RESULTS OF HUMPBACK WHALE POPULATION MONITORING IN GLACIER BAY AND ADJACENT WATERS: 2005

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 2005, the twenty-first 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 2005 are outlined below.

Vessel Surveys: We conducted surveys in Glacier Bay and Icy Strait from May 27 through October 19, 2005. We searched for, observed and photographed humpback whales from the *Sand Lance*, a 5.8-meter motorboat 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. Survey hours include our transit time to and from Bartlett Cove.

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). 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. Several Icy Strait surveys included Dundas Bay, Idaho Inlet, Lemesurier Island and Pleasant Island. 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.

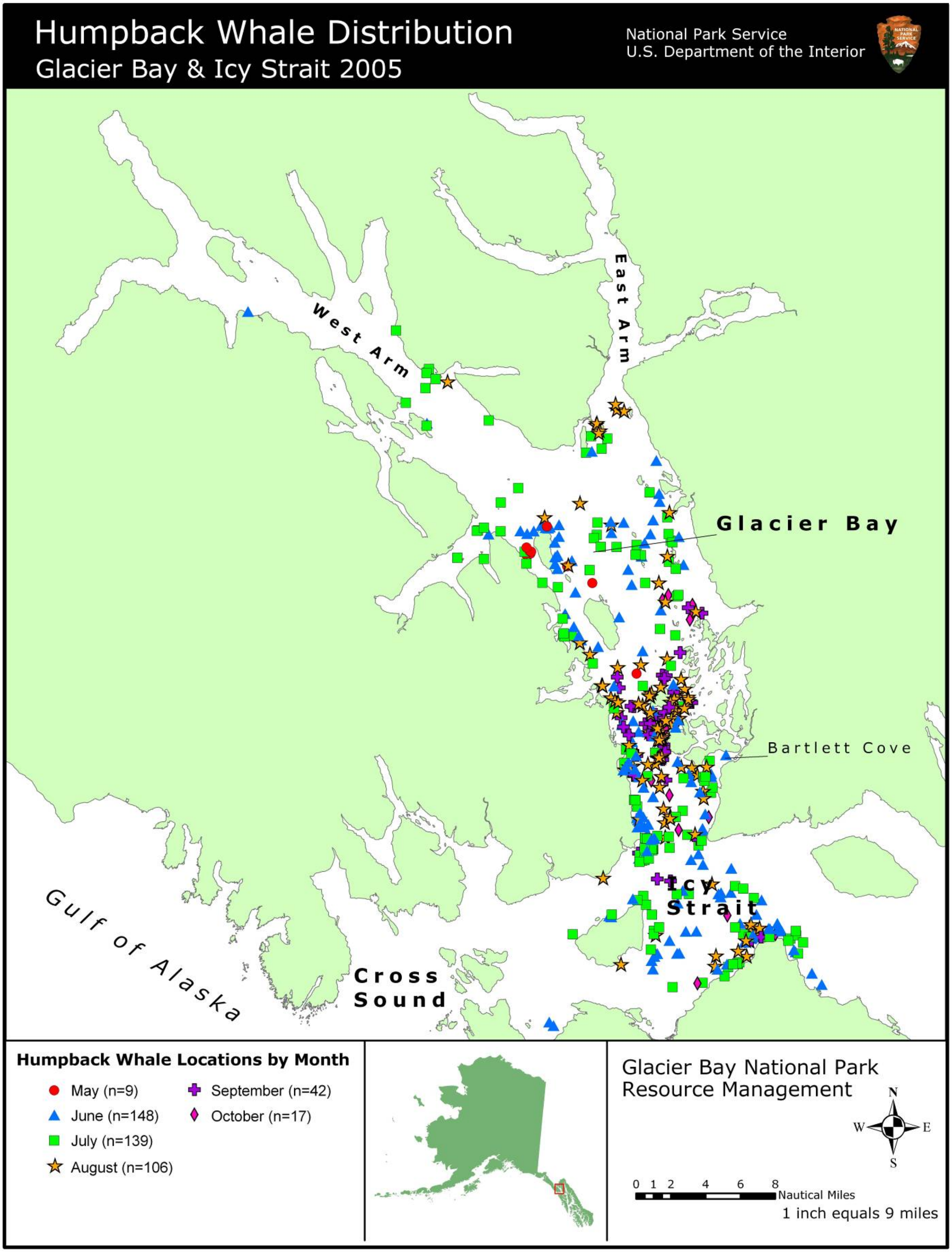

Figure 1. Study area in Glacier Bay and Icy Strait showing humpback whale distribution in 2005.

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 have 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 film and digital cameras. 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 2005. We also printed and catalogued the best 2005 identification photograph (fluke or dorsal fin) of each individual.

Whale Counts: We analyzed the 2005 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) 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 and sent the other half to the National Marine Fisheries Service Southwest Fisheries Science Center (SWFSC) for DNA amplification and archiving. The SWFSC sends the DNA to the University of Auckland in New Zealand for mitochondrial DNA haplotyping and sex determination.

Prey Identification: We used field guides (Hart 1988; Mecklenburg *et al.* 2002; Pearse *et al.* 1987; Smith and Johnson 1977) to taxonomically identify sample prey items that we collected opportunistically at the surface.

RESULTS AND DISCUSSION

Vessel Surveys: We searched for, observed and photographed humpback whales for a total of 349 hours in the combined Glacier Bay/Icy Strait study area (Table 1). This total is comparable to the overall average for the study area for the period 1985 – 2004 but lower than in 2004 when effort was at a record high. In 2005, survey effort in Glacier Bay was above average and survey effort in Icy Strait was below average. For the second year in a row the high number of whales in park waters necessitated extra survey effort in Glacier Bay compared to Icy Strait for us to stay abreast of where whales were concentrated so that we could make appropriate whale waters management recommendations. 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, distance of whale aggregations from Bartlett Cove, 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).

Table 1. Monthly & Annual Survey Effort, 1985 – 2005.

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	19	5	19	3	15	3	5	3	***53***	***11***	*293*	*57*	***349***
1985-2004 average survey effort:											45.4	15.7	259.4	88.3	347.7

Note: Total # survey hours are not available for 1986 & 1987

Whale Counts: For the third year in a row we documented a record number of whales in the study area as a whole (Fig. 2, Appendix 3). The number of whales in Icy Strait (n = 88) was the highest on record and the number of whales in Glacier Bay (n = 103) was the second highest on record. Overall the humpback whale population in southeastern Alaska is growing and the current rate of increase in the Central North Pacific stock of humpback whales is estimated to be 7% per year (Mobley *et al.* 2001).

Twenty-two of the whales that we documented in the study area in 2005 had not been sighted previously in Glacier Bay or Icy Strait. Two whales had been sighted elsewhere in southeastern Alaska, one had been sighted in British Columbia and 18 whales had never been documented. The percentage of "new" whales in the study area (15%) was slightly above the 1985 – 2004 average (11%). This was the fourth time that we have documented the movement of a whale between the study area and British Columbia.

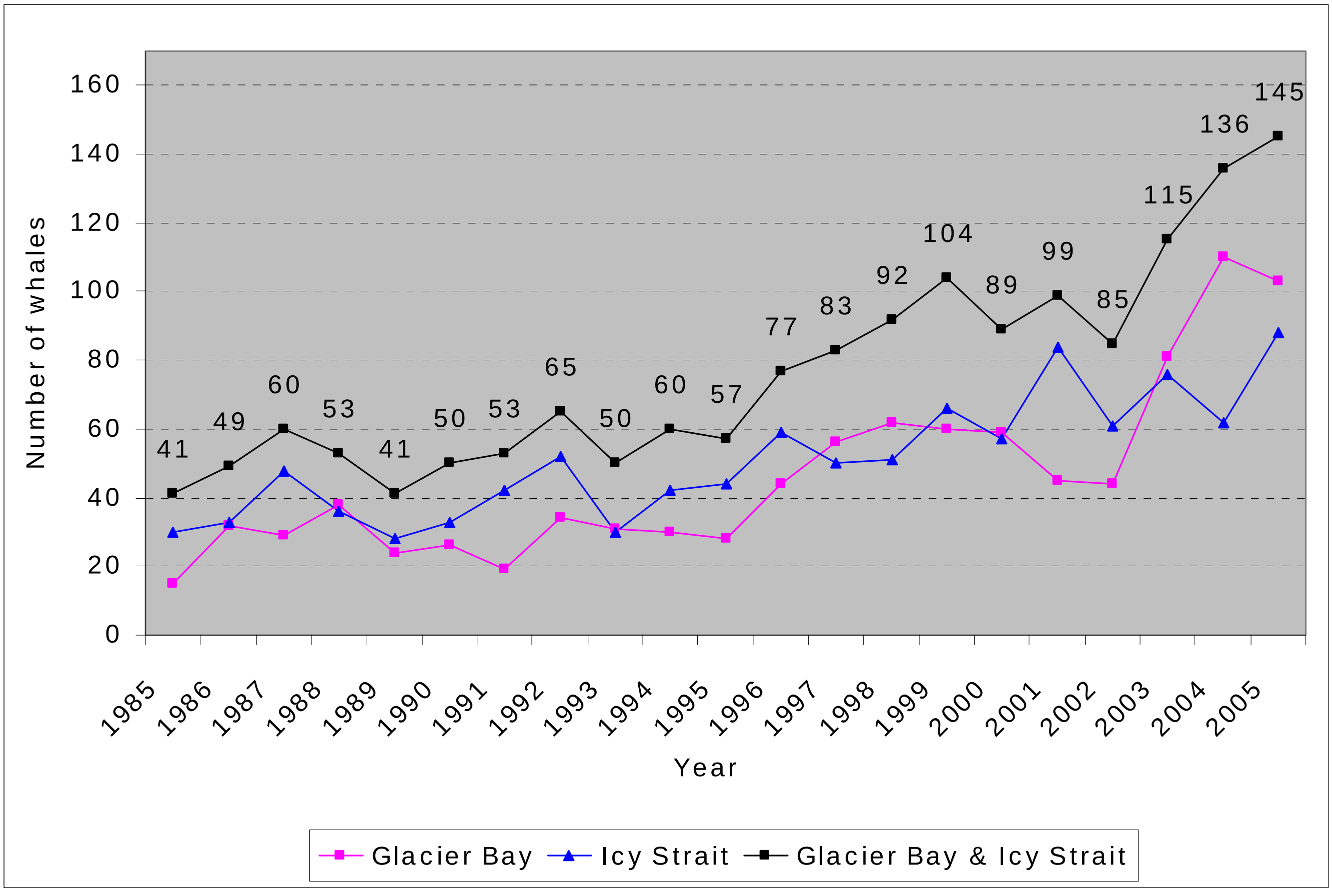

Figure 2. Number of individual whales documented in Glacier Bay and Icy Strait, 1985 – 2005.

Eight of the new whales were small to medium-sized and are presumed to be juveniles. Three of the eight resembled past years' calves from the study area but the matches could not be confirmed due to a lack of suitable photographs in their calf year. In July we documented whale #826 in Icy Strait. This whale had not been documented in southeastern Alaska since 1985.

Seasonal Distribution: Beginning in late May and continuing throughout the summer we observed whales throughout Glacier Bay, with the highest numbers concentrating in the mid and lower bay (Fig. 1). We received the first report of a humpback whale sighting on April 1 when a whale was observed near Boulder Island (A. Andrews, pers. comm.). By late May, 12 – 18 whales were distributed widely between Point Carolus and northern Drake Island. Throughout the summer, we observed a high level of whale activity in lower Glacier Bay that was typical of recent years; however the fact that it persisted until early October was unusual. The low number of whales in Beardslee Entrance prior to early August was unexpected compared to previous years. From late May until late June an unusually high number of whales concentrated near Drake Island, with up to 12 individuals feeding within one-half mile of the northeastern shore of the island. From mid-July through early August, we also documented an unusually large aggregation of whales around Point Carolus, with as many as 14 individuals identified there on July 13, 2005. Interestingly, the only other record we have of a comparably large aggregation at Point Carolus was in 2001 at the same time of year (July 16, 2001) when we identified 18 individuals on one day. Unlike some past years when whale activity in Whidbey Passage is fairly consistent, we only documented two pulses of activity there in 2005: the first in June and the second from late July through early August.

Whale numbers in the West Arm were low compared to some previous years, with only 2 – 3 whales sighted intermittently, mostly near Blue Mouse Cove and Tidal Inlet. One exception was the regular reports of a single humpback feeding in and near Reid Inlet throughout June. Overall, the amount of activity on the east side of the mid-bay seemed appeared to be below average although there were several whales scattered there throughout the summer. Conversely, whale numbers in the East Arm appeared to be above average compared to previous years. On July 11 at least three individuals were observed in Wachusett Inlet (J. Smith, pers. comm.; A. Milner, pers. comm.) and a few days later a visitor reported six whales between McBride and Riggs Glaciers. On August 1 we documented five whales at the entrance to the East Arm, but we do not know if these were some of the same whales that had been reported farther north in the East Arm.

Throughout June and most of July a large number of whales were distributed throughout the middle of Icy Strait, especially off the eastern shore of Lemesurier Island. By late July most of the activity had shifted to the Chichagof Island shoreline between Point Adolphus and Mud Bay, which is more typical of whale distribution in Icy Strait in previous years. Unlike in some years, we documented very few whales in western Icy Strait.

Whale Waters: The length of whale waters restrictions in lower Glacier Bay (124 days) was the second longest since 1985 and the restrictions remained in effect later into the fall than in previous years. A high number of whales in Whidbey Passage warranted temporary vessel speed restrictions in this area during two periods in the summer (June 3 – July 8, July 29 – August 13). In addition, an unusually high number of whales around Point Carolus warranted temporary whale waters from late July until mid-August.

Residency: Thirty-eight (37%) of the 103 whales that entered Glacier Bay between June 1 and August 31, including one cow/calf pair, remained 20 or more days, long enough to be considered resident (Appendix 2). The proportion of whales that were considered resident in Glacier Bay appears to be lower than in most previous years. Twenty-seven (31%) of the 88 whales that we identified in Icy Strait, including two cow/calf pairs, remained long enough to be considered resident, which is a typical proportion for Icy Strait. An additional 21 (14%) of the 145 whales that we sighted in Glacier Bay/Icy Strait, including two cow/calf pairs, were resident in the combined Glacier Bay/Icy Strait study area. Eight whales were resident in more than one area (*e.g.,* resident in Glacier Bay and then resident in Icy Strait).

We identified 40 of the whales (28%) that entered the study area, including three mother/calf pairs, on just one day: 19 in Glacier Bay and 21 in Icy Strait. However, we documented three of these 40 whales on additional days outside of the June 1 – August 31 monitoring period. The proportion of whales sighted only once in the study area is comparable to the proportion from 1994 through 2002 (23% – 43%), but higher than the proportion in 2003 and 2004 (16% – 18%).

Reproduction and Juvenile Survival: We documented 10 mother/calf pairs in the study area (Table 2). The crude birth rate of 6.9% in 2005 is somewhat lower than average for previous years (Table 3) but well within the documented range of values for this extremely variable parameter.

Table 2. Mother-Calf Pairs, 2005.

	Mother ID#	Calf ID#	Documented in:
1.	161	1892	GB & IS
2.	219	1893	IS
3.	232	1894	GB
4.	539	539_calf_2005	IS
5.	801	801_calf_2005	GB
6.	965	965_calf_2005	IS
7.	1019	1019_calf_2005	IS
8.	1042	1890	IS
9.	1233	1891	GB & IS
10.	1593	1593_calf_2005	GB & IS

Notes:

- GB = Glacier Bay; IS = Icy Strait

- Only calves whose flukes were photographed received an identification number.

Table 3. Reproduction and known age whales in Glacier Bay and Icy Strait, 1982 – 2005.

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	10.8	17	83
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	11.8	35	136
2005	10	5	50	6.9	35	145
1982-2004 average:	6.9	4.8	67.4	10.5	14.2	71.3

Notes:
- 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.

Whale #1233, first documented in southeastern Alaska as an adult in 1992 (J. Straley, unpublished data) and seen nearly every year since then, returned to the study area for the first time with a calf (Fig. 3). Whale #1233's sighting history is intermittent with no sightings documented in 1993 or 1996, so it is possible that she had a calf in a year when she was not sighted and/or prior to 1992. Two female whales already known to be grandmothers (#219 and #539) returned to the study area with new calves. We

Figure 3. Whale #1233 with her 2005 calf.

identified six whales (#1654, born 2002; #1803, born 2003; #1836, born 2004; #1838, born 2004; #1840, born 2004; and #1846, born 2004) that had not been sighted in the study area since they were calves.

In 2005 we documented a record number of known-age juveniles (n = 7) 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 since 2001 (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 changes in prey availability or other habitat characteristics of the Glacier Bay area have made the habitat increasingly attractive to juvenile whales. In addition, we speculate that the increase may be partially attributable to our conversion from a film camera to a digital camera in 2003. Calves and juveniles are small and their erratic behavior often makes them difficult to approach and photograph. While a 300mm lens on a Nikon film camera magnifies the subject 6x, the same 300mm lens on a Nikon digital camera magnifies the subject 9x (Nikon, Inc. 2003). This enhanced magnification with the digital camera effectively increases our ability to collect adequate quality identification photographs of all whales, but the effect may be disproportionately beneficial when photographing calves and juveniles.

Genetics: We collected 18 sloughed skin samples from 16 unique individuals, including three calves. Since 1996, we have collected 138 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. Continued genetic analysis of sloughed skin samples from our study area will help elucidate the genetic relationships among whale populations worldwide (***e.g.,*** Baker et al. 1998, Vant 2002). The only other practical ways we are able to determine a whale's sex are if the whale returns to the study area with a calf (then we assume it is female) or in the infrequent event that we obtain photographs of the whale's genital area.

Feeding Behavior and Prey Identification: Between July 22 and August 5 we observed three adult humpback whales (#1313, #159 and #1432) independently perform a variation of typical vertical lunge feeding near Point Carolus and Rush Point. The behavior involved a single whale lunging vertically through the surface of the water, then pausing for several seconds at the surface with its mouth agape before snapping its head slightly backwards and rapidly closing its mouth to engulf the prey.

On October 3, we observed three partially digested birds coated with whale feces floating in the water near adult whales #1302 and #1486. We collected the birds, cleaned them (Fig. 4) and attempted to identify the species. We were unable to obtain positive species identifications due to the advanced state of decomposition of the carcasses. On gross examination one of the birds resembled a marbled or Kittlitz's murrelet (*Brachyramphus marmoratus* or *Brachyramphus brevirostris*), one resembled a common murre (*Uria aalge*) and the third bird could not be identified (G. Streveler, pers. comm.). Although we occasionally observe whale feces at the water's surface, this is the first time that we have observed birds or other whole animals in the feces. We frequently observe humpback whales and birds feeding on the same prey patches (GBNPP unpublished data) so it is not surprising that occasionally some birds might be engulfed by feeding humpback whales. We are aware of one other observation of birds in humpback whale feces in southeastern Alaska. In July 2004 two murrelets (species not identified) were found in humpback whale feces in upper Lynn Canal. These two birds' carcasses were in better condition than the ones that we collected, with the feathers and appendages still intact (S. Lewis, pers. comm.).

We positively identified two species of fish in association with feeding humpback whales in 2005: capelin (*Mallotus villosus*) and sand lance (*Ammodytes hexapterus*) (Table 4). The prey type most commonly identified was capelin, with multiple observations of this species from mid-June through late September. In addition, on June 1 we received a report from a researcher conducting hydroacoustic

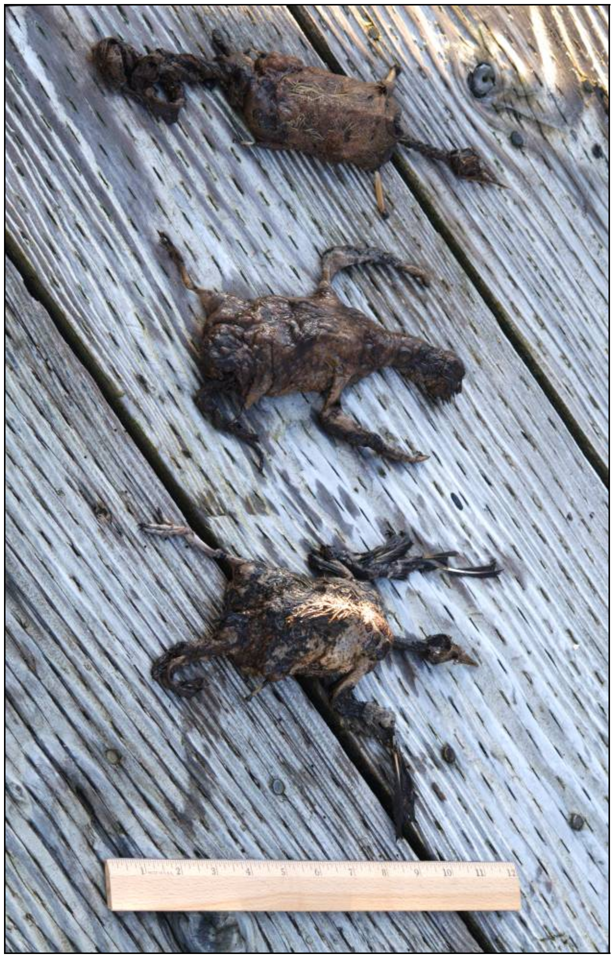

Figure 4. The three birds after being cleaned.

Table 4. Humpback whale prey type determinations.

	PREY SPECIES (# of cases):	
METHOD:	***capelin***	***sand lance***
Collected specimen with dip net	1	1
'Cucumber' smell in air	14	
Fish observed near surface	4?	

surveys in Sitakaday Narrows that there were dense balls of capelin at a depth of approximately 30 m (D.
Csepp, Auke Bay Laboratory, pers. comm.). Unlike in past years, we did not observe any schools of herring near feeding whales at Point Adolphus.

Whale/Human Interactions: The number of whale/human interactions that we documented in the study area in 2005 was lower than in 2004 but similar to previous years. In early June we observed a private motor vessel and a commercial fishing vessel approaching well within ¼ mile of a conspicuous tail-slapping whale in Sitakaday Narrows (Fig. 5). Both vessels were transiting within one mile of the

Figure 5. Vessels approaching whale in Sitakaday Narrows.

shore in whale waters, in violation of Park regulations. When we contacted the private vessel on VHF radio, the captain indicated that his navigational path was intended to avoid the whale, despite the outward appearance of a deliberate close approach. In contrast, the commercial fishing vessel appeared to be simply in transit on a consistent course and speed, perhaps even unaware of the whale's presence.

In early July a local resident reported that a humpback whale became entangled in his 80 lb test fishing line while he was sport fishing for halibut near Bartlett Cove. The incident occurred while the fisherman fished from a skiff anchored at the mouth of Bartlett Cove. When the whale snagged the fishing line, the fisherman cut the line and observed the line, lure and bait lying across the whale's back but the animal did not appear to be badly entangled (D. Waguespack, pers. comm.).

In early July a humpback whale calf was struck by a 26 ft fiberglass cabin cruiser that was in transit between Pinta Cove and Point Adolphus in Icy Strait (G. Nelson, pers. comm.). Upon seeing the calf surface directly in front of the vessel, the captain immediately reduced speed and shut off the engine. The calf struck the starboard bow of the vessel with its tail as it flipped its tail to avoid the vessel and dive. The captain reported that the impact was "not that hard" because the boat was "barely moving". A short time later, he saw the calf surface several hundred feet away, breathing and behaving normally. There were no photographs with which to determine which calf was involved in the collision. We did not detect any calves with visible injuries in the study area subsequent to this incident and presume that the calf was not seriously injured.

On August 9 we observed a man paddling a dinghy to within 20 yards of whale #157 while the whale slept at the water's surface near Point Adolphus. We contacted the man after he returned to his nearby sailboat and advised him of the 100 yard approach regulation for humpback whales in Alaska and of the danger of startling a sleeping whale.

We are unaware of any incidents in which humpback whales nearly collided with vessels transiting in Glacier Bay, although several such close calls were documented in 2004. It is unlikely that the decrease is attributable to a decline in the reporting rate from NPS park rangers onboard these types of vessels because the rangers are aware that such incidents should be reported. Instead, this change likely reflects differences in the distribution of whales in Glacier Bay in 2004 and 2005. Unlike in 2004 (Doherty and Gabriele 2004), in 2005 whales did not congregate in high numbers at the entrance to the West Arm where vessel traffic is common. In addition, the unusually long period of time in which lower Glacier Bay whale waters vessel course and speed restrictions were in place in 2005 may have reduced the overall number of instances in which whales and vessels were in close proximity to each other in this part of the bay.

Elsewhere in southeastern Alaska, in mid-May a juvenile male humpback whale drowned after becoming entangled in a king salmon drift gillnet near Wrangell (NOAA Fisheries Alaska Region, unpublished data). In early June a humpback whale calf was reported entangled in gillnet near Juneau but the entanglement was assessed to be non-life threatening and no attempts were made to disentangle the animal (NOAA Fisheries Alaska Region, unpublished data). In early September a humpback whale calf was reported entangled in line and a buoy from sport red king crab pot gear near Juneau. Efforts by the Alaska marine mammal stranding network, including Park staff, to disentangle the calf were unsuccessful; however, five days after the initial report, the whale shed the gear on its own (NOAA Fisheries Alaska Region, unpublished data). In October a juvenile or calf male humpback whale was found floating dead in Peril Strait. A necropsy revealed that the probable cause of death was severe blunt trauma with mandibular and cervical muscle damage (Alaska SeaLife Center 2005). The frequency of whale/human interactions in southeastern Alaska in 2005 is likely attributable in part to increases in the overall size of the population. The predominance of incidents that involved calves and juveniles is not surprising because in other areas young whales have been found to be more susceptible than adult whales to entanglements and vessel strikes (Heyning and Lewis 1990, Lien 1994, Laist et al. 2001, Robbins and Mattila 2001, Knowlton *et al*. 2005).

Notable Behavioral Observations:

On June 7 we observed a minke whale (*Balaenoptera acutorostrata*) in Icy Strait that appeared to be feeding near the water's surface below a large flock of gulls. We observed male humpback whale #1299 (age 8) approach the area, surface underneath the same group of birds and the minke whale rapidly departed. Whale #1299 surfaced several times in the vicinity of the apparent prey patch and then also departed the area. It is uncommon for us to detect behavioral interactions between minke and humpback whales such as this apparent displacement of a feeding minke whale by a humpback whale.

For the third year in a row we observed whale #1809, a small to medium-sized animal of unknown age that has appeared unhealthy since we first documented it in the study area in 2003 (Doherty and Gabriele 2004). This year we noted a distinct hollow/wheezing sound when this whale inhales which may be an indication that its health is deteriorating.

On June 27 killer whale (*Orcinus orca*) researchers Volker Deecke and Michael deRoos observed adult whale #1795 follow and remain in close proximity to four transient killer whales while the killer whales attacked a harbor seal for over one hour near North Marble Island (Fig. 6) (V. Deecke, pers. comm.). They observed several tail swipes from whale #1795 and it appeared that some of them were directed at the seal. We are aware of at least four similar incidents in the study area in which humpback whales closely interacted with killer whales during predation events on other marine mammals (Doherty and Gabriele 2003, V. Deecke pers. comm.); thus this type of interaction, although difficult to interpret, may not be uncommon.

Figure 6. Whale #1795 (right) near a transient killer whale (left) that is attacking a harbor seal with a head-mounted VHF tag (circled in left foreground). Photo by Michael deRoos.

On October 17 we detected a singing humpback whale on a portable hydrophone deployed off the whale survey vessel *Sand Lance* in Sitakaday Narrows. There were two whales nearby, #1012 (sex unknown) and #1083 (male, based on genetic analysis of skin sample collected in 1998). However, on several occasions we observed whale #1012 at the surface while we heard singing on the hydrophone, thus it is unlikely that this whale was the singer. We presume that male whale #1083 was the singer based on the volume of the song as we drifted in close proximity to where whale #1083 dove.

ACKNOWLEDGEMENTS

The whale monitoring study is vastly enriched by participation from Park staff and volunteers. We gratefully acknowledge the hard work and contributions of Melissa Senac. 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 Justin Smith on the NPS vessel *Capelin*, Jim Johnson on the NPS vessel *Serac* and Captain Blake Harper on the NPS concessionaire vessel *Baranof Wind*. Thanks to Justin Smith and Jim Johnson for keeping an eye on the weather for us and for serving as escorts in heavy seas. Special thanks to Dena Matkin for continuing to contribute supplementary whale photographs and for her sighting reports. We are grateful to Margaret Hazen for her assistance in helping us to try to locate singing whales heard on the hydrophone. A big thanks to Bruce McDonough for keeping the *Sand Lance* running smoothly throughout the summer. We are grateful to Whitney Rapp for volunteering her expertise to print and organize photos for the identification catalog. Last but not least, we thank Susan Boudreau for her ongoing 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 #473-1700-00.

LITERATURE CITED:

Alaska SeaLife Center (2005). Necropsy Report Humpback Whale HWs05-04. Unpublished report. 3 pp.

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., L. Medrano-Gonzalez, J. Calambokidis, A. Perry, F. Pichler, H. Rosenbaum, J. M. Straley, J. Urban-Ramirez, M. Yamaguchi and O. von Ziegesar (1998). Population structure of nuclear and mitochondrial DNA variation among humpback whales in the North Pacific. Molecular Ecology 7:1-13.

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.

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.

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.

Hart, J. L. (1988). Pacific Fishes of Canada. Fisheries Research Board of Canada, Ottawa, Canada K1A 0S9.

Heyning, J. E., and T. D. Lewis. 1990. Entanglements of baleen whales in fishing gear off southern California. Reports of the International Whaling Commission 40:427-431.

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.

Knowlton, A. R., M. K. Marx, H. M. Pettis, P. K. Hamilton and S. D. Kraus. 2005. Analysis of scarring on North Atlantic right whales (Eubalaena glacialis): Monitoring rates of entanglement interaction: 1980-2002. Final Report to the National Marine Fisheries Service. Contract #43EANF030107. 20 pp.

Laist, D. W., A. R. Knowlton, J. G. Mead, A. S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science 17:35-75.

Lien, J. 1994. Entrapments of large cetaceans in passive inshore fishing gear in Newfoundland and Labrador (1979-1990). Reports of the International Whaling Commission (Special Issue 15):149-157.

Mecklenburg, C. W., T. A. Mecklenburg, and L. K. Thorsteinson (2002). Fishes of Alaska. American Fisheries Society, Bethesda, MD, 1037 pp.

Mobley, J. M., S. Spitz, R. Grotefendt, P. Forestell, A. Frankel and G. Bauer. 2001. Abundance of humpback whales in Hawaiian waters: Results of 1993-2000 aerial surveys. Report to the Hawaiian Islands Humpback Whale National Marine Sanctuary. 16 pp.

Nikon, Inc. 2003. D100 Digital SLR Camera Specification Sheet. 1 p.

Pearse, V., J. Pearse, M. Buchsbaum, and R. Buchsbaum (1987). Living invertebrates. Blackwell Scientific Publications, Boston, MA.

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.

Robbins, J., and D. K. Mattila. 2001. Monitoring entanglements of humpback whales (Megaptera novaeangliae) in the Gulf of Maine on the basis of caudal peduncle scarring. Unpublished report to the 53rd Scientific Committee Meeting of the International Whaling Commission. Hammersmith, London. Document # SC/53/NAH25. 12 pp.

Smith, D. L. and K. B. Johnson (1977). A guide to marine coastal plankton and marine invertebrate larvae. Kendall/Hunt, Dubuque, IA, 221 pp.

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

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.

Vant, M. D. (2002). Population structure and genetic diversity in humpback whales (*Megaptera novaeangliae*) in the North Pacific: a multi-loci approach. MS Thesis. School of Biological Sciences. University of Auckland, New Zealand. 127 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: 2005
(GB = Glacier Bay, IS = Icy Strait)

#	Whale ID	Nickname	05/27/2005	05/31/2005	06/01/2005	06/03/2005	06/06/2005	06/07/2005	06/09/2005	06/10/2005	06/13/2005	06/14/2005	06/15/2005	06/16/2005	06/17/2005	06/21/2005	06/22/2005	06/23/2005	06/27/2005	06/28/2005	06/29/2005	06/30/2005	07/01/2005	07/05/2005	07/06/2005	07/07/2005	07/08/2005	07/10/2005	07/11/2005	07/12/2005	07/13/2005	07/14/2005	07/18/2005	07/20/2005	07/21/2005	07/22/2005	07/25/2005	07/26/2005	07/27/2005	07/28/2005	07/29/2005	08/01/2005	08/02/2005	08/03/2005	08/05/2005	08/08/2005	08/09/2005	08/11/2005	08/12/2005	08/15/2005	08/17/2005	08/19/2005	08/22/2005	08/23/2005	08/26/2005	08/29/2005	08/30/2005	09/02/2005	09/21/2005	09/26/2005	10/03/2005	10/07/2005	10/14/2005	10/17/2005	10/19/2005
1	1246		GB																						IS																																									
2	1299		GB			GB		IS		GB		GB												IS							GB					GB		IS					IS	GB						GB			GB				GB		GB	GB	GB				
3	1012			GB							GB													IS	IS		GB																																				GB		
4	1018			GB																						GB									GB						GB					GB		GB				GB													
5	1065			GB					GB											GB																										GB				GB				GB											
6	1423			GB																																																													
7	1489			GB												GB															IS										GB																								
8	159			GB																																		GB			GB	GB							GB	GB															
9	1658			GB			GB									GB	GB																																															
10	1832			GB									GB			GB																																																
11	1840			GB																															GB										GB					GB															
12	351			GB					GB		GB									GB				GB												GB		IS								GB				GB			GB							GB	GB					
13	1079				GB	GB				GB										GB				GB							IS											GB		GB		GB						GB					GB							GB	
14	1088				GB	GB								IS				IS							IS						GB																																		
15	1302				GB																															GB						GB		GB		GB				GB										GB	GB			GB	
16	1652				GB		GB		GB		GB		GB							GB																																												
17	1784				GB																																																											
18	1803				GB									IS																																																		
19	937				GB	GB								IS				GB																																														
20	1014					GB												GB							IS											GB																									GB	GB			GB	
21	1298					GB																																												GB																
22	1461					GB																																																										
23	1474					GB					GB			IS											IS						IS			IS				IS																											
24	1593					GB																			IS																																								
25	1593_calf_2005	calf of 1593				GB																			IS																																								
26	161	B.W.M.				GB																			IS																																								
27	1892	calf of 161				GB																			IS																																								
28	166	Frenchie				GB																IS												IS						IS																			IS							
29	1816					GB																		GB							IS					GB		IS							GB																	IS				
30	1850					GB																																																										
31	221					GB									IS							IS												IS						IS																									
32	577	Scoper				GB																			IS																					GB																			
33	1470						GB					GB														GB								IS					GB											GB															
34	250						GB			GB									GB																GB							GB																							
35	1042							IS							IS							IS												IS						IS																									
36	1890	calf of 1042						IS							IS							IS																		IS																									
37	118	Chop Suey						IS						IS	IS						GB				GB						GB			IS						IS								IS											IS				IS			
38	1306							IS							IS							IS												IS						IS																	IS									
39	1659							IS																																																									
40	1806							IS																																																									
41	186							IS							IS							IS												IS														IS											IS							
42	193							IS																										IS																																
43	352							IS																								GB		IS						IS						GB										IS						IS			
44	353							IS							IS							IS												IS																						IS		IS							
45	944							IS		GB																										GB						GB																				GB			
46	GBNP-JLN-20050607-1-0018							IS																																																								
47	1533								GB		GB			IS					GB																																													
48	1898								GB							GB																																																
49	1063									GB																																																						
50	1304									GB														GB														IS								GB																			

APPENDIX 2 (cont'd.)

Sighting Histories of Individually Identified Whales: 2005
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	05/27/2005	05/31/2005	06/01/2005	06/03/2005	06/06/2005	06/07/2005	06/09/2005	06/10/2005	06/13/2005	06/14/2005	06/15/2005	06/16/2005	06/17/2005	06/21/2005	06/22/2005	06/23/2005	06/27/2005	06/28/2005	06/29/2005	06/30/2005	07/01/2005
51	157	M.D.								GB								IS					
52	1809									GB													
53	1846									GB													
54	584									GB								IS					
55	1486										GB		GB										
56	1795										GB					GB				GB	GB		
57	1811										GB	GB											
58	1895										GB					GB							
59	235	Spot									GB			IS				GB					
60	535	Quits									GB			IS				GB					
61	564	Roundup Taylor									GB		GB					GB					
62	117	White Eyes										GB											
63	1507											GB											
64	1808											GB			GB						GB		
65	465											GB				GB		IS					
66	1046												GB										
67	1082												GB										GB
68	1485												GB						GB				
69	1896												GB							GB			
70	GBNP-JLN-20050615-1-0017												GB										
71	1313													IS									
72	1439													IS									
73	1505													IS									
74	1657													IS									
75	1812													IS	IS								
76	1897													IS	IS								
77	539	Max												IS									
78	539_calf_2005	calf of 539												IS									
79	587	Gertrude												IS	IS							IS	
80	933													IS	IS								
81	GBNP-JLN-20050616-1-0014													IS									
82	1031														IS								
83	1049														IS								
84	1293														IS			IS					
85	1432														IS								
86	1438														IS								
87	155	Freckle Fluke													IS							IS	
88	219														IS							IS	
89	1893	calf of 219													IS							IS	
90	573														IS							IS	
91	875														IS							IS	
92	1899															GB							
93	GBNP-JLN-20050621-1-0039															GB							
94	1473																GB						
95	1629																	GB					
96	1807																	GB					
97	941																	GB					
98	616	Lesser																IS					
99	801																		GB				GB
100	801_calf_2005	calf of 801																	GB				GB

	Whale ID	07/05/2005	07/06/2005	07/07/2005	07/08/2005	07/10/2005	07/11/2005	07/12/2005	07/13/2005	07/14/2005	07/18/2005	07/20/2005	07/21/2005	07/22/2005	07/25/2005	07/26/2005	07/27/2005	07/28/2005	07/29/2005	08/01/2005	08/02/2005	08/03/2005
51	157		IS															IS				
52	1809	IS										IS	GB									
53	1846																					
54	584																					
55	1486																		GB	GB		GB
56	1795																					
57	1811																					
58	1895								IS						GB					GB		
59	235																					
60	535																					
61	564																					
62	117														GB				GB			GB
63	1507																					
64	1808								GB	GB						GB						
65	465																					
66	1046									GB			GB		GB					GB		GB
67	1082			GB			GB															
68	1485												GB				GB		GB			
69	1896								IS	GB												GB
70	GBNP-JLN-20050615-1-0017																					
71	1313													GB								GB
72	1439		IS					GB				IS										
73	1505		IS																			
74	1657																					
75	1812																					
76	1897																					
77	539																					
78	539_calf_2005																					
79	587											IS						IS				
80	933											IS										
81	GBNP-JLN-20050616-1-0014																					
82	1031																					
83	1049																					
84	1293		IS				GB															GB
85	1432	GB							IS													
86	1438													GB		IS						
87	155											IS										
88	219											IS						IS				
89	1893											IS						IS				
90	573											IS						IS				
91	875													GB				IS				
92	1899										GB		GB		GB							
93	GBNP-JLN-20050621-1-0039																					
94	1473																			GB		
95	1629																		GB			
96	1807		IS																			
97	941								GB	GB												
98	616																	IS				
99	801					GB																
100	801_calf_2005					GB																

	Whale ID	08/05/2005	08/08/2005	08/09/2005	08/11/2005	08/12/2005	08/15/2005	08/17/2005	08/19/2005	08/22/2005	08/23/2005	08/26/2005	08/29/2005	08/30/2005	09/02/2005	09/21/2005	09/26/2005	10/03/2005	10/07/2005	10/14/2005	10/17/2005	10/19/2005
51	157			IS																		
52	1809						GB			GB												
53	1846																					
54	584			GB																		
55	1486		GB			GB	GB									GB	GB	GB				
56	1795	GB		IS																		
57	1811																					
58	1895		GB				GB															
59	235		GB																			
60	535																					
61	564																					
62	117	GB														GB		GB				
63	1507																					
64	1808																					
65	465																					
66	1046																					
67	1082																					
68	1485									GB												
69	1896						GB			GB												
70	GBNP-JLN-20050615-1-0017																					
71	1313		GB													GB						
72	1439																					
73	1505															GB						
74	1657		GB							GB					GB							
75	1812																					
76	1897																					
77	539																					
78	539_calf_2005																					
79	587																					
80	933																					
81	GBNP-JLN-20050616-1-0014																					
82	1031															GB						
83	1049																					
84	1293		GB				GB					GB										
85	1432	GB				GB												GB				
86	1438																					
87	155																					
88	219																					
89	1893			IS																		
90	573																					
91	875																					
92	1899	GB																				
93	GBNP-JLN-20050621-1-0039																					
94	1473		GB								GB											
95	1629						GB		GB													
96	1807																					
97	941		GB				GB								IS							
98	616																					
99	801																					
100	801_calf_2005																					

APPENDIX 2 (cont'd.)

Sighting Histories of Individually Identified Whales: 2005
(GB = Glacier Bay, IS = Icy Strait)

	Whale ID	Nickname	05/27/2005	05/31/2005	06/01/2005	06/03/2005	06/06/2005	06/07/2005	06/09/2005	06/10/2005	06/13/2005	06/14/2005	06/15/2005	06/16/2005	06/17/2005	06/21/2005	06/22/2005	06/23/2005	06/27/2005	06/28/2005	06/29/2005	06/30/2005	07/01/2005	07/05/2005	07/06/2005	07/07/2005	07/08/2005	07/10/2005	07/11/2005	07/12/2005	07/13/2005	07/14/2005	07/18/2005	07/20/2005	07/21/2005	07/22/2005	07/25/2005	07/26/2005	07/27/2005	07/28/2005	07/29/2005	08/01/2005	08/02/2005	08/03/2005	08/05/2005	08/08/2005	08/09/2005	08/11/2005	08/12/2005	08/15/2005	08/17/2005	08/19/2005	08/22/2005	08/23/2005	08/26/2005	08/29/2005	08/30/2005	09/02/2005	09/21/2005	09/26/2005	10/03/2005	10/07/2005	10/14/2005	10/17/2005	10/19/2005
101	1813																		GB																																														
102	1870																			GB																																													
103	1297																					IS																																											
104	536																					IS																																											
105	581																					IS												IS																															
106	817																					IS																																											
107	879																					IS																																											
108	397																					IS												IS		GB																													
109	350	Lace																					GB	GB								GB				GB																														
110	1244	Dimple Dorsal																						GB								GB														GB	GB				GB										IS					
111	1421																							GB								IS																																		
112	1019																								IS																																										
113	1019_calf_2005	calf of 1019																							IS																																										
114	1532																								IS						IS																																						
115	826																								IS									IS																																	
116	1426																									GB	GB																																								
117	1654																									GB									GB																																
118	1838																										GB																			GB																			GB
119	1848																										GB																															GB								
120	1901																										GB						GB																GB																	
121	237																												GB						GB																															
122	1083																														GB			IS						IS																					GB				GB	
123	1233																														IS													GB						GB							GB								
124	1891	calf of 1233																													IS													GB						GB							GB								
125	GBNP-JLN-20050713-1-0078																														IS																																		
126	1479																																GB																																
127	1849																																	IS													IS																		
128	516	Garfunkle																																IS						IS																									
129	1817																																			GB																													
130	GBNP-JLN-20050725-1-0027																																				GB																											
131	1802																																					GB				GB																							
132	232	Notchfin																																					GB					GB																					
133	1894	calf of 232																																					GB					GB																					
134	GBNP-JLN-20050727-1-0014																																						GB																										
135	1815																																							IS																									
136	1836																																								GB																					GB				
137	283																																								GB	GB																							
138	1900																																												GB				GB	GB															
139	965																																														IS																		
140	965_calf_2005	calf of 965																																												IS																		
141	GBNP-CMG-20050809-1-061																																														IS																		
142	GBNP-CMG-20050809-1-063																																														IS																		
143	GBNP-JLN-20050815-1-0093																																																	GB															
144	336																																																		GB														
145	GBNP-JLN-20050819-1-0016																																																			GB													
146	GBNP-JLN-20050830-1-0022																																																								GB								
147	1011	Wide White Eyes																																																									GB	GB		IS			
148	1805																																																											GB					
149	GBNP-JLN-20050926-1-0064																																																											GB					
150	1295																																																																GB

APPENDIX 3

STANDARDIZED (July 9 – August 16) and TOTAL (June 1 – August 31)
Humpback Whale Counts, 1985-2005

	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	17	38	29	36	40	53
1989	20	24	20	28	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	42	56	33	50	67	83
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	84	110	38	62	109	136
2005	66	103	50	88	95	145