60
1988	8	5	63	15.1	4	53
1989	5	3	60	12.2	5	41
1990	6	6	100	12.0	7	50
1991	4	4	100	7.5	8	53
1992	12	10	83	18.5	7	65
1993	3	3	100	6.0	12	50
1994	9	5	56	15.0	10	60
1995	3	2	67	5.3	9	57
1996	6	3	50	7.8	18	77
1997	9	7	78	11.0	17	82
1998	8	7	88	8.7	18	92
1999	9	5	56	8.7	24	104
2000	3	2	67	3.4	23	89
2001	12	9	75	12.1	26	99
2002	11	6	55	12.9	23	85
2003	7	5	71	6.1	27	115
2004	16	12	75	11.6	36	138
2005	10	5	50	6.9	35	145
2006	13	8	62	8.8	41	148
2007	17	12	71	10.6	38	161
1982-2006 average:	7.2	5.0	66.5	10.2	15.2	74.7

Note: Only includes whales documented during the June 1 – August 31 study period. Crude Birth Rate (CBR) = a percentage computed by # calves / total whale count. CBR's for 1982 & 1983 could not be calculated because total whale counts for these years are not available. Number of known age whales does not include calves of the year. These data are not available for 1982 – 1984.

documented with their first known calves. We identified two whales (#1655, born 2002, and #2023, born 2006) that had not been sighted in the study area since they were calves.

In June and July we documented female #1593 and her calf (#2033) five times in Icy Strait, primarily around Point Adolphus. However, when we sighted #1593 later in the season her calf appeared to be

missing. We observed #1593 for 31 minutes on August 31 and for 8 minutes on September 15. Although we occasionally observe mothers separate from their calves for periods up to one hour (NPS, unpublished data), in most cases we eventually document both the mother and the calf on the same day. The apparent absence of #1593's calf in late August and September is cause for some concern, although our observations were not long enough to determine conclusively that the calf was missing. We will not know the fate of this calf unless we resight it in subsequent years using the fluke and dorsal fin photographs that we took earlier in the summer. Only three documented cases of calf mortality have been recorded in the study area (Baker 1986, Baker and Straley 1988, Doherty and Gabriele 2004). In a fourth case we documented a female without her calf late in the season but we could not determine if the calf had died or been weaned early (Doherty and Gabriele 2001). Overall, late season calf absences are very ambiguous given observations of temporary mother/calf separation as well as weaning on the feeding grounds (Baraff and Weinrich 1993, Gabriele *et al.* 2001).

Incidentally, on July 27 we received a report from a whale watching vessel of an injured humpback whale calf at Point Adolphus (T. Merriman, pers. comm.). As the calf rolled at the surface, a passenger reported seeing a large red circular wound measuring approximately 40 cm (16 in) in diameter on the calf's flank. The wound was located about half-way down the calf's body posterior to the insertion point of the pectoral fin. It was not clear if the wound was anthropogenic or natural. On July 30, the captain of the same whale watching vessel thought he saw a "flash of red" on a calf's flank near Point Adolphus (T. Merriman, pers. comm.). We were unable to survey for whales at Point Adolphus until July 31, when we documented several mother/calf pairs but none of the calves had any visible wounds. It is worth noting that our last sighting of #1593's calf was on July 18, thus it is possible that #1593's calf was the injured calf reported in late July and that the calf then died, which would explain its apparent absence in late August and September.

For the third year in a row we documented a record high number of known-age juveniles (n = 8) compared to the 1985-2004 average of 2.6 known-age juveniles per year. The most likely reason for this increase is that the high number of calves documented in the study area in recent years (Table 3) has increased our potential for sighting juveniles in subsequent years. Southeastern Alaska juveniles tend to return to the areas where they were brought by their mother in their calf year (Straley 1994). It is also possible that prey availability or other habitat characteristics of the Glacier Bay area make the habitat especially attractive to juvenile whales.

Genetics: We collected 20 sloughed skin samples from 18 unique individuals, including five calves. Since 1996, we have collected 208 sloughed skin samples from humpback whales in Glacier Bay and Icy Strait. Genetic analysis of these samples allows sex determination, definition of mitochondrial DNA haplotype and nuclear DNA genotyping. The only other practical ways we determine a whale's sex are if the whale returns to the study area with a calf (in which case we know that the mother is female) or in the infrequent event that we obtain photographs of the whale's genital area.

Feeding Behavior and Prey Identification: We positively identified two types of prey in association with feeding humpback whales in 2007: Pacific herring (*Clupea harengus pallasi*) and sand lance (*Ammodytes hexapterus*) (L. Meyer, pers. comm.) (Table 4). In addition, on seven occasions between mid July and late August we noted a distinctive cucumber smell near feeding whales that was likely capelin (*Mallotus villosus*). In most past years the prey type we identified most often was capelin, but in 2007 we were unsuccessful in collecting any specimens with a dip net.

Table 4. Humpback whale prey type determinations.

	PREY SPECIES (# of cases):		
METHOD:	***herring***	***capelin***	***sand lance***
Collected specimen with dip net	1		1
'Cucumber' smell in air		7	

Whale/Human Interactions: We are aware of one possible collision between a humpback whale and a vessel in Glacier Bay in 2007 but as far as we know the collision did not result in serious injury or death of the whale. On July 27, the captain of a 13 m chartered jet boat reported that he was transiting on plane at approximately 28 knots near Lamplugh Glacier in the West Arm when a humpback whale surfaced unexpectedly right off his starboard side. He immediately reduced the vessel's speed and made an evasive maneuver that was so abrupt that it threw him out of his seat and jolted others onboard. The captain did not think that his vessel had struck the whale and he subsequently observed the whale surface at least three more times. However, at least one passenger reported that the whale had been struck (National Park Service Incident Record 07-082). Due to weather and other logistics we were unable to conduct a whale survey in the area for several days, but on August 3 we encountered a whale in the West Arm near Russell Island that may have been involved in the incident. The whale was adult

#1018, a female who regularly frequents the West Arm, and we observed an unusual skin abrasion on her left side (Fig. 3) that we speculated may have been an injury from a vessel collision. The injury consisted of a swath of abraded skin and appeared to be superficial and not life threatening.

Figure 3. Whale #1018 on August 10, 2007 with a minor skin abrasion that may have been caused by a vessel collision.

In 2007 there were seven reported "close call" incidents in which humpback whales nearly collided with vessels in Glacier Bay, compared to 2005 (n = 0) and 2006 (n = 1). Of the seven close calls reported in 2007, six involved cruise ships and one involved a tour boat. On May 17, NPS rangers observed a whale breaching less than 200 m from a cruise ship as the ship transited in the lower West Arm at a speed of approximately 17 knots (M. Fisher and M. Seraphin, pers. comm.). On July 31, a whale surfaced approximately 10 m in front of a 31 m tour boat that was transiting near Strawberry Island at a speed of 13 knots. The operator slowed down the vessel, made an evasive maneuver and avoided a collision (D. Johnson, pers. comm.). On August 3, we observed a cruise ship pass by a whale in the West Arm at a distance of approximately 300 m. On August 6, a whale crossed approximately 40 m in front of a cruise ship's bow as the ship transited north of Strawberry Island at a speed of approximately 15 – 17 knots (K. Harris, pers. comm.). On August 8, a whale surfaced approximately 120 m from a cruise ship as the ship transited near Willoughby Island. Later that day, another whale crossed approximately 120 – 150 m in front of the same ship's bow as the ship transited through Sitakaday Narrows (N. Drumheller, pers. comm.). On September 26, a mother/calf pair surfaced very close to a cruise ship (exact distance unknown) as the ship transited near Rush Point. The pair was observed off the bow of the ship and then off the stern (L. Lieberman, pers. comm.).

Although we do not systematically solicit or track reports of vessels harassing whales in the study area, we occasionally receive reports of harassment. In 2007 we received several reports of the tour boat

Fairweather Express II harassing whales at Point Adolphus during their whale watching trips based out of Bartlett Cove. Passengers reported that the vessel violated federal regulations which prohibit placing a vessel in the path of an oncoming humpback whale so that the whale surfaces within 91 m (100 yards) of the vessel (50 CFR Part 224.103). In addition, we received a report that the *Fairweather Express II* observed the same group of whales continuously for 90 minutes, which conflicts with NOAA Fisheries recommended "Code of Conduct" advising vessels to limit the time they spend observing individual marine mammals to 30 minutes.

In addition, for the second year in a row, we observed many vessels in Park waters in Icy Strait around Point Carolus in close proximity to whales (within 100 m), but in most cases the vessels were anchored or drifting while fishing. Efforts are ongoing to increase awareness among area boaters that the Park's ¼ mile humpback whale approach regulation applies in all Park waters, not just in Glacier Bay proper.

Elsewhere in southeastern Alaska, on July 8 a dying humpback whale was reported in Chatham Strait with a grossly inflated tongue and deformed head (Fig. 4). The animal was identified as whale #1211, an adult first documented in southeastern Alaska in 1992 (J. Straley Investigations, unpublished data). On July 11 the whale was found dead on a beach on Admiralty Island. A necropsy revealed that the whale had been in excellent body condition and that the probable cause of death was blunt trauma to the

Figure 4. Whale #1211 while still alive in Chatham Strait (photo credit NOAA Fisheries Alaska Region).

chest/neck which could have been caused by a collision with a vessel. It appeared that the impact ruptured part of the respiratory tract, forcing air into the tongue and causing it to inflate (Burek 2007, A. Jensen, pers. comm.).

In 2007 we received one report of an entangled whale near Point Adolphus and we documented one whale in Glacier Bay with a minor entanglement. On June 28 a private vessel operator reported a humpback whale entangled in line near Point Adolphus. Subsequent analysis of the reporting party's video footage revealed that it was #2037, whale #581's calf, and that the calf was probably not entangled; instead, it appeared that the calf was playing with strands of bull kelp that closely resembled line. We observed this calf on June 27 playing with kelp and again on July 3, when the calf was surface active, including breaching. In the latter encounter, we confirmed that the calf was not entangled during 18 minutes of observation. Incidentally, on July 12 a different private vessel reported a "sick" whale at Point Adolphus and said that the whale appeared to be lethargic and barely breathing. However, subsequent analysis of the reporting party's digital images of the animal revealed that it was again #2037 and that the calf was probably just resting.

On August 9 we observed adult whale #1426 near South Marble Island in Glacier Bay and suspected that the whale was trailing entangling gear from its flukes, however the whale's dives and travel were so erratic that we were unable to collect detailed observations. Four days later, we encountered #1426 in Sitakaday Narrows and obtained digital images showing what appeared to be a small amount of monofilament line snagged on the whale's right fluke tip. The entanglement was assessed to be non-life threatening and no further action was taken.

Elsewhere in southeastern Alaska, the number of humpback whales reported entangled in 2007 (n = 6) was typical of recent years. On March 17 a humpback whale was reported entangled in line and a buoy in Jamestown Bay in Sitka (NOAA Fisheries Alaska Region, unpublished data). On June 10 a humpback whale was reported entangled in line and a buoy in Sitka Sound (NOAA Fisheries Alaska Region, unpublished data), however it is unclear whether this was the same animal as the whale reported entangled on March 17. On June 15 a humpback whale calf was reported entangled in shrimp pot gear in Tenakee Inlet and then apparently self-released within a few hours of the initial sighting (NOAA Fisheries Alaska Region, unpublished data). On June 19 a sub-adult humpback whale was reported entangled in gillnet that was trailing approximately 50 feet behind the animal outside the study area in eastern Icy Strait near Spasski Island (NOAA Fisheries Alaska Region, unpublished data). On June 22 a

humpback whale calf was reported entangled in line and two buoys at the mouth of Port Frederick outside the study area in eastern Icy Strait (NOAA Fisheries Alaska Region, unpublished data). On July 1 a humpback whale calf was reported entangled in gillnet in lower Lynn Canal near Juneau but then apparently self-released, although this was never confirmed (NOAA Fisheries Alaska Region, unpublished data). On November 13 a sub-adult humpback whale was reported entangled in line in Wrangell Narrows near Petersburg. A trained disentanglement team from the Petersburg Marine Mammal Center successfully removed the gear (NOAA Fisheries Alaska Region, unpublished data).

Notable Behavioral Observations: On August 31 we observed a group of four transient killer whales attacking a Steller sea lion (*Eumetopias jubatus*) near Point Adolphus in Icy Strait. Several hours later, near the end of the kill, two humpback whales approached the kill site wheeze blowing and tail slashing at the remains of the dead sea lion (D. Matkin, pers. comm.). Based on dorsal fin photographs taken by killer whale researcher Dena Matkin, we identified the humpback whales as adult male #166 and whale #1907 (age class and sex unknown). Incidents in which humpback whales are apparently attracted to killer whale predation events on other marine mammals (particularly Steller sea lions) are difficult to interpret but not uncommon (Dolphin 1987, Doherty and Gabriele 2003, Jefferson *et al.* 1991, Matkin *et al.* 2007, Neilson and Gabriele 2005, D. Matkin and V. Deecke pers. comm.). These curious interactions highlight the need to exercise extreme caution in interpreting reports of attempted predation or harassment by killer whales on humpback whales, especially when the observations are brief and/or made from a distance.

On August 19 a NPS marine mammal observer onboard a cruise ship near Rush Point in lower Glacier Bay saw a group of killer whales (*Orcinus orca*) apparently pursuing a humpback whale (N. Drumheller, pers. comm.). Initially, four killer whales splashed and milled while a group of six humpback whales surfaced in tight formation nearby. A few minutes later, a single humpback whale surfaced near the ship with three killer whales “right behind it and almost on top of it”, while the group of six humpbacks continued to surface approximately 0.5 km away. As the single humpback whale dove, the observer caught a brief glimpse of a flesh-colored patch on its right side behind the pectoral fin which may have been a wound, but he could not be certain. Further observations of the interaction were not possible and whether or not this was truly a predation attempt could not be confirmed.

We received two more reports of killer whales apparently pursuing humpback whales in the study area, but both reports were second-hand and neither could be confirmed. The first report involved a group of

killer whales apparently trying to separate a humpback whale mother and calf (C. Murdoch, pers. comm.) and the second report involved a group of killer whales apparently pursuing a surface active humpback whale in Icy Strait (D. Johnson, pers. comm.).

On October 3 we observed three humpback whales (adult male #186, adult male #1244 and an unidentified individual) wheeze blowing next to a group of four or five killer whales. Soon after, the humpback whales began to travel away while the killer whales began milling approximately 500 m away. We did not detect a killer whale predation event associated with this interaction and we do not know the significance of the behavior we observed.

In 2007 we visually confirmed the identity of two singing humpback whales in Glacier Bay. On September 18 we detected a singing humpback whale on a portable hydrophone deployed off the whale survey vessel *Sand Lance* at the entrance to Glacier Bay. By correlating the timing and loudness of the song with our observations of a nearby whale, we positively identified the singer as whale #352, a 23-year-old male who had not been documented singing in the study area before. On October 14 we deployed the portable hydrophone off the *Sand Lance* in Sitakaday Narrows and heard a whale singing who we positively identified as whale #1065, a 15-year-old whale of unknown sex. Whale #1065 was documented singing in 2003 and was also the first whale ever to be confirmed as a singer in Glacier Bay, exactly four years prior to our 2007 observation on October 14, 2003 (Doherty and Gabriele 2003).

ACKNOWLEDGEMENTS

The whale monitoring study is vastly enriched by participation from Park staff and volunteers. We gratefully acknowledge the diligent efforts of Ellen Chenoweth who cheerfully assisted us with a wide variety of tasks from data entry to whale surveys. We thank all of the enthusiastic staff at Glacier Bay National Park & Preserve for reporting whale sightings, and the Park's Visitor Information Station for recording them and passing them on to us. We especially appreciated receiving regular whale sighting reports from NPS shipboard marine mammal observers Karin Harris and Nat Drumheller, Justin Smith on the *Capelin*, Deb Johnson on the *Sigma-T* , and Jim Johnson, Wayne Clark and Tom Howard on the *Serac*. Special thanks to Dena Matkin on the *Kingfisher* for passing on her humpback whale observations and photographs. We appreciate Tim Merriman on the *Spirit of Adventure* for sharing his whale observations in Icy Strait. A big thanks to Bruce McDonough for keeping the *Sand Lance* running smoothly for another busy field season. We are grateful to Lexa Meyer for positively identifying a fish sample that we collected. Last but not least, we thank Susan Boudreau for her support of this research. National Park Service data from 1988 to 1990 were collected by Jan Straley. National Park Service data from 1985 to 1988 were collected by C. Scott Baker. This work was carried out under NOAA Fisheries Permit #945-1776-00.

LITERATURE CITED:

Baker, C. S. (1986). Population characteristics of humpback whales in Glacier Bay and adjacent waters: Summer 1986. Report to the National Park Service, Gustavus, AK, 30 pp.

Baker, C. S., A. Perry and L. M. Herman (1987). Reproductive histories of female humpback whales (*Megaptera novaeangliae*) in the North Pacific. Marine Ecology Progress Series 41:103-114.

Baker, C. S. and J. Straley (1988). Population characteristics of humpback whales in Glacier Bay and adjacent waters: Summer 1988. Report to the National Park Service, Gustavus, AK, 30 pp.

Baraff, L. and M. T. Weinrich (1993). Separation of humpback whale mothers and calves on a feeding ground in early autumn. *Marine Mammal Science* 9(4):431-434.

Blackmer, A. L., S. K. Anderson and M. T. Weinrich (2000). Temporal variability in features used to photo-identify humpback whales (*Megaptera novaeangliae*). Marine Mammal Science 16:338-354.

Burek, K. (2007). Cetacean Necropsy Report MN-71307. Unpublished report. 4 pp.

Calambokidis, J., E. A. Falcone, T. J. Quinn, A. M. Burdin, P. J. Clapham, J. K. B. Ford, C. M. Gabriele, R. LeDuc, D. Mattila, L. Rojas-Bracho, J. M. Straley, B. L. Taylor, J. R. Urban, D. Weller, B. H. Witteveen, M. Yamaguchi, A. Bendlin, D. Camacho, K. Flynn, A. Havron, J. Huggins and N. Maloney. (2008). SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback

Whales in the North Pacific. Final report to U.S. Department of Commerce for Contract AB133F-03-RP-00078, Cascadia Research, Olympia, WA. 57 pp.

Doherty, J. L. and C. M. Gabriele (2001). Population characteristics of humpback whales in Glacier Bay and adjacent waters: 2001. Report to the National Park Service, Glacier Bay National Park and Preserve, Gustavus, AK. 27 pp.

Doherty, J. L. and C. M. Gabriele (2003). Results of humpback whale population monitoring in Glacier Bay and adjacent waters: 2003. Report to the National Park Service, Glacier Bay National Park and Preserve, Gustavus, AK. 22 pp.

Doherty, J. L. and C. M. Gabriele (2004). Results of humpback whale population monitoring in Glacier Bay and adjacent waters: 2004. Report to the National Park Service, Glacier Bay National Park and Preserve, Gustavus, AK. 25 pp.

Dolphin, W.F. (1987). Observations of humpback whale, *Megaptera novaeangliae* – killer whale, *Orcinus orca*, interactions in Alaska: comparison with terrestrial predator-prey relationships. Canadian Field-Naturalist 101:70-75.

Gabriele, C. M., J. M. Straley and C. S. Baker (1995). The Variability of Humpback Whale Counts in Glacier Bay and Icy Strait. Proceedings of the Third Glacier Bay Science Symposium, 1993, edited by D. R. Engstrom, p. 239-245.

Gabriele, C. M., J. M. Straley, S. A. Mizroch, C. S. Baker, A. S. Craig, L. H. Herman, D. Glockner-Ferrari, M. J. Ferrari, S. Cerchio, O. von Ziegesar, J. Darling, D. McSweeney, T. J. Quinn II and J. K. Jacobsen (2001). Estimating the mortality rate of humpback whale calves in the central North Pacific Ocean. Canadian Journal of Zoology 79:589-600.

Jefferson, T. A., P. J. Stacey and R. W. Baird (1991). A review of killer whale interactions with other marine mammals: predation to co-existence. Mammal Review 21:151-180.

Jurasz, C. M. and V. P. Palmer (1981). Censusing and establishing age composition of humpback whales (*Megaptera novaeangliae*), employing photodocumentation in Glacier Bay National Monument, Alaska. Report to the National Park Service, Anchorage, AK, 42 pp.

Katona, S. K., B. Baxter, O. Brazier, S. Kraus, J. Perkins and H. Whitehead (1979). Identification of Humpback whales by Fluke Photographs. In: Behavior of Marine Animals, vol. 3: Cetaceans. Edited by H. E. Winn and B. L. Olla, Plenum Press, p. 33-44.

Matkin, D. R., J. M. Straley and C. M. Gabriele (2007). Killer whale feeding ecology and non-predatory interactions with other marine mammals in the Glacier Bay region of Alaska. *In* Piatt, J.F., and Gende, S.M., eds., Proceedings of the Fourth Glacier Bay Science Symposium, October 26–28, 2004: U.S. Geological Survey Scientific Investigations Report 2007-5047, p. 155-158.

Neilson, J. L., and C. M. Gabriele (2005). Results of humpback whale population monitoring in Glacier Bay and adjacent waters: 2005. Report to the National Park Service, Glacier Bay National Park and Preserve, Gustavus, AK. 24 pp.

Neilson, J. L., and C. M. Gabriele (2006). Results of humpback whale population monitoring in Glacier Bay and adjacent waters: 2006. Report to the National Park Service, Glacier Bay National Park and Preserve, Gustavus, AK. 22 pp.

Perry, A., C. S. Baker, and L. M. Herman (1985). The natural history of humpback whales (*Megaptera novaeangliae*) in Glacier Bay. Final Report to the National Park Service, Alaska Regional Office, Anchorage, AK, 41 pp.

Straley, J.M. (1994). Seasonal characteristics of humpback whales (*Megaptera novaeangliae*) in southeastern Alaska. Master's Thesis, University of Alaska, Fairbanks. 121 pp.

Straley, J. M., C. M. Gabriele, and C. S. Baker (1994). Annual reproduction by individually identified humpback whales *(Megaptera novaeangliae)* in Alaskan waters. Marine Mammal Science 10:87-92.

Straley, J. M. and C. M. Gabriele (2000). Humpback Whales of Southeastern Alaska. Humpback whale fluke identification catalog (3rd printing), National Park Service, P.O. Box 140, Gustavus, Alaska, 150 pp.

APPENDIX 1

Humpback Whale Fluke Catalogs Used for Matching

Cartwright, R. Unpublished data. Keiki Kohola Project. Department of Biology, California State University – Channel Islands, One University Dr., Camarillo, CA 93012.

Darling, J. D. (1991). Humpback Whales in Japanese Waters (Ogasawara and Okinawa) Fluke Identification Catalogue 1987-1990. World Wide Fund for Nature Japan, Minato-ku, Tokyo, Japan. 56 pp.

Jacobsen, J. Unpublished data. Department of Biological Sciences, Humboldt State University, PO Box 4492, Arcata, CA 95518.

Jurasz, C. M. and V .P. Palmer (1981). Censusing and establishing age composition of humpback whales (*Megaptera novaeangliae*), employing photodocumentation in Glacier Bay National Monument, Alaska. Report to the National Park Service, Anchorage, AK, 42 pp.

Pacific Biological Station. Photographic Catalogue of Humpback Whales in British Columbia (http://www-sci.pac.dfo-mpo.gc.ca/sa/cetacean/humpbackwhale/default_e.htm), Cetacean Research Program, Pacific Biological Station, 3190 Hammond Bay Rd., Nanaimo, BC V9T 6N7.

Perry, A., C. S. Baker and L. M. Herman (1985). The natural history of humpback whales (*Megaptera novaeangliae*) in Glacier Bay. Final Report to the National Park Service, Alaska Regional Office, Anchorage, AK, 41 pp.

Perry, A., J. R. Mobley, Jr., C. S. Baker and L. M. Herman (1988). Humpback whales of the central and eastern North Pacific. University of Hawaii Sea Grant Miscellaneous Report, UNIHI-SEAGRANT-MR-88-02, 236 pp.

Sharpe, F. Unpublished data. Alaska Whale Foundation, 4739 University Way NE #1239, Seattle, WA 98105.

Straley, J. M. and C. M. Gabriele (2000). Humpback Whales of Southeastern Alaska. Humpback whale fluke identification catalog (3rd printing), National Park Service, PO Box 140, Gustavus, AK. 151 pp.

Uchida, S. and N. Higashi (1995). Fluke Identification Catalogue of Humpback Whales in Japanese Waters off Okinawa 1991-1995. Okinawa Expo Aquarium, Motobu-Cho, Okinawa, Japan 905-03. 18 pp.

von Ziegesar, O., B. Goodwin and R. DeVito (2004). A catalog of humpback whales in Prince William Sound Alaska 1977-2001, Eye of the Whale Research, PO Box 15191, Homer, AK 99603. 49 pp.

APPENDIX 2

Sighting Histories of Individually Identified Whales: 2007
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	5/16/2007	5/18/2007	5/25/2007	5/30/2007	6/1/2007	6/4/2007	6/5/2007	6/6/2007	6/7/2007	6/11/2007	6/12/2007	6/13/2007	6/14/2007	6/15/2007	6/18/2007	6/20/2007	6/21/2007	6/22/2007	6/25/2007	6/26/2007	6/27/2007	6/28/2007	6/29/2007	7/2/2007	7/3/2007	7/6/2007	7/9/2007	7/10/2007	7/11/2007	7/13/2007	7/17/2007	7/18/2007	7/19/2007	7/20/2007	7/23/2007	7/24/2007	7/25/2007	7/27/2007	7/30/2007	7/31/2007	8/2/2007	8/3/2007	8/7/2007	8/8/2007	8/9/2007	8/10/2007	8/13/2007	8/14/2007	8/15/2007	8/16/2007	8/20/2007	8/21/2007	8/23/2007	8/27/2007	8/28/2007	8/30/2007	8/31/2007	9/11/2007	9/12/2007	9/18/2007	9/20/2007	9/27/2007	10/2/2007	10/3/2007	10/14/2007	10/19/2007
1	1065		GB		IS					IS		IS														IS				IS		IS											GB				GB		GB					GB				GB					GB			IS	GB	GB
2	1088		GB							IS			GB					GB				IS																	IS						IS				GB							IS	GB											
3	1293		GB	GB	IS																IS					IS						IS	GB					IS																GB	GB				IS		IS							GB
4	1652		GB		GB											IS		GB				IS										IS									GB						GB				IS						GB											
5	235	Spot	GB																		IS	IS								IS															IS																							
6	1816		IS	GB																						IS							GB				IS				GB								GB																			GB
7	1832		IS									IS																																					IS																			
8	1899		IS	IS						IS																IS																										GB			GB													
9	1904		IS	GB																						GB							IS																GB																			
10	351		IS	GB	GB	GB		GB					GB					GB								IS			GB	IS			GB				IS				GB													GB			GB			GB								
11	1809			GB						IS			IS								IS							GB				IS					GB	IS			GB																GB											
12	1844			IS															IS																																																	
13	1896			IS														GB			IS									IS			IS				IS	IS								GB	GB											GB										
14	1299			IS				GB									IS				GB					IS			GB				GB				IS	IS			GB						GB	GB						GB									GB					
15	1014				GB																GB																				GB								GB					GB														
16	2028	calf of 1014			GB																GB																				GB								GB					GB														
17	161	B.W.M.			GB								IS				IS	GB				IS																	IS																									GB				
18	1807				GB							IS				IS			IS							GB						IS	IS						IS							GB			GB																			
19	1808				GB													GB	IS							GB		GB	GB				GB								GB													GB														
20	577	Scoper			IS								IS				IS	GB				IS								GB									IS						IS						IS		IS						IS		IS							
21	1012				IS				GB		GB				GB						IS									IS											GB								GB	GB					GB		GB	GB		GB							GB	
22	1244	Dimple Dorsal			IS												IS	GB								IS							IS	IS							GB					GB				GB			GB													IS	GB	
23	1302				IS	GB			GB								IS		IS		GB								GB			IS					IS										GB							GB				GB		GB								GB
24	2029	calf of 1302			IS				GB								IS				GB								GB									IS									GB													GB								GB
25	1505					GB									GB	IS																																													IS					IS		IS
26	1042						IS																IS											IS					IS			IS			IS																							
27	118	Chop Suey					IS										GB						GB				IS		GB				GB						IS		GB				IS								IS						IS									
28	1306						IS									IS			IS				IS				IS							IS											IS						IS																	
29	157	M.D.					IS			IS						IS																		IS					IS														IS								IS			IS		IS		
30	1593						IS									IS							IS				IS							IS																									IS		IS							
31	2033	calf of 1593					IS									IS			IS				IS				IS							IS																																		
32	1659						IS									IS											IS																																		IS							
33	1834						IS																			IS				GB																																						
34	186						IS												IS				IS				IS																		IS						IS		IS						IS		IS					IS		
35	219						IS												IS								IS						IS	IS					IS														IS						IS		IS							
36	352						IS																														IS					IS																			IS	GB						
37	516	Garfunkle					IS												IS				IS											IS											IS						IS								IS									
38	875						IS									IS			IS								IS															IS									IS																	
39	1063							GB		IS												IS										IS							IS				GB	GB			GB										GB											
40	1485								GB			IS	IS									IS										IS							IS		GB								GB	GB				GB						GB								
41	1840								GB								IS																							GB																												
42	117	White Eyes								IS								GB				IS				IS																				GB								GB							IS					IS		
43	1474									IS											IS	IS										IS	IS	IS					IS			IS			IS						IS		IS								IS							
44	564	Roundup Taylor								IS											IS					IS												IS			GB																											
45	1031											IS							IS																				IS						IS																							
46	1246											IS									GB	IS										IS							IS						IS				GB																	IS		
47	1532											IS	IS																																																							
48	1905											IS				IS					GB								GB	GB																										GB												
49	465											IS							IS							IS															GB					GB								GB														
50	1233												IS			IS		GB											GB																	GB																						

APPENDIX 2 (cont'd.)

Sighting Histories of Individually Identified Whales: 2007
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	5/16/2007	5/18/2007	5/25/2007	5/30/2007	6/1/2007	6/4/2007	6/5/2007	6/6/2007	6/7/2007	6/11/2007	6/12/2007	6/13/2007	6/14/2007	6/15/2007	6/18/2007	6/20/2007	6/21/2007	6/22/2007	6/25/2007	6/26/2007	6/27/2007	6/28/2007	6/29/2007
51	1657												IS												
52	1805												IS												
53	1480												IS			IS									
54	937												IS				IS					IS			
55	587	Gertrude											IS				IS					IS			
56	2038	calf of 587											IS				IS					IS			
57	GBNP-JLN-20070612-1-0061												IS												
58	1313												GB												
59	221												GB				IS				GB				
60	1018													GB						GB					
61	801													GB	GB									GB	
62	1049															IS							IS		
63	1292															IS						IS			
64	1421															IS									
65	1421_calf_2007	calf of 1421														IS									
66	1438															IS			IS						
67	GBNP-JLN-20070615-1-0031															IS									
68	1470																IS								
69	1479																IS								
70	1479_calf_2007	calf of 1479															IS								
71	166	Frenchie															IS		IS			IS			
72	1811																IS		IS						
73	573																IS					IS			
74	1046																	GB				IS			
75	1432																	GB							
76	225	Vagn																GB							
77	1439																		IS						
78	1817																		IS						
79	1870																		IS						
80	539	Max																	IS			IS			
81	826																		IS		GB	IS			
82	941																		IS			IS			
83	GBNP-JLN-20070621-1-0082																		IS						
84	1083																				GB				
85	1489																				GB				
86	1815																				GB				
87	584																				GB				
88	2044																				IS				
89	535	Quits																			IS	IS			
90	2036	calf of 535																			IS	IS			
91	1019																					IS			
92	1298																					IS			
93	1486																					IS			
94	1754																					IS			
95	1784																					IS			
96	616	Lesser																				IS			
97	965																					IS			
98	193																						IS		
99	353																						IS		
100	2035	calf of 353																					IS		

	Whale ID	7/2/2007	7/3/2007	7/6/2007	7/9/2007	7/10/2007	7/11/2007	7/13/2007	7/17/2007	7/18/2007	7/19/2007	7/20/2007	7/23/2007	7/24/2007	7/25/2007	7/27/2007	7/30/2007	7/31/2007
51	1657																	
52	1805	IS							IS					IS				
53	1480																	
54	937														IS		GB	
55	587		IS												IS			IS
56	2038		IS												IS			IS
57	GBNP-JLN-20070612-1-0061																	
58	1313																	
59	221	IS	IS							IS								
60	1018						GB											
61	801															GB		
62	1049		IS							IS		GB						
63	1292							IS										
64	1421																	
65	1421_calf_2007																	
66	1438	IS			GB	GB			GB					IS				
67	GBNP-JLN-20070615-1-0031																	
68	1470																	
69	1479																	
70	1479_calf_2007																	
71	166					IS									IS			IS
72	1811																	
73	573					IS				IS					IS			IS
74	1046												GB		IS			
75	1432												IS				GB	
76	225																	
77	1439		IS												IS			
78	1817												IS				GB	
79	1870																	
80	539					IS		IS										
81	826																	
82	941					IS		IS										
83	GBNP-JLN-20070621-1-0082																	
84	1083							IS		IS					IS			
85	1489	IS													IS			
86	1815							IS							IS			
87	584							IS							IS			
88	2044																	
89	535							IS										
90	2036							IS										
91	1019							IS							IS			
92	1298							IS					GB		IS			IS
93	1486							IS					GB				GB	
94	1754																	
95	1784	IS							GB									
96	616							IS										
97	965																	
98	193		IS							IS					IS			
99	353		IS							IS								IS
100	2035		IS							IS								IS

	Whale ID	8/2/2007	8/3/2007	8/7/2007	8/8/2007	8/9/2007	8/10/2007	8/13/2007	8/14/2007	8/15/2007	8/16/2007	8/20/2007	8/21/2007	8/23/2007	8/27/2007	8/28/2007	8/30/2007	8/31/2007	9/11/2007	9/12/2007	9/18/2007	9/20/2007	9/27/2007	10/2/2007	10/3/2007	10/14/2007	10/19/2007
51	1657							IS															IS		IS		
52	1805																						GB				
53	1480																										
54	937			IS																			IS				
55	587			IS						IS		IS						IS		IS							
56	2038			IS						IS		IS						IS		IS							
57	GBNP-JLN-20070612-1-0061																										
58	1313							GB					GB				GB										
59	221			IS				GB		IS								IS									
60	1018	GB	GB				GB																				
61	801		GB				GB																				
62	1049																	IS									
63	1292																										
64	1421																										
65	1421_calf_2007																										
66	1438																										
67	GBNP-JLN-20070615-1-0031																										
68	1470			IS																							
69	1479																										
70	1479_calf_2007																										
71	166			IS						IS		IS						IS		IS							
72	1811																										
73	573			IS						IS		IS						IS		IS			GB				
74	1046		GB						GB					GB													
75	1432												GB			GB											
76	225																										
77	1439																										IS
78	1817				GB																					GB	
79	1870																										
80	539																										
81	826			IS																							
82	941																										
83	GBNP-JLN-20070621-1-0082																										
84	1083																	IS		IS							
85	1489							GB					GB				GB										
86	1815											IS															
87	584																										
88	2044																										
89	535		GB		GB																						
90	2036		GB		GB																						
91	1019											IS															
92	1298			IS						IS										IS			IS				
93	1486			IS				GB		IS											GB					GB	
94	1754																										
95	1784																										
96	616									IS		IS													IS		
97	965																										
98	193									IS		IS															
99	353			IS						IS		IS						IS									
100	2035			IS						IS		IS						IS									

APPENDIX 2 (cont'd.)

Sighting Histories of Individually Identified Whales: 2007
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	5/16/2007	5/18/2007	5/25/2007	5/30/2007	6/1/2007	6/4/2007	6/5/2007	6/6/2007	6/7/2007	6/11/2007	6/12/2007	6/13/2007	6/14/2007	6/15/2007	6/18/2007	6/20/2007	6/21/2007	6/22/2007	6/25/2007	6/26/2007	6/27/2007	6/28/2007	6/29/2007	7/2/2007	7/3/2007	7/6/2007	7/9/2007	7/10/2007	7/11/2007	7/13/2007	7/17/2007	7/18/2007	7/19/2007	7/20/2007	7/23/2007	7/24/2007	7/25/2007	7/27/2007	7/30/2007	7/31/2007	8/2/2007	8/3/2007	8/7/2007	8/8/2007	8/9/2007	8/10/2007	8/13/2007	8/14/2007	8/15/2007	8/16/2007	8/20/2007	8/21/2007	8/23/2007	8/27/2007	8/28/2007	8/30/2007	8/31/2007	9/11/2007	9/12/2007	9/18/2007	9/20/2007	9/27/2007	10/2/2007	10/3/2007	10/14/2007	10/19/2007
101	581																						IS				IS							IS																																				
102	2037	calf of 581																					IS				IS							IS																																				
103	GBNP-CMG-20070627-1-0023																						IS																																															
104	2023																							GB																																														
105	1235																								GB																																												
106	1428																									GB						IS																	IS								GB											
107	2030	calf of 1428																								GB						IS																	IS								GB											
108	1654																									GB																							GB																			
109	1821																									IS																																										
110	2039																									IS																																										
111	408																									IS																																										
112	600																									IS																																										
113	155	Freckle Fluke																									IS							IS										IS						IS		IS								IS							
114	2032	calf of 155																									IS							IS										IS						IS		IS								IS							
115	397																										IS							IS								IS			IS						IS		IS								IS							
116	1903																										IS												IS			IS			IS																							
117	1903_calf_2007	calf of 1903																									IS												IS			IS			IS																							
118	1082																											GB			GB						GB																																		
119	1057																												GB																																								
120	159																													IS		IS																						IS											IS	GB			
121	1898																															IS																						IS															
122	250																															IS					GB									GB						GB		GB	GB	GB												
123	250_calf_2007	calf of 250																														IS														GB						GB		GB	GB													
124	541																															IS																																				
125	1426																																GB														GB		GB																			
126	1836																																GB			GB		GB		GB																GB													
127	1901																																GB																GB							GB												
128	1907																																	IS								IS			IS						IS		IS						IS									
129	1838																																		GB	GB		GB																		GB			GB					GB					
130	1803																																				IS																															
131	1812																																				IS																															
132	1812_calf_2007	calf of 1812																																			IS																															
133	1850																																				IS		IS																													
134	1900																																				IS												GB																			
135	1460																																				IS			GB									GB																			
136	2031	calf of 1460																																			IS			GB									GB																			
137	GBNP-CMG-20070724-1-0074																																					IS																														
138	1658																																						IS							GB										GB												
139	283																																						IS																													
140	1079																																							GB							GB			GB				GB				GB		GB			GB					GB
141	1655																																							GB																												
142	232	Notchfin																																						GB				GB					GB		IS																GB	
143	237	Dike																																						GB												GB																
144	1461																																								GB						GB				IS													GB				
145	944																																								GB																											
146	2042																																									IS			IS						IS																	
147	1473																																										GB			GB																						
148	1473_calf_2007	calf of 1473																																									GB			GB																						
149	2041																																										GB										GB														
150	1671																																													GB	GB		GB					GB	GB		GB											

APPENDIX 2 (cont'd.)

Sighting Histories of Individually Identified Whales: 2007
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	5/16/2007	5/18/2007	5/25/2007	5/30/2007	6/1/2007	6/4/2007	6/5/2007	6/6/2007	6/7/2007	6/11/2007	6/12/2007	6/13/2007	6/14/2007	6/15/2007	6/18/2007	6/20/2007	6/21/2007	6/22/2007	6/25/2007	6/26/2007	6/27/2007	6/28/2007	6/29/2007	7/2/2007	7/3/2007	7/6/2007	7/9/2007	7/10/2007	7/11/2007	7/13/2007	7/17/2007	7/18/2007	7/19/2007	7/20/2007	7/23/2007	7/24/2007	7/25/2007	7/27/2007	7/30/2007	7/31/2007
151	2034	calf of 1671																																								
152	1802																																									
153	1820																																									
154	GBNP-JLN-20070808-2-0018																																									
155	GBNP-JLN-20070808-2-0025																																									
156	2043																																									
157	183																																									
158	GBNP-JLN-20070821-1-0041																																									
159	GBNP-JLN-20070823-1-0055																																									
160	GBNP-CMG-20070830-1-0033																																									
161	2040																																									
162	GBNP-CMG-20070912-1-051																																									
163	1061																																									
164	1849																																									
165	1011	Wide White Eyes																																								

	8/2/2007	8/3/2007	8/7/2007	8/8/2007	8/9/2007	8/10/2007	8/13/2007	8/14/2007	8/15/2007	8/16/2007	8/20/2007	8/21/2007	8/23/2007	8/27/2007	8/28/2007	8/30/2007	8/31/2007	9/11/2007	9/12/2007	9/18/2007	9/20/2007	9/27/2007	10/2/2007	10/3/2007	10/14/2007	10/19/2007
151				GB	GB		GB					GB	GB		GB											
152				GB					IS					GB	GB											
153				GB																						
154				GB																						
155				GB																						
156					GB					GB			GB													
157									IS																	
158												GB														
159													GB													
160																GB										
161																GB										
162																			IS							
163																			IS							
164																								IS		
165																										GB

APPENDIX 3

STANDARDIZED (July 9 – August 16) and TOTAL (June 1 – August 31) Humpback Whale Counts, 1985-2007

	GLACIER BAY		ICY STRAIT		GLACIER BAY & ICY STRAIT	
Year:	standardized whale count	total whale count	standardized whale count	total whale count	standardized whale count	total whale count
1985	7	15	19	30	24	41
1986	26	32	24	33	39	49
1987	18	29	33	48	40	60
1988	19	41	29	36	40	53
1989	23	27	23	31	33	41
1990	16	26	24	33	33	50
1991	17	19	33	42	44	53
1992	27	34	38	52	48	65
1993	24	31	24	30	40	50
1994	17	30	29	42	44	60
1995	18	28	26	44	37	57
1996	37	44	43	59	65	77
1997	41	55	33	50	66	82
1998	45	62	28	51	69	92
1999	36	60	40	66	69	104
2000	44	59	26	57	62	89
2001	26	45	58	84	72	99
2002	28	44	34	61	56	85
2003	53	81	61	76	102	115
2004	85	111	38	64	110	138
2005	66	102	50	89	95	145
2006	66	82	98	120	130	148
2007	76	91	98	129	132	161
average:	**35.43**	**49.91**	**39.52**	**57.70**	**63.04**	**83.22**