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POPULATION CHARACTERISTICS OF HUMPBACK WHALES
(*Megaptera novaeangliae*)
IN GLACIER BAY AND ADJACENT WATERS
1989

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ABSTRACT

A total of 42 humpback whales were photoidentified, including five calves (11.9%), in the Glacier Bay-Icy Strait area during the 1989 monitoring season, from 17 May to 09 September. Of this total, 24 were sighted in Glacier Bay and 30 in Icy Strait. Twelve whales were common to both areas. Eleven whales, including two calves, were present in Glacier Bay for 20 days or longer. This is comparable to 1986-89 when 9-12 whales were present in Glacier Bay for a similar length of time. The seasonal influx of whales into Glacier Bay occurred in mid- to late June with a peak in mid-July, the numbers of whales declined during August with a few remaining in September. The numbers of whales in Icy Strait remained constant throughout the season. These use patterns are similar to past years. The feeding behavior of the whales in Glacier Bay consisted primarily of quick, shallow dives followed by a vertical lunge. Two cases of bubblenet feeding were observed in Glacier Bay and one in Icy Strait. Primary prey appeared to be schooling fish. Further documentation of reproductive histories of females continue to add significantly to the biology of humpback whales. This year animal #581 returned with a calf for the third consecutive year, most often females give birth every two or three years. Numerous interactions with vessels and aircraft were observed this year. Pt. Adolphus, in Icy Strait, continues to be a focus for 'whalewatching' by private and commercial vessels.

INTRODUCTION

Prior to 1978, as many as 24 humpback whales (*Megaptera novaeangliae*) entered Glacier Bay to feed for a good part of the summer. In 1978 most of the whales that arrived in Glacier Bay departed soon after entry. Two hypotheses were suggested as to the cause of this departure. The first theorized that vessel traffic disturbed the behavior of the whales and the increase in traffic, during the years prior to and including 1978, caused the whales to abruptly depart Glacier Bay. The second hypothesis attributed a natural decline in prey availability to the departure.

In 1981, the National Park Service, with the assistance of the National Marine Mammal Laboratory, National Marine Fisheries Service, Seattle, Washington, initiated a multi-disciplinary study to begin to understand some of the questions relating to the behavior, prey availability and acoustic environment of the humpback whale in Glacier Bay and southeastern Alaska (Baker et al. 1982; Malme, Miles and McElroy 1982; Baker er al. 1983; Miles and Malme 1983; Wing and Krieger 1983; Krieger and Wing 1984; 1986).

The result of this study did not conclusively demonstrate the reason for the sudden departure of whales from Glacier Bay. There is evidence,however, that a shift in prey distribution may have occurred and there is short-term temporary disturbance when vessels passby within one-quarter mile of humpback whales. Given the absence of prey-related data prior to 1978 and the difficulty of assessing the threshold of vessel activity that could cause abandonment of foraging habitat, the exact cause of the 1978 departure may never be resolved. This study aids in further understanding of the biology and natural history of the humpback whale in Alaskan waters (Baker et al. 1985; Perry et al. 1985; Baker et al. 1986; Baker et al. 1987). It is apparent that continued long-term will be of great value to the management of this endangered whale throughout their migratory range.

This report summarizes the results of the ongoing monitoring of the humpback whale in the waters of Glacier Bay and Icy Strait during the late spring and summer of 1989.

METHODS

Vessel Surveys

Humpback whales were observed and photographed from a 17' Boston Whaler skiff, OGIVE, powered by a 50hp Evinrude outboard motor. Surveys were conducted in Glacier Bay and Icy Strait (Figure 1) from 17 May to 09 September 1989. Glacier Bay was usually

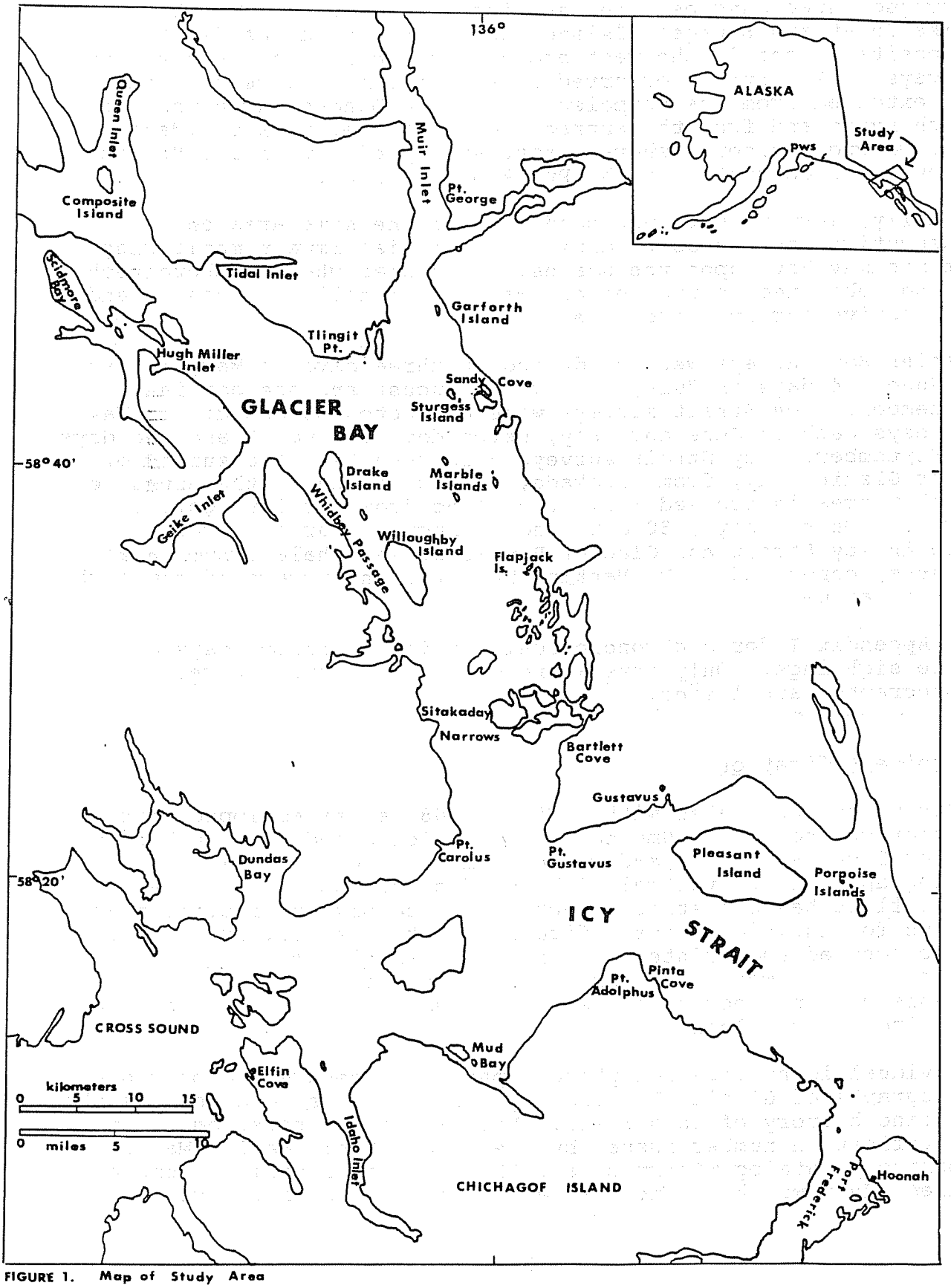

FIGURE 1. Map of Study Area

surveyed three days per week and included lower and mid-bay to Geike Inlet and Sturgess Island and the upper bay as far as Composite Island in the west arm and Pt. George in the east arm. Surveys in Icy Strait occurred once, sometimes twice per week, and extended from the Porpoise Islands to Dundas Bay along the north shore and from the entrance to Port Frederick to Idaho Inlet along the south shore. Most survey effort in Icy Strait, however, concentrated in the Pt. Adolphus area.

Normally, surveys were not conducted in the same area on consecutive days so as to minimize potential impact monitoring efforts may have upon the whales. In an area where a photograph was not obtained, survey effort was occasionally increased, and consecutive surveys were made.

Glacier Bay surveys were conducted on three days in May, 17 days in June, 14 days in July, 16 days in August and one day in September. Icy Strait surveys were conducted on one day in May, six days each in June and July, seven days in August and two days in September. Icy Strait surveys also resulted in a survey of lower Glacier Bay, from Sitakaday Narrows south to the entrance, as that area is crossed while traveling from Bartlett Cove to Icy Strait. On two days, 30 June and 16 August, surveys occurred both in Icy Strait and Glacier Bay as killer whale (*Orcinus orca*) surveys, conducted by D. Matkin, resulted in surveys of humpback whales, as well.

See Appendix I for a chronological listing of survey days and whale sightings. Only days where whales were encountered and photographed are listed.

Photoidentification

Photographs were taken with a Nikon 8008 camera equipped with a motordrive and a 70-210mm zoom lens. High speed (400 pushed to 800 or 1600 ISO) black and white film was used to obtain photographs of the ventral fluke surface of each whale. Each whale fluke has a distinct black and white pigment pattern that allows for individual identification (Katona et al. 1979). Film was processed and printed by Pandalab, Seattle, Washington. Contact sheets were used for preliminary data analysis. The seasons best photograph of each fluke was selected for subsequent printing and cataloging.

Individual identification photographs were compared to previous photographs of Glacier Bay and Icy Strait whales to determine the sighting history of each whale. Each whale was referred to by identification number issued by the Kewalo Basin Marine Mammal Laboratory catalog (Perry et al. 1988) of North Pacific humpback whales. Unknown whales to Glacier Bay and Icy Strait were

assigned a temporary identification code, such as AIS 89-01 or AGB 89-01. This code refers to where the animal was first sighted, Icy Strait (AIS) or Glacier Bay (AGB), the year (89) and the sighting sequence (01, 02, etc.). Two whales, AIS 87-09 and AGB 87-04, were first sighted in 1987 and resighted this year, have yet to be assigned permanent identification numbers. Whales first photoidentified by Jurasz and Palmer (1981a; 1981b) were also listed by their nicknames.

Prey Assessment

This year, qualitative assessment of prey was determined visually and through sampling of gut contents of salmon and halibut caught in areas where whales were actively feeding. In previous years, quantitative hydroacoustic assessment of prey was conducted by National Marine Fisheries Service, Auke Bay Laboratory, Juneau, Alaska (Wing and Krieger 1983; Krieger and Wing 1984; 1986).

Vessel and Aircraft Interactions

Vessel and aircraft interactions observations occurred opportunistically during normal survey efforts in Glacier Bay and Icy Strait.

RESULTS

Counts

Forty-two individual humpback whales were photoidentified in Glacier Bay and Icy Strait between 17 May and 09 September 1989 (Appendix I). Of this total count, 18 whales were photoidentified only in Icy Strait and 12 only in Glacier Bay. Twelve whales were common to both areas. Total count for the 1989 season in Glacier Bay was 24 humpback whales (12 common to both areas and 12 found only in Glacier Bay equals 24).

Previous studies (Perry et al. 1985, Vequist and Baker 1987) describe a standardized counting period where whales were identified during the first week in July and mid-August (specifically 09 July-16 August) and compared between study years. This standardized count was 20 and 19 whales identified in Glacier Bay and Icy Strait, respectively (Table 1).

Birth Rates and Juvenile Survival

There were five calves (whales less than one year old and accompanied by their mothers) identified in the Glacier Bay and Icy Strait area during 1989 (Appendix I). This resulted in a crude birth rate (defined as calves/total count) of 11.9%. Two calves were seen in Glacier Bay and three in the Icy Strait.

Birth rates between 1982 and 1989 ranged from 0-18.2% (Table 2) (Baker 1985a; Perry et al. 1985; Baker 1986; Baker 1987; Baker and Straley 1988).

Table 1.
Standardized and total counts of humpback whales (adults and calves) identified in Glacier Bay and Icy Strait, 1982-1989.

	Counts of Humpback Whales							
	1982	1983	1984	1985	1986	1987	1988	1989
Glacier Bay								
standardized	22	10	24	10	26	28	17	20
total	22	10	25	15	32	33	39	24
Icy Strait								
standardized	5	9	21	19	27	34	29	19
total	15	9	22	30	35	48	36	30
Combined								
standardized	33	17	39	27	42	49	41	33
total	33	17	39	41	51	59	55	42

Note: Total counts refer to the number of whales sighted during the entire monitoring season. Standardized counts refer to the number of whales photoidentified during early July and mid-August each year.

Table 2.
Total whale counts, number of calves and crude birth rates for humpback whales in the Glacier Bay and Icy Strait area, 1982-1989.

Year	1982	1983	1984	1985	1986	1987	1988	1989
Total count	33	17	39	41	51	59	55	42
Calves	6	0	7	2	8	4	8	5
Birth rate %	18.2	0.0	17.9	4.5	15.7	6.8	14.5	11.9

Calves photoidentified in previous years have returned in subsequent years. Two juveniles (a whale five years old or less),#353 and #352, sighted as calves in 1984, have continued to be photoidentified in the Glacier Bay-Icy Strait area since 1987 (they were not seen in 1985 and 1986). Their mothers, #581 and #530, respectively, also continue to return to the area. Another juvenile, #349, calf of #535 in 1984, was observed in Icy Strait this year. Two whales, #186 and #516, now considered to be adults (a whale over five years of age), have also returned to this area since first identified as calves. Animal #186, the calf of #530 in 1982, has returned every year and #516 (Garfunkle) has returned in 11 out of 15 years since first identified as a calf in 1974. The continued return of these whales, as juveniles and adults, continues to document maternally-directed fidelity to the Glacier Bay-Icy Strait area.

Garfunkle was thought to be the calf of animal #166 (Frenchie) (Jurasz and Palmer 1981a). Frenchie has never been sighted with a calf in ten consecutive years of observation (Baker et al. 1987; Baker 1987; Baker and Straley 1988) and the gender of this whale has been in question for a number of years. Recent documentation, through karyotyping from biopsy samples, has shown Frenchie to be a male and is therefore not the mother of Garfunkle (C.S. Baker pers. comm.).

Animal #581 was seen with a calf in three consecutive years, 1987, 1988 and 1989. The only other documentation of consecutive calving years has been for animal #235 (Spot) in 1987 and 1988.

Fluke identification photographs were not obtained on two cows of the five cow/calf pairs sighted in the Glacier Bay-Icy Strait area this year. Dorsal fin photographs, however, were taken but did not match with known cows. One cow, AIS 89-04, was sighted once, near the Porpoise Islands. The second unidentified cow, AGB 89-03, was sighted repeatedly in Glacier Bay and, through matching dorsal fin photographs, could possibly be animal #161 (BWM), a known Glacier Bay cow.

Seasonal Distribution

Glacier Bay- One humpback whale was seen in Glacier Bay during May. On 30 May a single humpback was observed near the entrance to Hugh Miller Inlet. Unfortunately, a fluke identification photograph was not obtained. Surveys were conducted on a regular basis and few whales were seen or reported from early to mid-June. One whale was reported near Queen Inlet in early June. During mid- to late June whales were observed around Pt. Carolus and north along the west shore to Fingers Bay. Whales continued to utilize the Pt. Carolus, Sitakaday Narrows, Whidbey Passage areas and Bartlett Cove through late July. In mid-July an occasional whale was sighted in the upper bay. Scidmore Bay,

Sandy Cove, Tidal Inlet and just north of Drake Island towards Tlingit Point were also whale sighting locations. On 18 July the largest number of whales were encountered with 12 whales photoidentified and two others not identified, for a total of 14 whales in the bay on that day. In August, whales were observed in the Garforth Island, Sturgess Island and Sandy Cove area on a regular basis. They were also sighted in the middle bay area, Whidbey Passage, north of Willoughby Island, around Flapjack Island, and in the upper bay near Russell Island. By late August and early September whale numbers declined in Glacier Bay with an occasional sighting near Willoughby Island, Geike Inlet and in the Sandy Cove-Marble Island area.

Icy Strait- Humpback whales were observed in Icy Strait throughout the monitoring season. Eleven whales were photoidentified near Pt. Adolphus on 1 June. The majority of these were members of the "core group" (Perry et al. 1985) seen in previous years. Early in the season the whales were dispersed from Pinta Cove towards Mud Bay and in July a few whales were seen between Pt. Gustavus and Pleasant Island. There were repeated sightings around the Porpoise Islands and occasional sightings along the shoreline from Pt. Corolus to Dundas Bay. The largest number of whales photoidentified in Icy Strait was 12 on 25 August (Appendix I).

Movement Between Areas and Length of Stay

Twelve whales were common to both Glacier Bay and Icy Strait (Appendix I). Eight whales made one or more round-trips (moved from one area and back) and four whales moved from one area to the other. Animal #157 (MD) was extremely mobile between areas, making two round-trips, one of these in three days between 25-27 July. This consistent exchange between areas continues to support the idea that these whales consider these two areas one habitat.

Out of the 42 total whales seen in the Glacier Bay-Icy Strait area this season 27 were observed for 20 or more days in one or both areas. The longest length of stay was held by Garfunkle with a sighting interval of 114 days (Appendix I). Within Glacier Bay, 11 animals were observed for at least 20 days during the 1989 monitoring season (Table 3).

Table 3.
Length of stay (20+ days) for whales in Glacier Bay during the 1989 monitoring season.

	Whale ID #	Nickname	First Day Sighted	Last Day Sighted	Days
1.	516	Garfunkle	27 June	09 August	44
2.	118	Chop Suey	13 June	23 August	72
3.	235	Spot	21 July	31 July	41
4.	250	---	13 July	06 August	25
5.	157	MD	21 June	25 July	37
6.	566	Curly Fluke	12 June	18 July	37
7.	calf	AGB 89-01	12 June	18 July	37
8.	352	---	21 June	16 August	57
9.	cow	AGB 89-03	21 June	18 July	28
10.	calf	AGB 89-04	21 June	18 July	28
11.	1018	AGB 89-05	18 July	29 August	43

Prey Assessment and Feeding Behavior

Glacier Bay- The primary whale feeding behavior in Glacier Bay was short, shallow dives followed by a quick surface lunge. Time observed on the surface was usually short (two or three blows) with a fluke-up dive seldom seen. Length of dives and resurfacing locations were unpredictable and erratic. This feeding behavior is usually associated with shallow, fast moving prey such as schooling fish. Whales were seen feeding close along shore and in the middle of the bay. As in past years, the whales were solitary or, occasionally, found in pairs.

Two bubblenetting episodes were observed this year. On 1 August animal #250 was seen bubblenetting near shore just south of Garforth Island. The net was 10-15m in diameter and in the shape of the number 6. No prey was documented but another whale was feeding nearby, in a manner described above, indicative of schooling fish. On 12 August animal #118 (Chop Suey) was seen bubblenetting similarly off the north tip of Willoughby Island. The prey, schooling fish 5cm in length, was observed boiling at the surface inside the net. On both occasions vertical lunges were associated with the bubblenets.

Visual observations documented the primary target prey to be small schooling fish, primarily sandlance (*Ammodytes hexapterus*). Once capelin (*Mallotus villosus*) were the target prey. Five gut samples from salmon and halibut caught near feeding whales in July and August consisted of sandlance.

Icy Strait- The feeding behavior of whales in Icy Strait was similar to past years. A cohesive "core group" dominated the feeding pattern at Pt. Adolphus for most of the summer. For a brief period in early to mid-July this group dispersed and individuals were found in Glacier Bay and near Pleasant Island. The group resumed their position at Pt. Adolphus by late July. This year the group consisted of #587, #577, #573, #166, #186, #353 and sometimes #155, #351 and #530. The first four whales have constituted a close affiliation and have been seen feeding together in numerous years (Perry et al. 1985; Baker 1986; 1987; Baker and Straley 1988). Animals with calves usually do not participate in the group as evidenced by #581 and #236, both cows with calves this year, who have previously been members. Interestingly, animal #530 has never been part of this group and was a regular affiliate in August this year.

Bubblenetting (full, closed circle, 10-15m diameter) was observed east of Pt. Adolphus on 4 September, by two whales, #237 (Dike) and #513. Dike was seen bubblenetting in this same area in 1988.

Visual observations showed the predominant prey at Pt. Adolphus to be herring (*Culpea harengus*). This was consistent with the findings of net tows and hydroacoustic surveys done in 1983-87 (Krieger and Wing 1984; 1986; Baker 1987).

Vessel and Aircraft Interactions

On two occasions, during survey efforts upon single whales in Glacier Bay, cruise ships passed within 1/2 mile. Each time the whale became evasive and disappeared and observations ended. On another occasion, during survey efforts near Flapjack Island, a single whale crossed from Flapjack Island to Willoughby Island. This whales was passed by two cruise ships, one large (over 90') pleasure boat and the GOLDRUSH (concession tourboat). Pleasure boats, including one kayak, were observed to pursue, or alter course to observe, humpback whales on four occasions. Once a charter boat, GOODTIME CHARLIE, approached the OGIVE during survey efforts on a single whale. Park ranger #216 and biologist #315, observed an aircraft flying 50' over a group of six whales feeding near Flapjack Island.

As in previous years, Pt. Adolphus continued to a favorite 'whalewatching' area for private and commercial vessels (Baker and Straley 1988). Guided kayak tours, charter boats, pleasure boats and cruise ships were observed at Pt. Adolphus this year. Both Holland America and Princess cruise ships visited Pt. Adolphus on a regular basis to observe humpback whales, especially the 'core group' of 6-9 whales. Charter boats (the PROFESSOR, SYLVIA J, and GOODTIME CHARLIE, in particular) were observed pursuing and photographing whales. Aircraft were seen

on at least four occasions flying 50-100' (and circling) over whales. Once an aircraft landed between pods of whales.

DISCUSSION

The influx of whales into Glacier Bay occurred in mid- to late June and peaked in mid-July. There was a slow decline in August and few whales observed in September. The number whales in Icy Strait and Pt. Adolphus, in particular, remained constant throughout the monitoring season. This was a consistent pattern from past years (Perry et al. 1985, Vequist and Baker 1987).

The total number of whales in the Glacier Bay was considerably lower than the three previous years (1986-88) but similar to 1984 and 85 (Table 1). This year, nearly one-half of the whales, 11 out of 24, were resident (a resident is considered to be in Glacier Bay for at least 20 days). Ten of these whales were present for four weeks (28 days) or longer. This is similar to the past three years where 9-12 were residents. Only three of the 24 whales had never been previously identified in Glacier Bay. Given the lower number of total whales using Glacier Bay this year there is a remarkable consistency in the number of whales that return to use the bay, for a comparable length of time, over the past four years.

The calving intervals of females humpback whales in southeastern Alaska is variable, ranging from one to five years, with an estimated calving rate of 0.37 (Baker et al. 1987). The increased documentation of yearly calving intervals this year by animal #581 (with a calf the past three years) and last year by animal #235 (Spot) (Baker and Straley 1988) may be evidence that the factors influencing calving intervals have been good in the past three years. The number of calves observed in the Glacier Bay Icy Strait area this year, however, is not higher or lower than found in past years as there is much variability in crude birth rates across the years 1982-89 (Table 2). Continued long-term monitoring of reproductive histories and calving intervals of known females will add significantly to the natural history and biology of this species in southeastern Alaska.

The unregulated 'whalewatching' that has occurred over the years at Pt. Adolphus continues to be a source of undocumented harassment on these whales. Short-term disturbance, observed in 1988 between a cow and calf when approached by a cruise ship, has been observed and long-term disturbance, such as decreased reproductive success or displacement, is currently unknown.

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Appendix I.

HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1989

WHALE ID #	NAME	DATE																						
		MAY		JUNE														JULY						
		17	30	01	04	07	12	13	17	21	22	23	26	27	28	29	30	01	02	03	06			
516	GARFUNKLE	I		I										G							G			
573				I		I							I				I							
219				I		I			I				I											
166	FRENCHIE			I		I			I				I				I			I				
587	GERTRUDE			I		I							I				I							
118	CHOP SUEY			I		I		G		G		G		G		G								
349				I																				
581				I					I				I							I				
CALF	AIS 89-01 ✓			I					I				I							I				
157	MD			I		I	I			G	G													
559	LUMPY					I																		
530						I											I							
577	SCOPER					I																		
235	SPOT						I			G														
566	CURLY FLUKE						G/I								G									
CALF	AGB 89-01 ✓						G/I								G									
134									I															
155									I				I				I							
186									I				I							I				
153									I								I			I				
152										G										G				
121														G	G									
196																	G	G						
139	MAX																			G				
193																				I				
117	WHITE EYES																							
151																								
150																								
136	LEIGH																							
CALF	AIS 89-03 ✓																							
137	DIKE																							
159																								
113																								
	AIS 87-09																							
	AIS 89-02			I																				
COW	AIS 89-04 who?																							
CALF	AIS 89-05																							
	AGB 89-02													G										
COW	AGB 89-03 ✓161									G									G	G				
CALF	AGB 89-04									G									G	G				
	AGB 89-05																							
	AGB 87-04																							

? ANIMALS DO NOT YET HAVE AN ASSIGNED WHALE ID #; HOWEVER, THESE ARE DIFFERENT NIMALS THAN THOSE LISTED WITH ID #'S)

HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1989

WHALE ID #	NAME	DATE																				
		JULY																AUGUST				
		07	08	09	11	12	13	14	17	18	19	20	22	23	25	26	27	31	01	03	06	
516	GARFUNKLE							G		G	G				G				G		G	
573			I		I						I		G			I				I		
219					I						I					I						
166	FRENCHIE		I								I											
587	GERTRUDE		I								I					I						
118	CHOP SUEY					G	G	G	G	G		G			G		G					
349																						
581																				I		
CALF	AIS 89-01																			I		
157	MD					G	G								G	I	G					
559	LUMPY																					
530					I						I					I						
577	SCOPER				G/I					G						I						
235	SPOT	G		G				G	G	G			G		G			G				
566	CURLY FLUKE								G	G												
CALF	AGB 89-01								G	G												
83																						
155					I					G			G			I						
186			I								I					I				I		
353			I													I						
352															G							
221																						
196																						
539	MAX		I		I				G	G			G	G								
193			I																			
117	WHITE EYES						G			G												
351																I						
250							G	G									G		G		G	
236	LEIGH																	G		I		
CALF	AIS 89-03																	G		I		
237	DIKE																				G	
159																						
513																						
?	AIS 87-09																		G			
?	AIS 89-02				I			G					G									
COW	AIS 89-04				I																	
CALF	AIS 89-05				I																	
?	AGB 89-02																					
COW	AGB 89-03									G								G				JLW, 3/06
CALF	AGB 89-04									G								G				
?	AGB 89-05									G												
?	AGB 87-04																					

HUMPBACK WHALES GLACIER BAY (G) AND ICY STRAIT (I) 1989

WHALE ID #	NAME	DATE																						
		AUGUST																SEPTEMBER						
		07	08	09	10	12	14	16	17	18	21	23	25	29	30	31	04	07	09					
16	GARFUNKLE		G	G						I	I		I					I						
73					I				I	I			I											
19			I										I				I		I					
66	FRENCHIE				I								I			I			I					
87	GERTRUDE				I								I			I								
18	CHOP SUEY	G		G		G					G	G	I											
49																								
81			I		I																			
ALF	AIS 89-01		I																					
57	MD				I								I					I						
59	LUMPY																							
30					I								I						I					
77	SCOPER								I				I			I			I					
35	SPOT																							
66	CURLY FLUKE																							
ALF	AGB 89-01																							
34	P25																							
55																								
86					I													I	I					
53			I							I			I					I	I					
52								G																
21																								
96																								
39	MAX																							
93																								
17	WHITE EYES																							
51			I															I	I					
50	♀																							
36	LEIGH		I		I								I					I	I					
ALF	AIS 89-03		I		I								I					I	I					
37	DIKE	G		G													I							
59							G		G			G												
13																	I							
	AIS 87-09																							
	AIS 89-02																							
OW	AIS 89-04																							
ALF	AIS 89-05																							
	AGB 89-02																							
OW	AGB 89-03																							
ALF	AGB 89-04																							
	AGB 89-05													G										
	AGB 87-04														G									