ALASKA LEGISLATURE COMMITTEE FILES 1983-1984 8612

2888 SRES SJR 31 - SJR 32

Figure 3. Animal AE 1, showing differences in pigmentation and scarring on the left (A) and right (B) sides. (Photos from Chenega Point, 4 June 1984 by C.O. Matkin.)

(A)

(B)

Exposed film was "push" processed using Edwal FG-7 fine grain developer with a 9% sodium sulphite solution (for ASA 1600) or Acufine developer (for ASA 1000). A proof sheet of each roll was prepared and filed with the negatives and associated data sheets. Developed negatives were examined under a Wild M5 stereomicroscope with 8 power eyepieces, affording 4.8 to 40.0 power magnification (9.6 power was used most commonly). When negatives were sharp and correctly exposed it was possible to detect detail adequate to clearly distinguish individuals (see Figure 4). For each frame containing images of killer whales a notation was made on the associated data sheet to indicate identifiable individuals it contained. Field notes accompanying film from a given encounter were used to help define the pod(s) involved.

Pods were designated alphabetically, using two letters (A to indicate Alaska, and A to Z to distinguish pods); individuals were designated numerically. In repeat encounters with a given pod, previous designations were continued and newly identified animals were simply assigned the next higher number available. A 12.5X17.5 cm (5X7 in) glossy print of each designated animal, made from the best negative containing an image of that animal, was placed in a working catalogue of known individuals. Whenever a better photograph of a particular individual was obtained the catalogue was updated with the improved print. The catalogue as it existed at season's end is being reproduced (Ellis, editor, in preparation) and will be available from HSWRI on request.

Each pod and its members were provisionally referred to as "residents" or "transients", following terminology and characteristics used routinely by investigators in British Columbia and Washington to distinguish animals which they report appear to differ consistently in various morphological and behavioral characteristics (see Table 1).

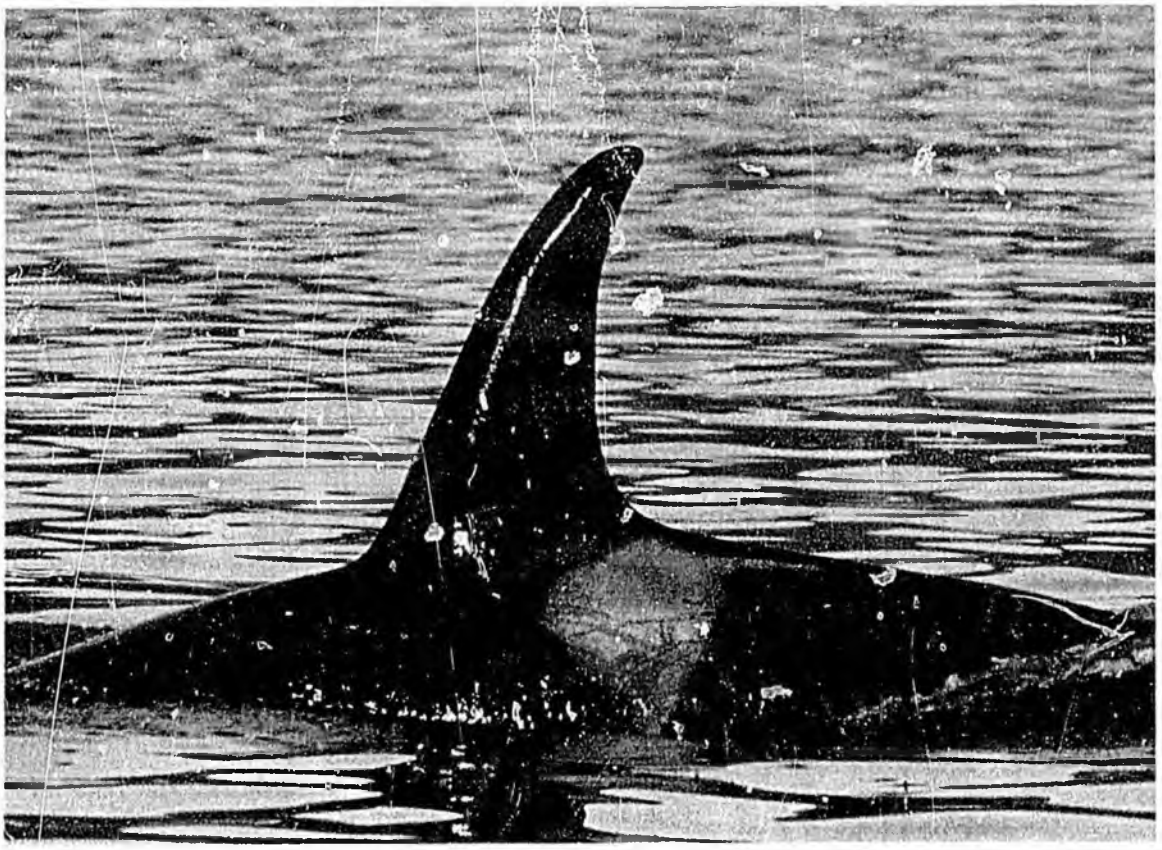
Photographs were also examined for information on associations among pods and among individuals within a pod. The association between a cow and her calf is the most obvious and can often be ascertained in a single encounter. Other associations may only become clear after longer monitoring of the population.

The main function of our vessel, base camp and aerial searches was to find killer whales for individual identification. For a variety of reasons, sightings data (and sightings records) are not considered appropriate for transect analysis to support independent estimates of density or population size. Therefore sightings and records are presented only to document distribution and relative abundance by area searched. Effort was logged as total number of days, hours, or miles searched in each "Statistical Reporting Area for Fisheries" defined by the Alaska Department of Fish and Game (ADFG).

The three study areas are geographically separate from one another. They were selected as distinct bodies of water somewhat in anticipation that any "resident" whales in each might be distinct from "residents" in the other. As approaches to coverage differed among the three areas, they are discussed separately.

Figure 4. Example of an animal (AB 25) identifiable by pigmentation and scars on 5 June 1984 (A) and 20 September 1984 (B). (Photos from Prince William Sound by C.O. Matkin.)

(A)



(B)

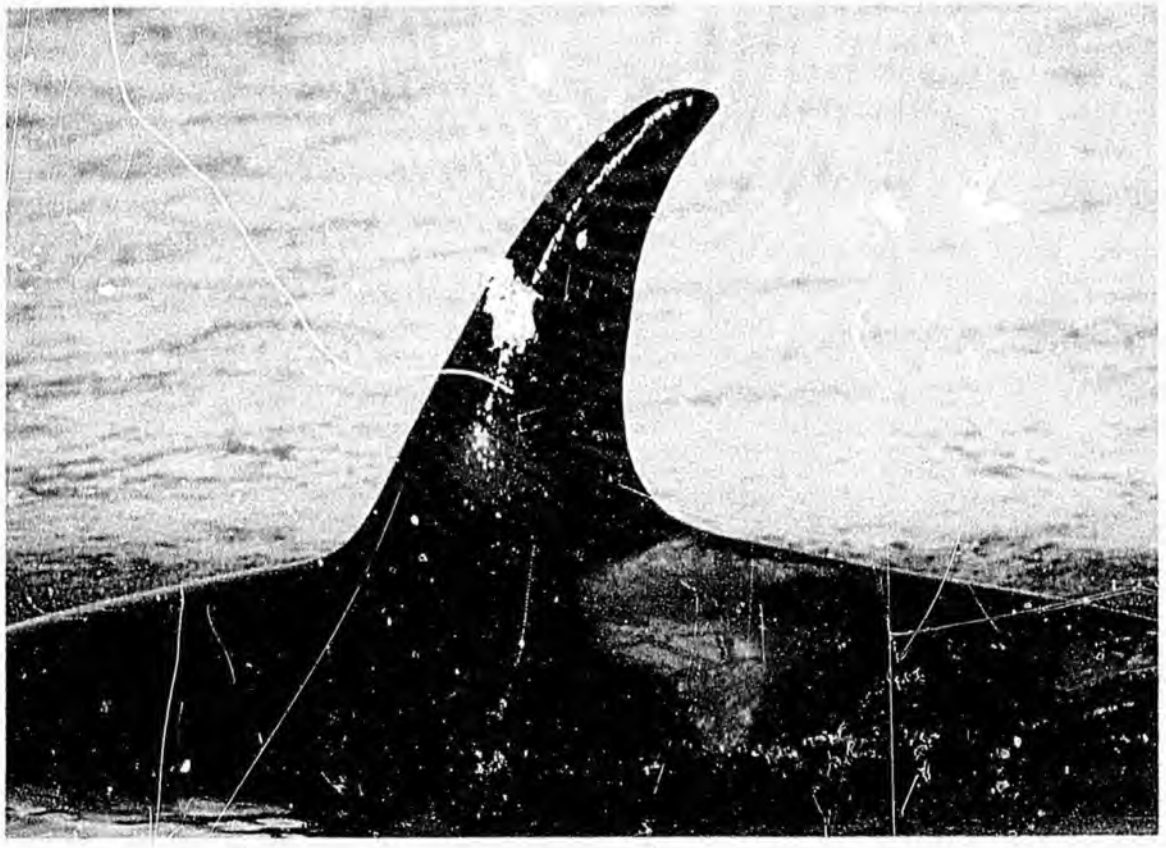


Table 1. A comparison of "typical" traits of postulated "resident" and "transient" forms of killer whales in British Columbia. *

	Residents	Transients
Pod Size	≥6	≤5
Form(a)	Dorsal fin rounded on tip, straight on front margin	Dorsal fin pointed on tip, bulged on front margin
Range	South Vancouver Island or North Vancouver Island & north coast, B.C.	All of British Columbia
Presence in British Columbia	Seen at least in summer, in some cases all year	Seen infrequently and during irregular times of year
Vocalizations(b)	Frequently vocal	Often quiet
Swimming behavior	Travel from headland to headland along coast in predictable manner; remain in open water; avoid inner bays	Tend to travel along shoreline in unpredictable manner with frequent changes of direction and dive times; often enter inner bays and narrow waterways
Associations with other pods	Found only with other resident pods, even when in close proximity	Found only with other transient pods, even when in close proximity
Food	Fish	Marine mammals and fish
Stability of pod composition	Membership in pods stable over long periods. Pod frequently solitary.	Membership in pods stable over time but several pods may combine for protracted periods.

* Prepared, with permission of the author, from Bigg, MacAskie and Ellis (1976, 1983), Bigg (1982) and a presentation 26 October 1984 to the University of Washington, Friday Harbor Marine Laboratory, Friday Harbor, Washington.
a) See description in Ellis (1978), based on pers. comm. from M.A. Bigg.
b) See Ford and Fisher (1982).

Southeast Alaska

The Southeast Alaska study area (Figures 1 and 5) includes coastal and inshore waters in the roughly 465 km (250 nm) strip from the Canadian border (ca 54°30'N) north to Cape Spencer (ca 58°30'N). Defined in this manner, Southeast Alaska is a large [approximately 51,400 km2 (15,000 nm2)], complex system of rivers, fiords, bays, sounds and passages with widely varying submarine topography and oceanographic characteristics.

Information on killer whales of Southeast Alaska is contained in Consiglieri and Bouchet (1977), Braham and Dahlheim (1982) and Leatherwood et al. (1984). Sightings have been reported from all areas but have been most common along the seaward coasts of the barrier islands and in the major entrances, particularly in outer Clarence and Chatham straits and throughout Cross Sound/Icy Strait. Leatherwood et al. (1984) used same-day sightings data, mostly from the Alaska Trollers Association (ATA) as the basis for their estimate that a minimum of 93 killer whales regularly use waters of Southeast Alaska. Some individuals from the population have been identified in several years since 1979 (McSweeney et al., in prep.) but no further details on the population are published.

The enormous area of Southeast Alaska was impossible to survey comprehensively with the time and resources available. Therefore, we concentrated effort on the five entrances connecting inland waters to the adjacent Pacific Ocean - Dixon Entrance (including Clarence Strait and Behm Canal), Sumner Strait, Chatham Strait, Peril Strait and Cross Sound/Icy Strait - on the premise that killer whales must use one of them to enter or leave the study area. Coverage of the outer coast was very limited. Coverage of inland waters involved field camps and vessels (Table 2).

Three base camps were established to monitor whale movements through the major entrances (Table 2; Figure 5). Camp A afforded an excellent view west across southern Clarence Strait to Prince of Wales Island, approximately 9.7 km (6 nm) distant. Except in poor weather conditions observers at the lookout could probably have seen whales entering or leaving the Strait. Camp B, on the north end of Prince of Wales Island, provided ready access to Sumner Strait, which in that area is approximately 9.7 km (6 nm) wide. Camp C used a platform on a promontory from which there was an unobstructed view across Cross Sound, which is about 9.7 km (6 nm) wide in this area. As at Camp A observers at Camp C could probably have detected whales in all except poor weather.

Each camp was staffed by two to four personnel. Weather permitting, visual watches were maintained during daylight hours using 7 to 9 power binoculars and a 25 power spotting scope. All marine mammal sightings were noted. Camps B and C were equipped with a LabCor hydrophone, anchored offshore and connected by cable to a transistorized amplifier at the observation post, used to listen for whales. Some fishermen cooperated with camp observers by providing their reports of killer whales. When HSWRI vessels were associated with camps or operating nearby (Table 2) they responded to killer whale sightings or reports and attempted to photograph the whales.

Additional shore camps were based on Yasha Island and on the Brothers Islands. Watches were maintained from shore at Yasha from 18 to 20 August.

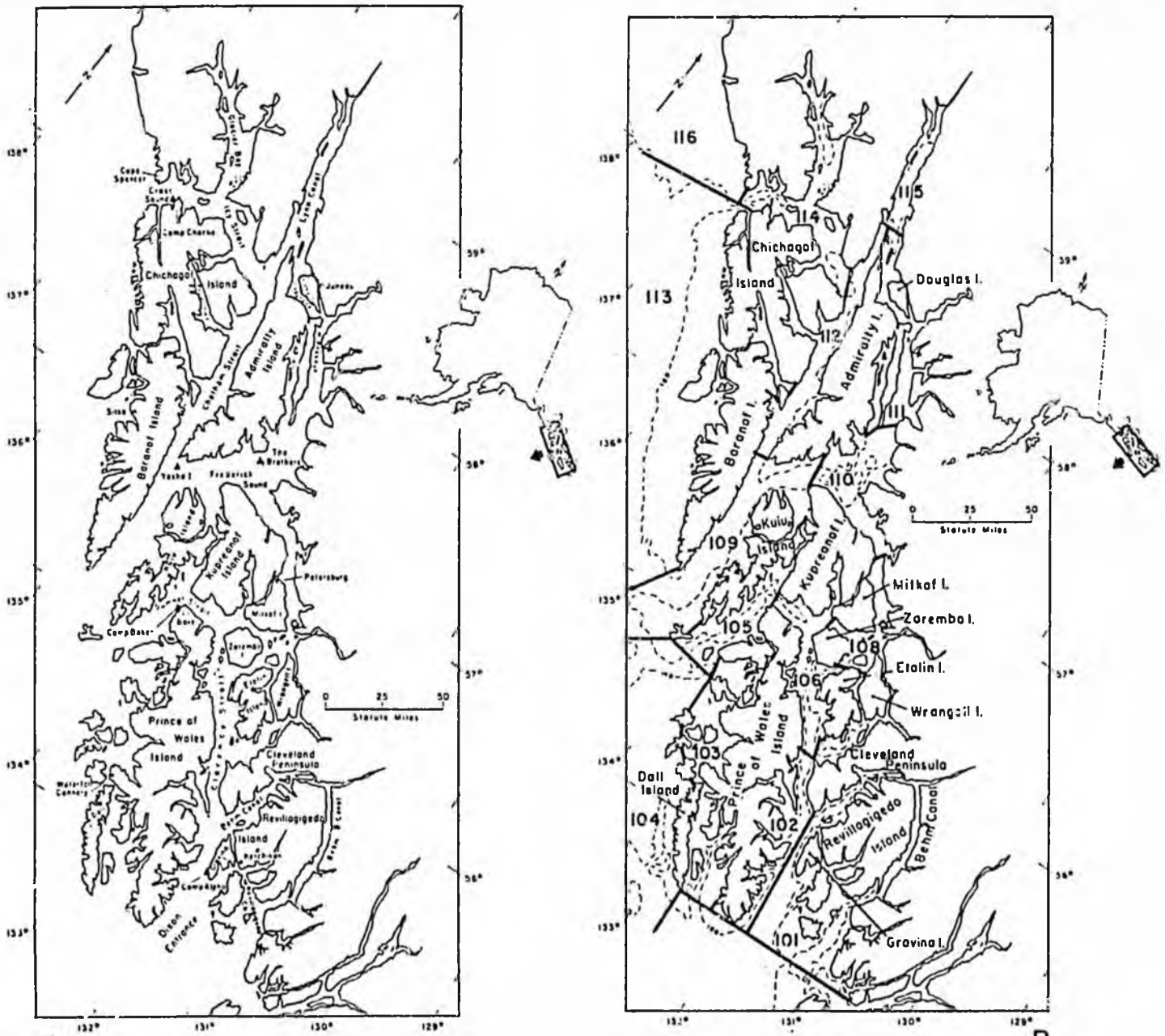


Figure 5. Southeast Alaska, showing place names referred to in the text (A) and ADFG statistical reporting areas (B).

Table 2 A. Vessels and shore camps used in Southeast Alaska, 1984: descriptions, general operating areas and levels of effort.

Platform	Dates of Operation	Areas of Operation	Description of Platform	Description of Activities	Average Speed (km/m;knots)	Eye Level (m;ft)	Total Distance Searched (km;nm)	Total Operating Days	Daylight Hours
S/R/V Diamaresa	20 Apr-15 Sept	Southeast Alaska	21m (68 ft) cutter-rigged motor sailer	supply shore camps;survey en route	13;7	2.75;9 to 18;60	10475;5966	148	1256.8
Zodiac	06 Aug-11 Sept	in association with Diamaresa	3.7m (12 ft) zodiac	support for Diamaresa	37;20	.9;3	696;375.5	11	53.4
R/V Orca	21 Apr-14 Sept	with Diamaresa, Camp C; outer coast, Cross Sound; Icy Strait; Glacier Bay; Lynn Canal	5.8m (19 ft) Boston Whaler;165 OMG inboard-outdrive	survey	46;25	1.8;6	6362;3433	86	621.8
R/V Orcinus	28 Jun- 27 Aug	Camp A; Ketchikan; Revillagigedo Channel; Behm Canal; Clarence Strait	5.8m (19 ft) Boston Whaler;165 OMG inboard-outdrive	survey	46;25	1.8;6	1400;755	19	107.1
R/V Shachi	20 Jun-22 Aug	Ketchikan to Icy Strait; outer coast Kupreanof	5.8m (19 ft) Boston Whaler;165 OMG inboard-outdrive	survey	46;25	1.8;6	1368;738	12	107.7
R/V Black Whale	3 Aug-10 Sept	Frederick Sound, Stephens Passage	5.8m (19 ft) zodiac Grand Raid;115 hp Mercury outboard	survey	46;25	1.8;6	2948;1591	28	283.8
SUBTOTAL							23827;12858.5	303	2430.6
Camp A	15 May-17 Aug	West Gravina Island (55°10'N,131 40'W)	cabin; blind at lookout point	shore watch	N/A	9.1;30	N/A	25	260.2
Camp B	18 Jun-30 Jun	Pt. Baker (56°21'N 133°35'W)	mobile home on log floats	shore watch	N/A	2.4;8	N/A	13	52.9
Camp C	28 June-19 Aug	Big George Island (58°12'N,136°23W)	cabin; platform at gun emplacement	shore watch	N/A	12.2;40	N/A	36	428.3
Camp D1	08 Aug-20 Aug	Yasha Island (56°58'N,134°33'W)	tent	base camp for Black Whale	N/A	5.5;18	N/A	7	30.0
Camp D2	29 Aug-10 Sept	Brother's Island (57°17'N,133°52'W)	tent	basecamp for Black Whale	N/A	N/A	N/A	11	-
SUBTOTAL								92	771.4
TOTALS							23827;12858.5	395	3202

Table 2 B. Vessels used in Scutheast Alaska: levels of effort.

		Coverage by ADFG Statistical Reporting Area (a)															
Month	Platform	Periods of Operation	101	102	103	104	105	106	108	109	110	111	112	113	114	115	116
April/May	Diamaresa	20 Apr-31 May	23	13	15	3	4	12		1	1	3	9		16		
	Orca	21 Apr-31 May	28	11	5	2	6	6					2		13		
	Subtotal		51	24	20	5	10	18		1	1	3	9		29		
June/July	Diamaresa	1 June-31 July	55	11			5	20	6	10	10	31	42	53	18		2
	Orcinus	28 June-31 July	25														
	Orca	1 June-31 July	11							2			1	20	76	0	4
	Shachi	20 June-31 July	11										8	9	7		
	Subtotal		102	11			5	20	6	12	10	31	51	62	101		6
Aug/Sept	Diamaresa	1 Aug-15 Sept	28	16	16	2	3	16	6	2	24	35	23	18	11	9	
	Orcinus	1 Aug-27 Aug	58														
	Orca	1 Aug-15 Sept					2	2					2			9	
	Shachi	1 Aug-22 Aug	2	1				6	1	3	3		7	6	3		
	Black Whale	3 Aug-10 Sept								11	50	15	3				
	Subtotal		86	17	16	2	5	24	7	16	77	50	35	24	14	18	
	TOTAL		239	52	26	7	20	62	13	28	88	84	95	86	144	18	6

(a) Numbers following periods of operation indicate the number of times vessels operated within some part of the indicated zone.

Otherwise these camps served only as a housing bases, providing ready access by skiff to Chatham Strait, Frederick Sound and Stephens Passage.

Five vessels were involved in field operations (Table 2). The principal survey platform was the SRV Diamaresa, a 21 m (68 ft) cutter-rigged motor sailer which supplied the shore camps and surveyed areas inaccessible to the camps. Coverage by the SRV Diamaresa consisted primarily of routes conveniently connecting shore camps with one another and with supply centers (Figure 6A). During 10,475 km (5,966 nm) of daylight transits one to six observers maintained watch from the wheelhouse, the deck outside, the top of the wheelhouse, or, weather permitting, the top spreaders, some 18.3 m (60 ft) off the water. Also, when weather permitted, a 3.7 m (12 ft) Zodiac and/or a 5.8 m (19 ft) Boston Whaler were deployed from the SRV Diamaresa to expand the search area.

Three 5.8 m (19 ft) Boston Whalers operated during the field season (Table 2; Figure 6B). The R/V Orcinus operated in the vicinity of Ketchikan and Camp A. The R/V Shachi ranged from Ketchikan to Icy Strait and the outer coast of Kupreanof Island, operating independently of the base camps and the SRV Diamaresa. The R/V Orca operated with the SRV Diamaresa for the first 35 days of the season, after which it was stationed at Camp C and Elfin Cove until early September. In early September it operated with the SRV Diamaresa during a survey of Lynn Canal.

The remaining survey vessel, the R/V Black Whale, a 5.8 m (19 ft) Zodiac Grand Raid, operated from Yasha and the Brothers Islands and searched primarily in Frederick Sound and Stephens Passage (Table 2; Figure 6B).

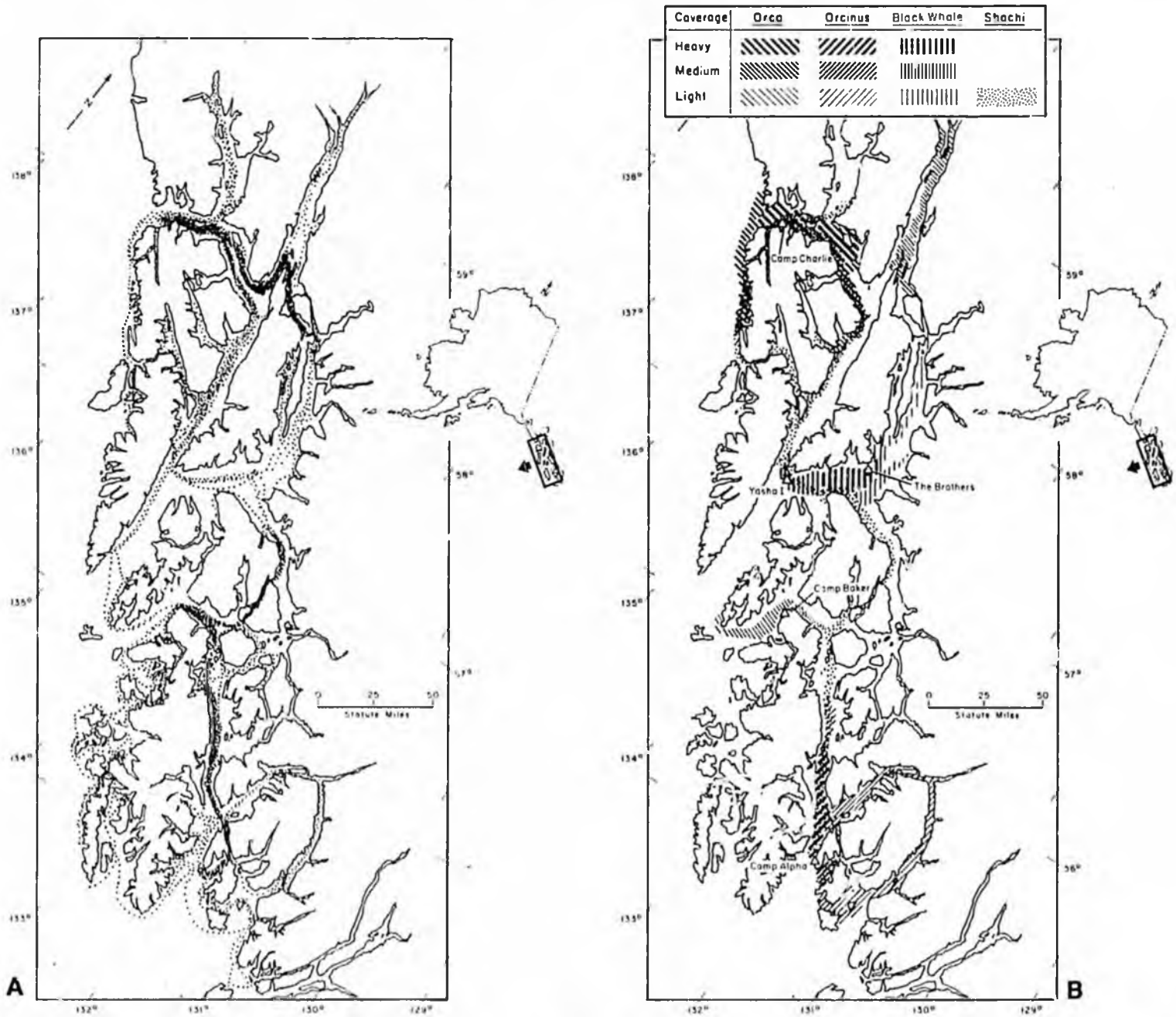
Prince William Sound

Prince William Sound, at the northern end of the Gulf of Alaska (Figures 1 and 7), is a deep, convoluted embayment extending from just below 60 N to just above 61 N between 145 30' W and 148 30' W. The Sound is connected to the adjacent Gulf by two major entrances, Hinchinbrook Entrance and Montague Strait, and by five smaller passages, four on the southwest, one on the southeast.

Information available on killer whales in Prince William Sound was reviewed by Leatherwood et al., (1984). Based principally on systematic surveys conducted between 1976 and 1983 (Hall 1979, 1981, in press; Matkin, 1980; Matkin and Matkin, 1981) and miscellaneous reports of incidental observations 1958-1981 (Braham and Dahlheim, 1982), the population appears to vary in abundance seasonally, to be distributed widely within the Sound part of the year but to concentrate seasonally in such areas as Knight Island Passage. It was determined by minimum count to contain 80+ whales and was estimated to contain conservatively 100+ whales (Leatherwood et al., 1984). Some individuals from the population have been identified in several years since 1976 (Hall, in press; von Ziegesar et al., in preparation), but no further details on the population are published.

Fieldwork in the Sound began on 11 April and continued through 26 September. Two platforms were used, the R/V Pelican and the R/V Kestrel (Table 3).

Figure 6. Southeast Alaska, showing relative coverage by area by the SRV Diamaresa and associated skiff (A) and all other vessels (B). The relative density of dots in (A) indicates relative coverage.



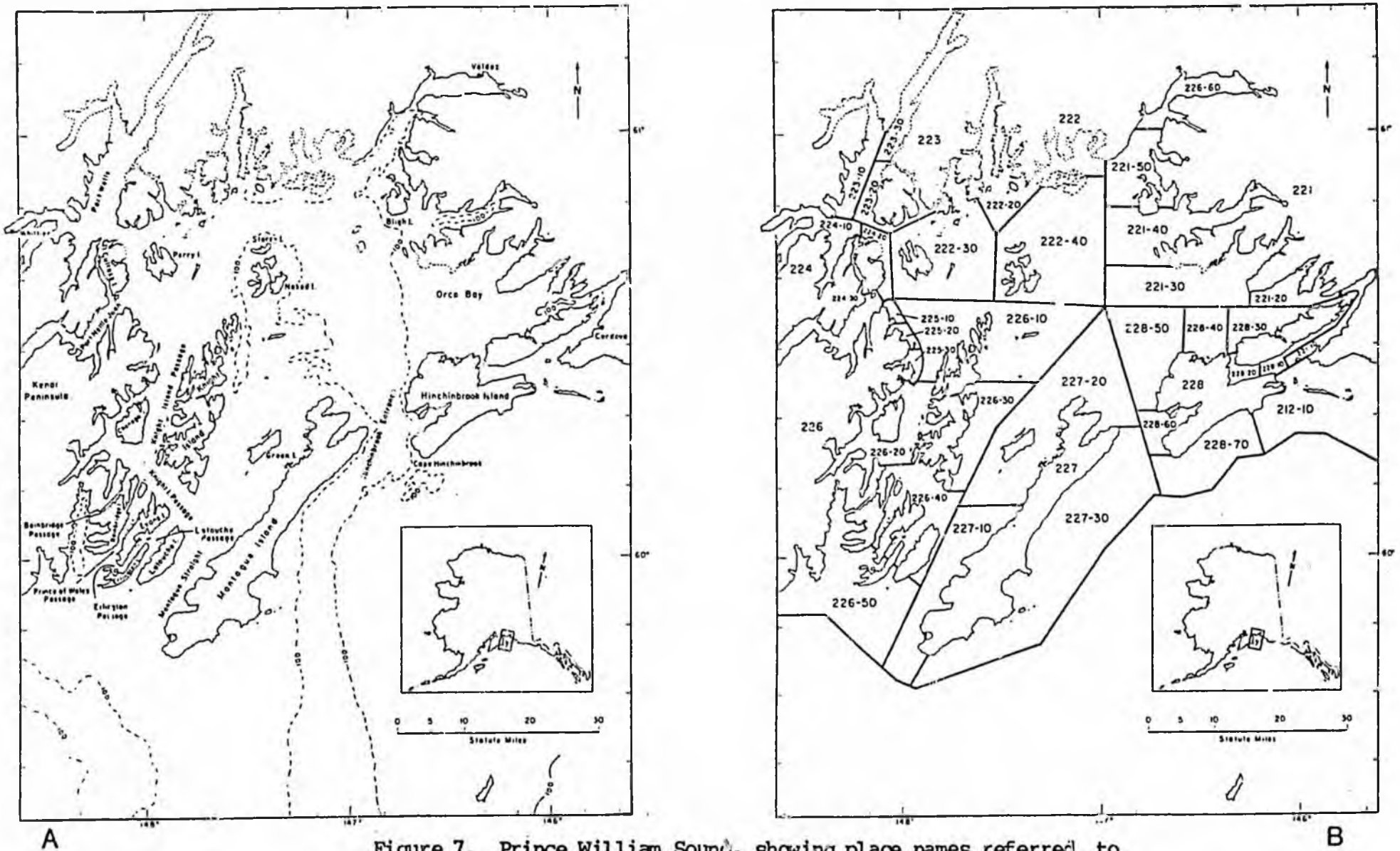


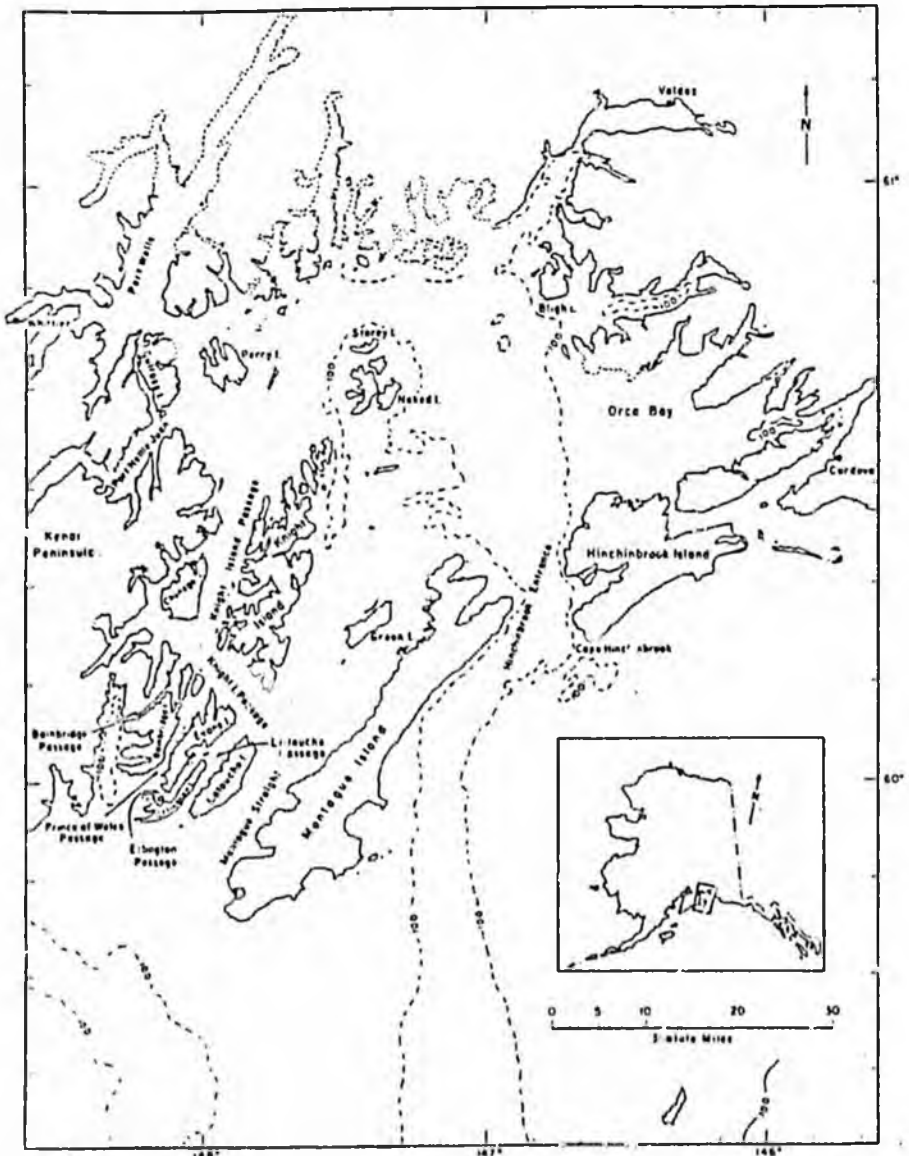
Figure 7. Prince William Sound, showing place names referred to in the text (A) and ADFG statistical reporting areas (B).

Table 3. Areas and levels of coverage in Prince William Sound, 1984.

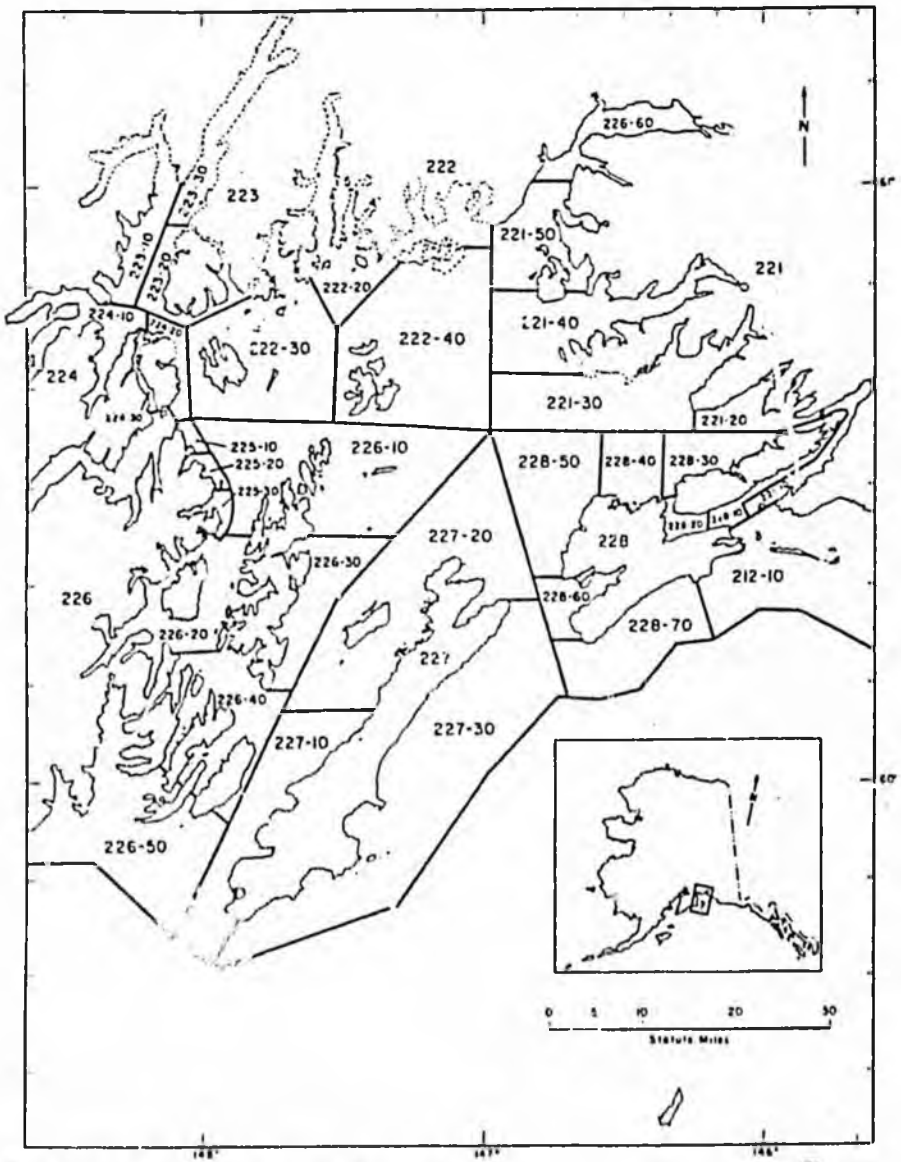
PLATFORM	Periods of Operation	Search Effort: Days	Hrs./Mins.	Miles	221					222				223	224				225			226					227		228				
					10	20	30	40	50	10	20	30	40		10	20	30	40	10	[illegible]	30	10	20	30	40	50	10	20	10	20	30	40	50
R/V Kestrel	4/10-5/12	28	279/05	1359	2		2	3	3			5	15									16	3	3	1			10	2	2	4	5	5
R/V Pelican	4/29-5/2	4	40/00	253				1	1			2	2		2	1						2											
	5/11-5/13	3	22/40	185							1	2	1		2	1						4	1	1	1	1							
Subtotals		35	341/45	1797	2		2	4	4		1	9	18		4	2						22	4	4	2	1		10	2	2	4	5	5
R/V Kestrel	5/18-6/28	33	382/54	1629	4	2	4						3		2	3		3	2	6	3	9	20	10	12			4			4	6	3
R/V Pelican	5/24-5/28	5	41/30	243								3	2		2	2	1	1				3	1		3	1	1	1					
	6/7-6/10	4	27/30	215								2	2	1	2	1	1	1				4	1		3	1	1	1					
	6/18-6/22	5	38/05	279							1	2	2		2	2						3	1	1	4	1	2	1					
Subtotals		47	489/59	2366	4	2	4				1	7	9	1	8	8	2	5	2	6	3	19	23	11	22	3	4	7			4	6	3
R/V Kestrel	7/5-8/31	55	515/55	1870	2	3	1					1	2									10	22	18	32	4	1	2					
R/V Pelican	7/5-7/8	4	27/30	217								2	5		4	6		1				4	1	2	3		1	1					
	7/17-7/20	4	28/00	270											2	2						2	2	2	3		1	1					
	7/27-7/30	4	34/00	216								2			2	1						3	2		5	1	1	1					
	8/2-8/9	8	23/00	152								1			2	2	1	1	1			3	2		2								
	8/16-8/19	4	39/00	108											2		3	2	2	1	2	1	2		2								
Subtotals		79	667/25	2833	2	3	1					6	7		12	11	4	4	3	1	2	23	31	22	47	5	4	5					
R/V Kestrel	9/1-9/26	19	192/5[illegible]	702	2			1													3	3	8	2	6		1	3	1		1	1	2
Subtotals		19	192/50	702	2			1													3	3	8	2	6		1	3	1		1	1	2
Totals		180	1711/5[illegible]	7698	10	5	[illegible]	5	4		2	22	34	1	24	21	6	11	5	7	8	67	66	39	77	9	8	22	2	2	9	12	10

Column groups 221–228: Coverage, By ADFG Statistical Reporting area (a)

(a) Numbers following periods of operation indicate the number of days in which some part of the indicated zone was surveyed.



A



B

Figure 7. Prince William Sound, showing place names referred to in the text (A) and ADFG statistical reporting areas (B).

Table 3. Areas and levels of coverage in Prince William Sound, 1984.

PLATFORM	Periods of Operation	Search Effort: Days	Hrs./Mins.	Miles	221					222				223	224				225			226					227		228				
					10	20	30	40	50	10	20	30	40		10	20	30	40	10	20	30	10	20	30	40	50	10	20	10	20	30	40	50
R/V Kestrel	4/10-5/12	28	279/05	1359	2		2	3	3			5	15									16	3	3	1			10	2	2	4	5	5
R/V Pelican	4/29-5/2	4	40/00	253				1	1			2	2		2	1						2											
	5/11-5/13	3	22/40	185							1	2	1		2	1						4	1	1	1	1							
Subtotals		35	341/45	1797	2		2	4	4		1	9	18		4	2						22	4	4	2	1		10	2	2	4	5	5
R/V Kestrel	5/18-6/28	33	382/54	1629	4	2	4						3		2	3		3	2	6	3	9	20	10	12			4			4	6	3
R/V Pelican	5/24-5/28	5	41/30	243								3	2		2	2	1	1				3	1		3	1	1	1					
	6/7-6/10	4	27/30	215								2	2	1	2	1	1	1				4	1		3	1	1	1					
	6/18-6/22	5	38/05	279							1	2	2		2	2						3	1	1	4	1	2	1					
Subtotals		47	489/59	2366	4	2	4				1	7	9	1	8	8	2	5	2	6	3	19	23	11	22	3	4	7			4	6	3
R/V Kestrel	7/5-8/31	55	515/55	1870	2	3	1					1	2									10	22	18	32	4	1	2					
R/V Pelican	7/5-7/8	4	27/30	217								2	5		4	6		1				4	1	2	3		1	1					
	7/17-7/20	4	28/00	270											2	2						2	2	2	3		1	1					
	7/27-7/30	4	34/00	216								2			2	1						3	2		5	1	1	1					
	8/2-8/[illegible]	8	23/00	152								1			2	2	1	1	1			3	2		2								
	8/16-8/19	4	39/00	108											2		3	2	2	1	2	1	2		2								
Subtotals		79	667/2[illegible]	2833	2	3	1					6	7		12	11	4	4	3	1	2	23	31	22	47	5	4	5					
R/V Kestrel	9/1-9/26	19	192/50	702	2			1													3	3	8	2	6		1	3	1		1	1	2
Subtotals		19	192/50	702	2			1													3	3	8	2	6		1	3	1		1	1	2
Totals		180	1711/59	7698	10	5	7	5	4		2	22	34	1	24	21	6	11	5	7	8	67	66	39	77	9	8	22	2	2	9	12	10

Coverage, By ADFG Statistical Reporting area (a)

(a) Numbers following periods of operation indicate the number of days in which some part of the indicated zone was surveyed.

The R/V Pelican is a an 8.2m (27 ft) fiberglass "Ocean Dory" powered by a 160 hp Volvo diesel inboard-outboard. Operating speed was generally 22 km/hr (12 knots), top cruising speed 31.5 km/hr (17 knots). Observers searched from the wheelhouse [eye level about 2.1m (7 ft)] or the top of the wheelhouse [eye level about 3.7m (12 ft)]. The R/V Pelican was capable of accommodating three to four scientists or observers comfortably for up to a week without refueling or reprovisioning.

Between 29 April and 19 August the R/V Pelican made 10 surveys, three to five days each, principally of northwestern, central and southwestern Prince William Sound. Surveys covered a total of 4,295 km (2,318 nm), distributed by area as shown in Table 3 and Figures 8A and B. The principal purpose of the surveys was to search for killer whales in areas of the Sound not being covered extensively by other means.

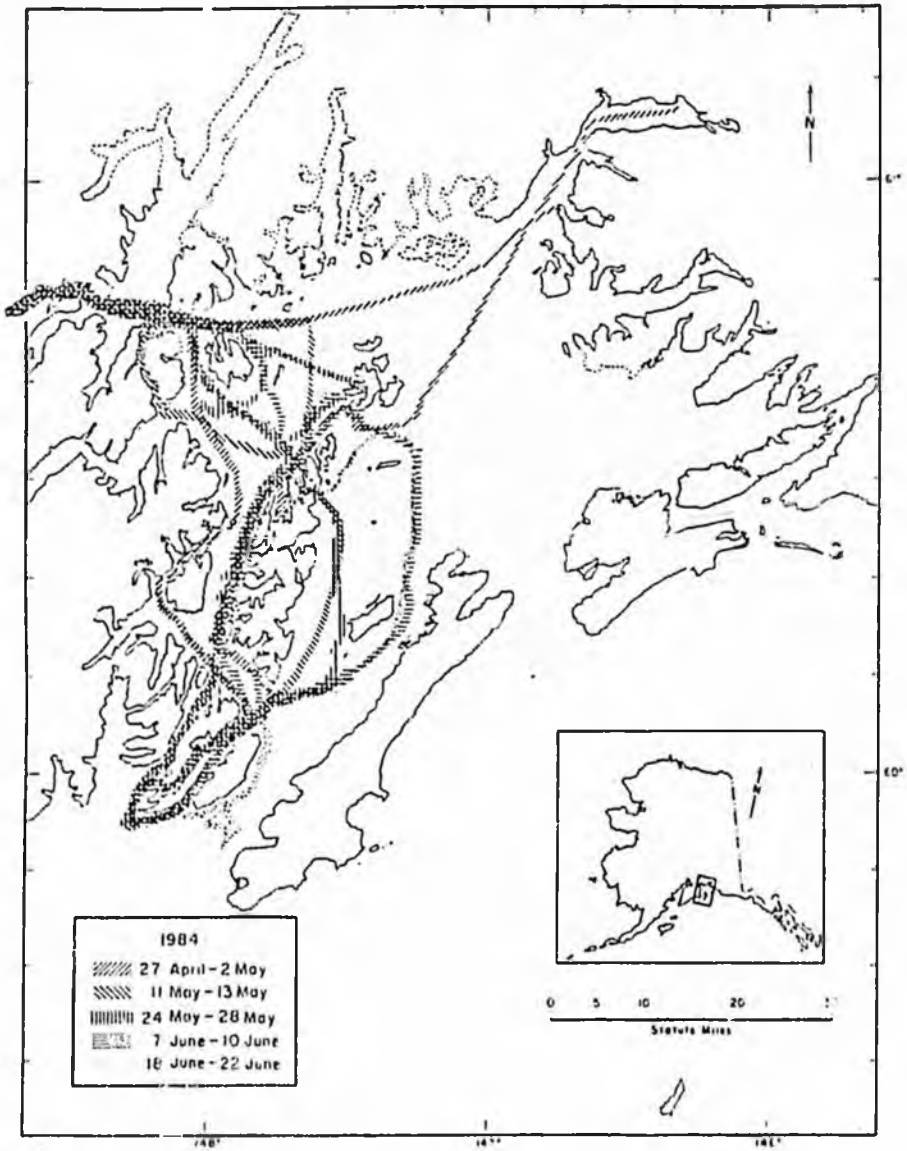
The R/V Kestrel is a 8.2m (27 ft) "bowpicker" design gillnetter powered by a 155 hp Volvo diesel inboard-outboard capable of speeds up to 27.8 km/hr (15 knots). The hydraulic reel and gillnet rollers were removed from the foredeck and bow, providing good visibility and a large, open area for observation and photography. In good sea conditions it was possible for one person to operate the vessel and simultaneously take photographs from the forward steering station. The research team (generally two scientists) was able to remain on board for extended periods. Fuel, which is generally unavailable in remote areas of the Sound, was purchased under special arrangement from Prince William Sound Aquaculture Corporation and from commercial fishing tenders. This enabled the R/V Kestrel to remain at sea for protracted periods.

The crew of the R/V Kestrel used the published information described above, their own previous research experience with whales in the Sound (Matkin, 1980; Matkin and Matkin, 1981; von Ziegesar and Goodwin, 1981; von Ziegesar et al., in prep.), and reports from vessel and aircraft operations, in 1984 and in previous years, to select focal areas for various parts of the 1984 field season.

In the spring, the R/V Kestrel concentrated on the central Sound (Table 3; Figures 8C and D). Searches for killer whales were initiated on 10 April in the area of Smith and Naked islands, where herring spotter pilots were reporting repeated sightings of killer whales, and were continued there through 12 May (the end of the herring season). A total of 2,518 km (1,359 nm) of survey track was logged during 28 days of operation. In the summer and early fall, effort shifted to the southwestern Sound (Table 3, Figures 8C and D), principally waters of Knight Island Passage, Montague Strait and the four smaller southwestern passes.

Overall, the crew searched for or tracked killer whales a total of 10,303 km (5,560 nm) in 135 survey days, an average of 76.3 km (41.2 nm) per survey day. The vessel was weathered-in and unable to be used to search for whales on only five days.

Areas of coverage by the R/V Kestrel became more constricted in August and September, as most sightings during salmon season originated in portions of the Sound south and west of Knight Island (Figures 8C and D). During this period members of the salmon purse seine fleet and salmon spotter pilots provided



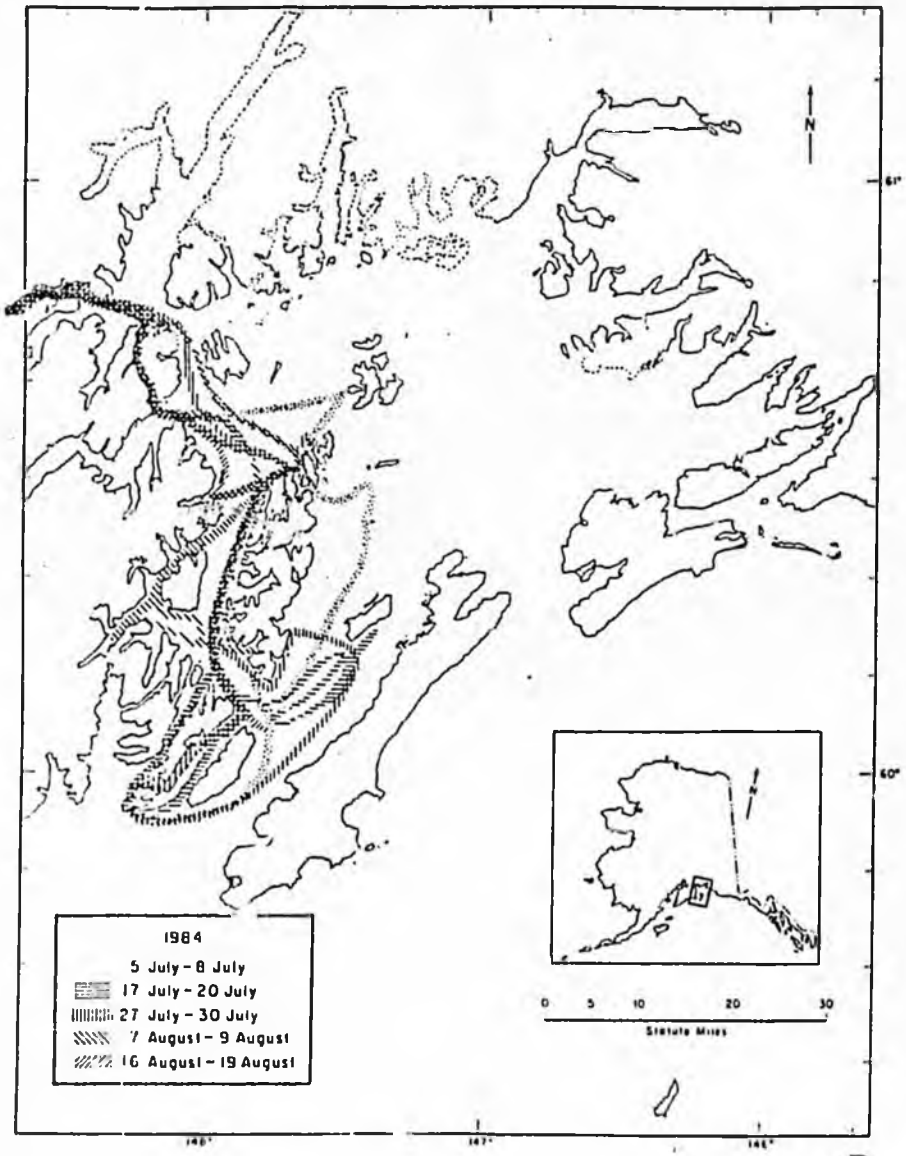
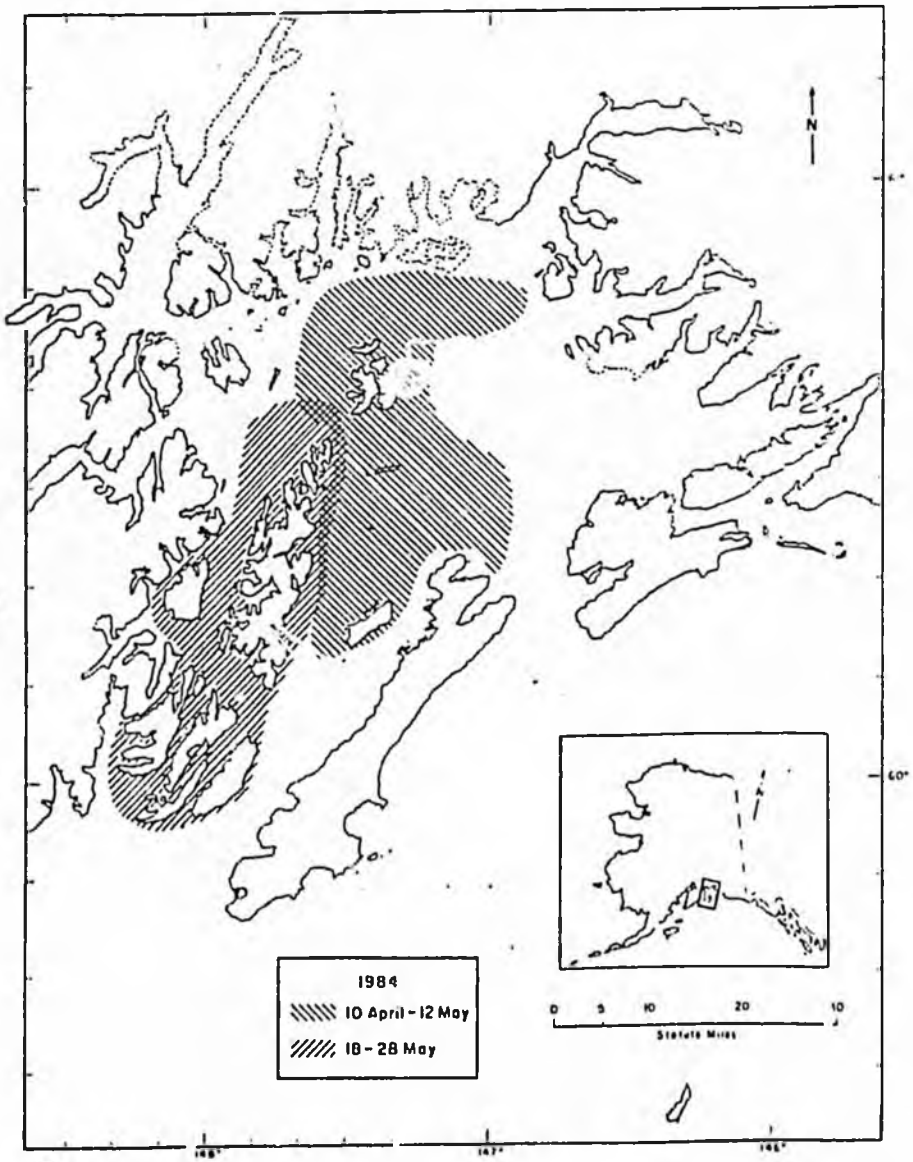
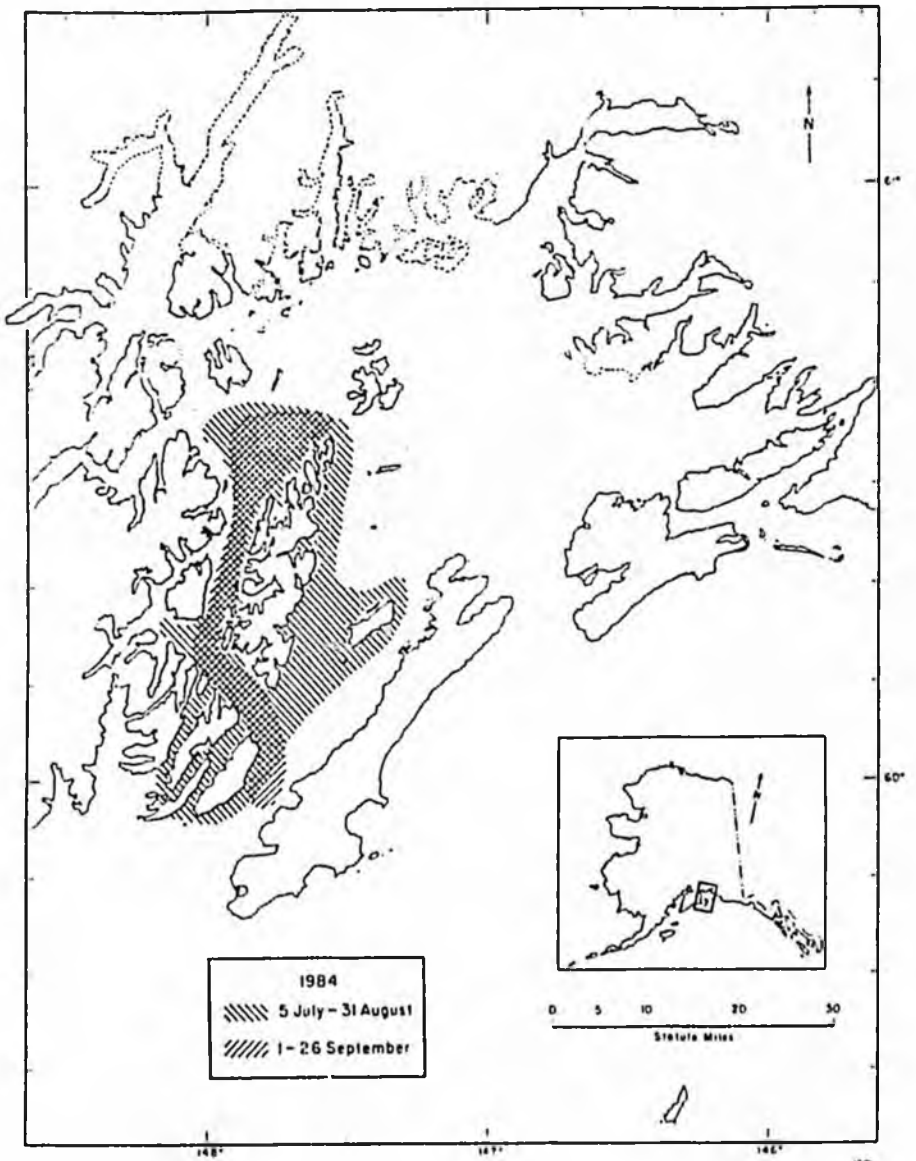


Figure 8. Prince William Sound, showing coverage by the R/V Pelican (A,B) and the R/V Kestrel (C,D).


N
1984
10 April - 12 May
18 - 28 May
0 5 10 20 30
Statute Miles

C


N
1984
5 July - 31 August
1 - 26 September
0 5 10 20 30
Statute Miles

D

valuable help by reporting their sightings of killer whales.

Shelikof Strait

Shelikof Strait is the approximately 31,000 km2 (9,000 nm2) body of water which separates Kodiak and Afognak islands, and their associated islets, from the nearby Alaskan Peninsula (Figures 1 and 9A). The Strait is 37-75 km (20-40 nm) wide and reaches oceanic depths 915-1,830m (500-1,000 fms) within a few kilometers of shore, particularly on its southwest end. The open Strait is well known for its bad weather, exacerbated by the dominant southwesterlies and the venturi effect they experience in the Strait, but the shores of the islands, and to a lesser extent the Alaskan Peninsula coast, are convoluted into large, deep and often quiet bays, inlets and fiords. The outer coasts of both islands are similarly configured.

Data available on killer whales of Shelikof Strait were reviewed by Leatherwood et al., (1984). They reported a minimum count of 66 individuals, based on a single aerial sighting on 5 August 1982, and a minimum population estimate of 100. Killer whales have been seen in widespread localities in the Strait and adjacent Gulf of Alaska (Braham and Dahlheim, 1982; Leatherwood, et al. 1983; Leatherwood et al., 1984). However, no data have been published on the identity of individual whales or pods using these areas.

Concentrated research in Shelikof Strait will begin in 1985. During the 1984 field season activities were limited to reconnaissance surveys by aircraft and vessel (27, 28 and 29 August), photography of groups encountered by boat and collection of miscellaneous sighting reports from fishermen.

Aerial searches were made from a Partenavia P-68 Observer, a twin engine, high-wing, reconnaissance plane with a plexiglass nose cone and a 11 cm (28 in) blown-plexiglass bubble window at an observer station on each side. This configuration affords excellent visibility along and near the aircraft's survey track and appears suitable for quantitative aerial surveys of cetaceans (Larsen, 1984; Stewart, Yochem, Karl and Leatherwood, 1984). Surveys were flown at 163m (500 ft) altitude along the routes shown in Figure 9B, with the pilot and principal observer in front seats in the nose cone and one or two additional observers at the rear stations. As the principal purpose of searches during 1984 was to locate killer whales for close-up photography from a cooperating vessel, no attempt was made to randomize coverage for transect analysis. Instead, searches followed the coastal contour and remained within the vessel's cruising range. Aerial searches covered some 1,630 km (880 nm) in 20 flying hours. The remaining time was spent circling.

Vessel searches were made from the F/V Lucky Pierre, a chartered 13.7m (45 ft) whaleback Troyer Crabber, working in coordination with the aircraft. The four observers aboard searched for animals along the routes shown in Figure 9C, watching from the cabin (in inclement weather) or the top of the wheelhouse, where eye level is about 4 m (13 ft) off the water. Vessel searches covered some 370 km (200 nm) in 36 hrs. When the aircraft located killer whales, the vessel altered course, proceeded to the location and attempted to photograph the whales.

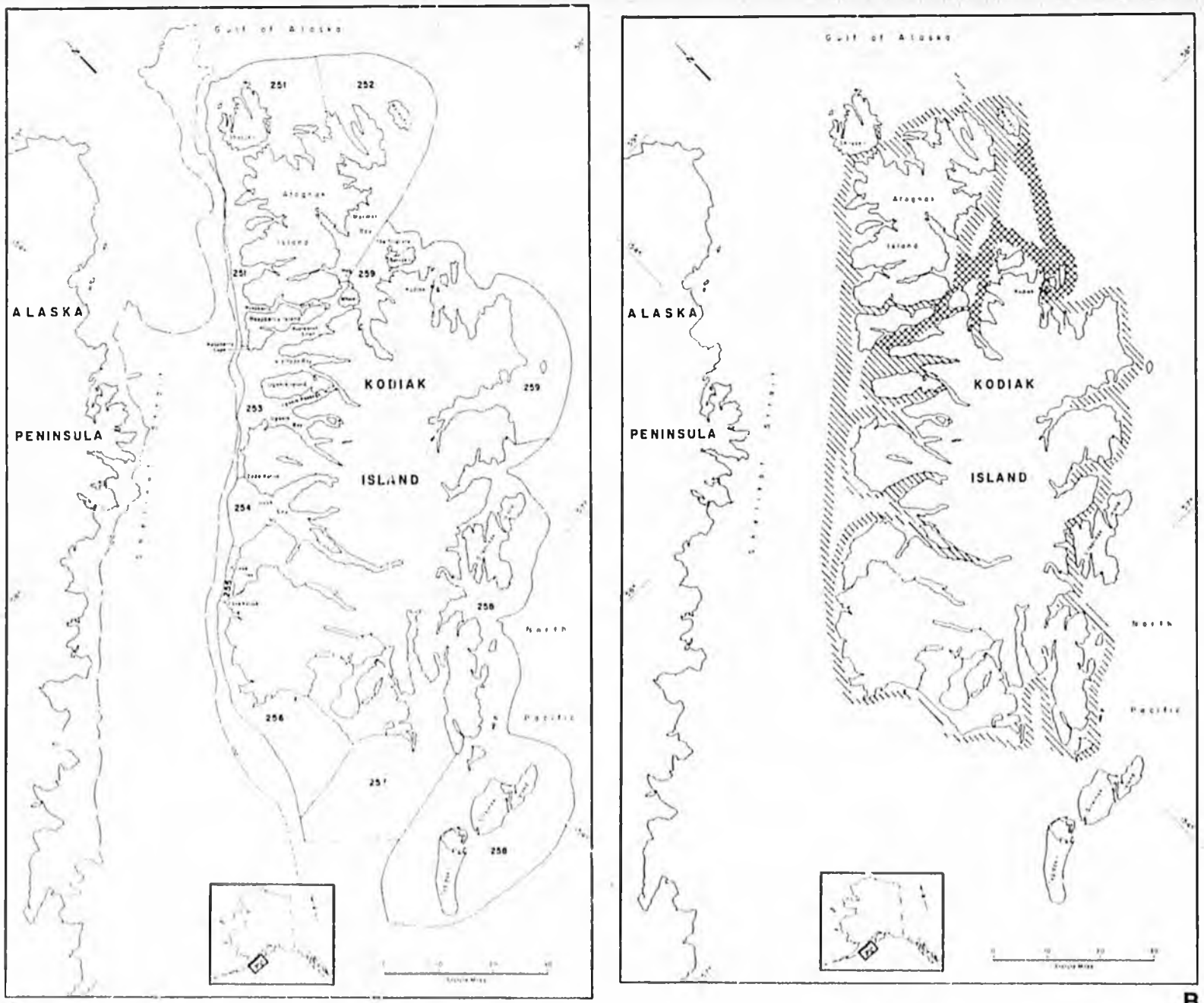
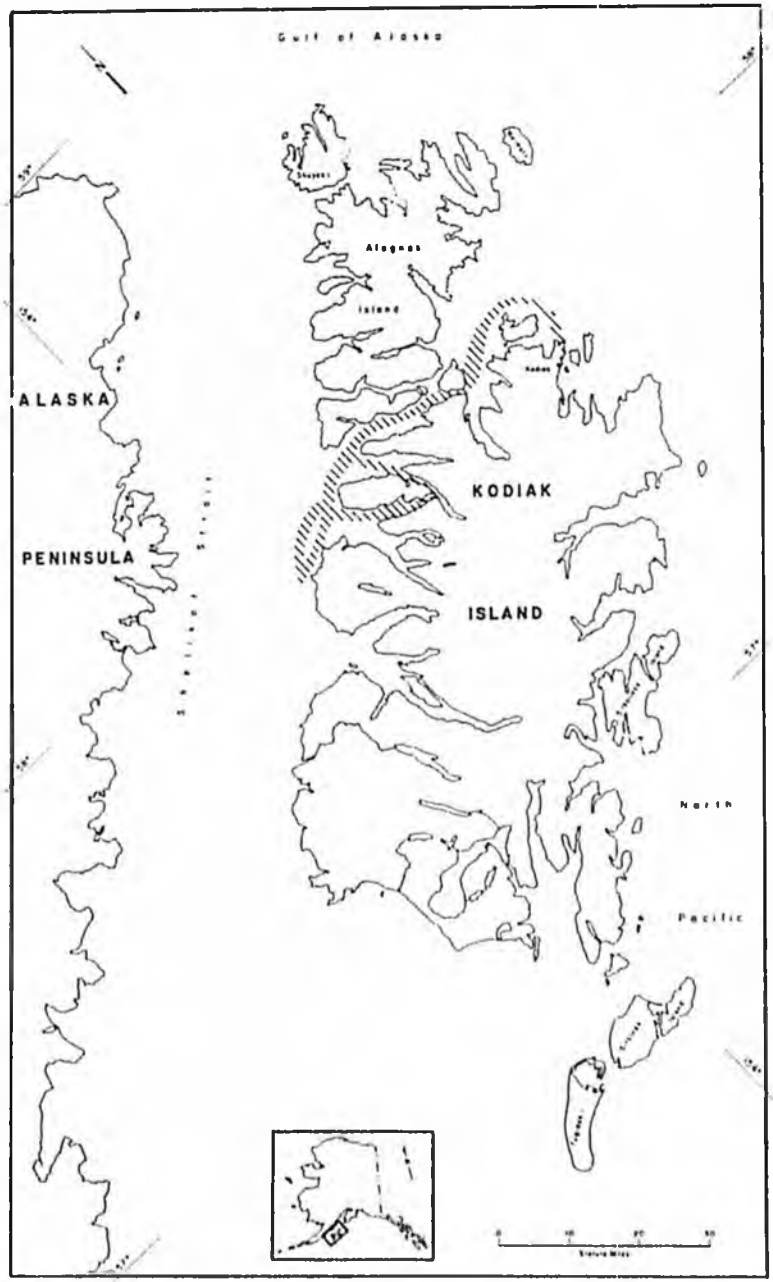
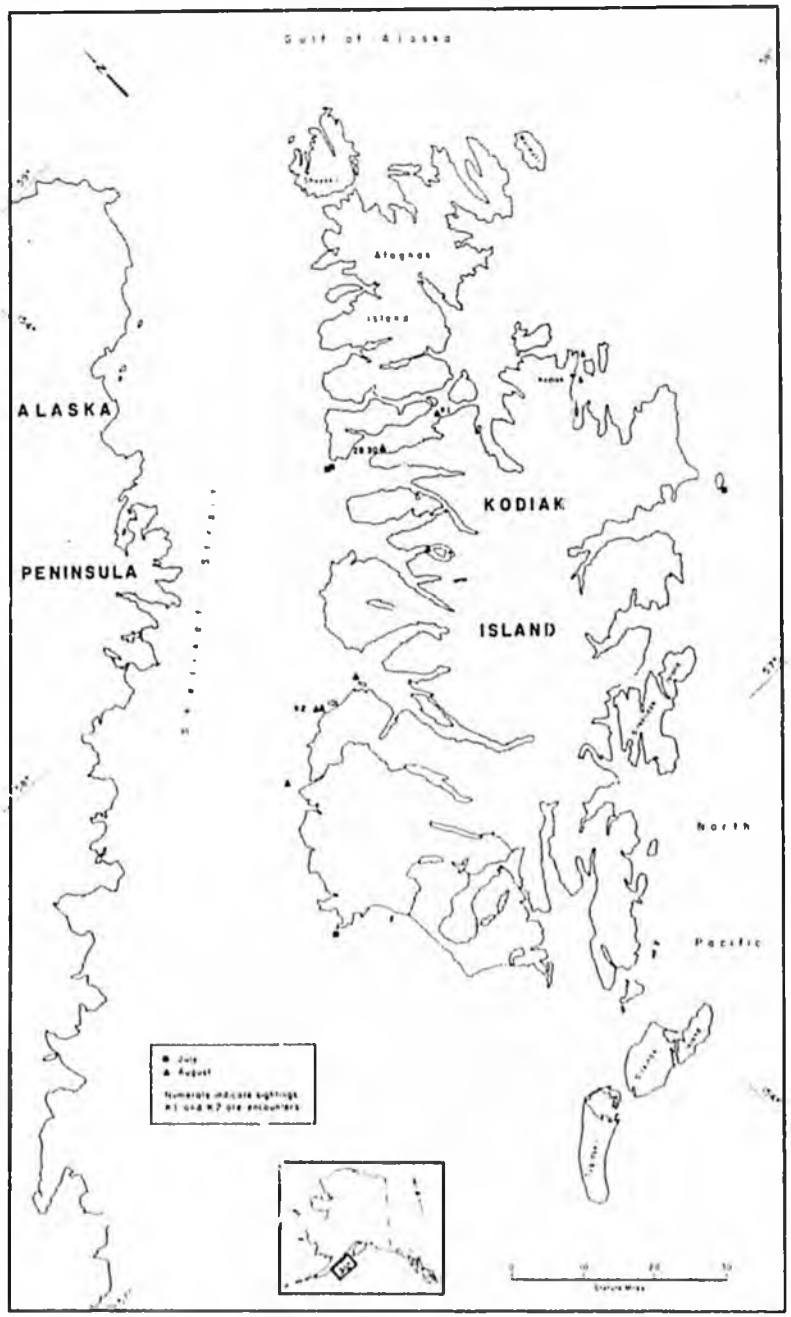


Figure 9. The Kodiak Island region showing: Place names and ADFG statistical reporting areas (A); aerial search areas 27-29 August (B); boat search areas 27 and 28 August (C); and sightings, reports and encounters of killer whales (D) (Figure continued on page 24.).


Gulf of Alaska
ALASKA
PENINSULA
Shelikof Strait
Afognak
Island
KODIAK
ISLAND
North
Pacific

C


Gulf of Alaska
ALASKA
PENINSULA
Shelikof Strait
Afognak
Island
KODIAK
ISLAND
North
Pacific

D

During all three days in Shelikof Strait seas were calm (less than Beaufort 4), making it easy to locate whales, but thick low overcast and intermittent rain made skies dark and unsuitable for photography. Further, most whales would not permit close approach by the vessel.

RESULTS AND DISCUSSION

Experience during 1984 demonstrated that in southern Alaska as elsewhere, most killer whales are distinctively pigmented or scarred and can be distinguished by such natural tags from one encounter to the next (see Figure 4). Data on killer whales are presented and discussed below, by study area. Photographs of humpback whales, Megaptera novaeangliae, identified from tail fluke patterns are present in McSweeney (editor) in preparation. Details of observations of other marine mammals will be reported elsewhere (Miller, et al., in prep.).

Southeast Alaska

Between 24 April and 26 September we logged data on 192 observations of killer whales. One hundred and sixty-two were sightings or reports which resulted in no photographic data useful in the present analysis. The 24 sightings (Figure 10A) were from our vessels or shore camps, made when it was not possible to track or photograph the whales. Sixty-five of the 138 reports (Figure 10B) were from vessels participating in the logbook program of the ATA; seventy were from fishing, sport and passenger vessels; three were instances in which killer whales were acoustically detected by hydrophone monitoring but could not be located. Details of sightings and reports are on file at HSWRI and will be provided on request.

Twenty-six of the observations were encounters in which the whales were approached, tracked and photographed for identification of individuals (Table 4, Figure 11). During such encounters whales were tracked for a total of 77.21 hrs (range 0.62 to 12.65, x 3.22) and a total distance of 379 km (204.4 nm) (x = 15.75 km (8.5 nm)/encounter). Average rate of travel was about 4.89 km/hr (2.64 kts). Approximately 95 rolls of Tri-X (about 3100 frames) were exposed. Killer whale vocalizations (total about 120 minutes) were recorded in two encounters.

A total of 70 individual killer whales was positively identified from photographs and catalogued into eight pods (or clans) we identified as occurring in Southeast Alaska in 1984 (Table 5; Ellis, ed., in prep.). In addition, three members of a ninth pod (AR) [(originally identified off British Columbia, designated R-pod, and known to contain 19 individuals (Bigg, 1982)] were positively identified from photographs taken of a large group encountered twice off western Prince of Wales Island in August. We add all members of AR (=R) pod, as recommended by Bigg (1982) under the assumption that if some pod members are present all are. From photographs of two other encounters we recognize seven additional individuals which cannot be assigned to a pod because of incomplete photographic coverage. They are listed under a miscellaneous category pending further photographs. When the above are combined, one derives a minimum count of 96 killer whales in Southeast Alaska based on photographs (Table 6). It is unlikely that in a single short season we encountered all pods

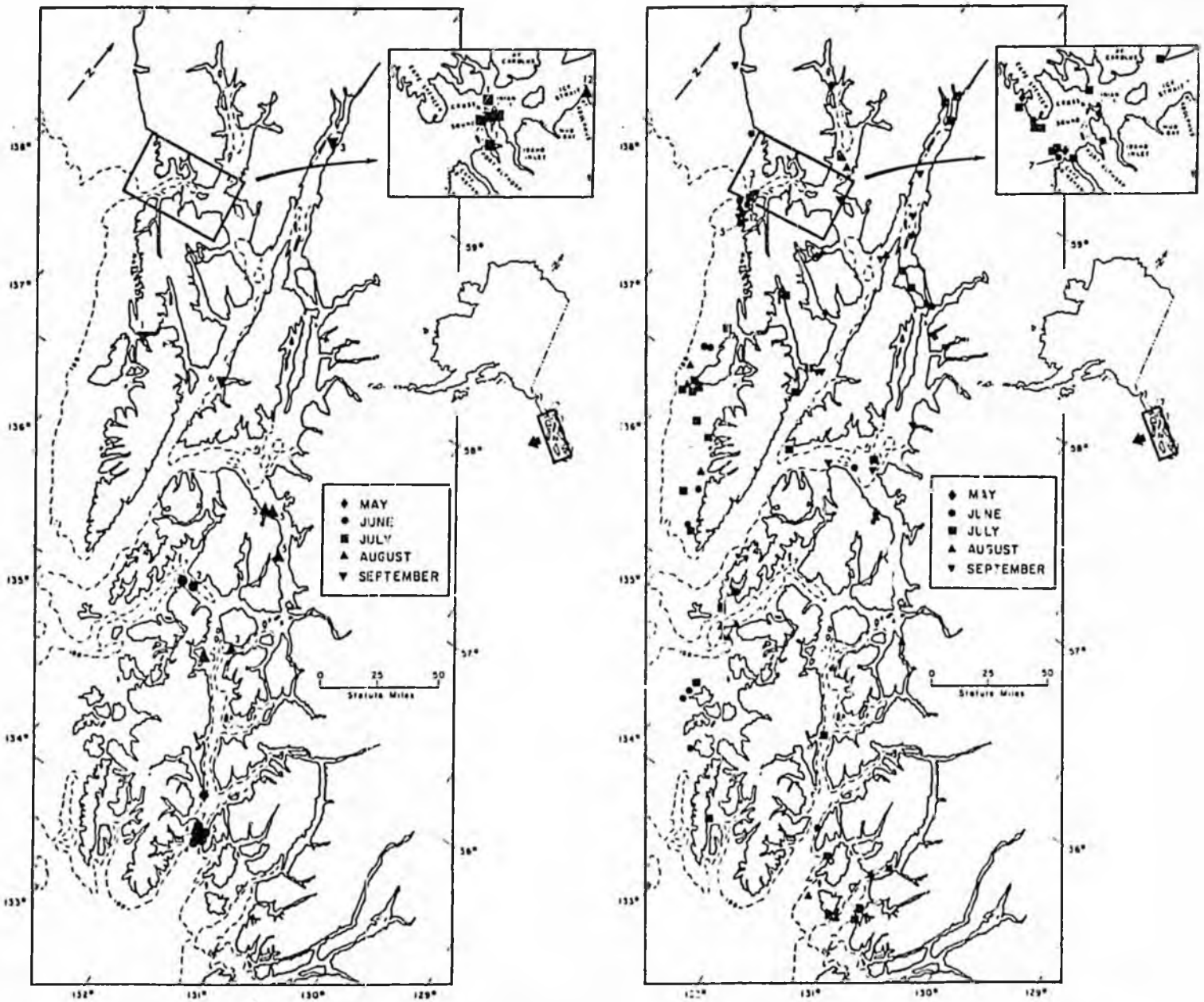


Figure 10. Locations of sightings (A) and reports (B) of killer whales in Southeast Alaska, 1984. Numbers indicate estimated group size (A) or multiple reports from the location indicated (B).

Table 4. Encounters with killer whales in Southeast Alaska, 1984.

Encounter Number	Pods Present	Date	Time		Hours Tracked	Location		Distance Tracked (nm)	Number of Individuals (field est.)
			Start	End		Begin	End		
1.	AA	Apr 28	1030	1520	4.83	SW Gravina Is., Clarence Strait	0.5 nm E of Wedge Is.	6.7	6
+2.A	AF	May 27	1950	2400	4.17	South Inian Pass			18
2.B	AF	May 28	0001	0830	8.48		Sisters Islands	34.5	23
3.	AH	May 29	1425	1625	2.00	South Inian Pass	3 nm W of N end Three Hill Is	4.5	6
4.	AM	Jun 02	1416	1705	2.82	SW of Douglas Is, Stephens Passage	1 nm S Pt. Hilda, Stephens Passage	5.4	3
5.	AG	Jun 04	0548	0826	2.63	1 nm E Pt. Adolphus	1 nm W Lemesurier Is.	14.0	16
6.	AG	Jun 26	1753	2000	2.12	South Inian Pass	E end Lemesurier Is.	3.6	16
7.	AL	Jun 28	1515	1800	2.75	off Yakobi Is	Cross Sound	6.4	10
8.	AL	Jul 07	2000	2200	2.00	North Inian Pass	Three Hill Island, Cross Sound	6.5	7
9.	AF	Jul 16	0700	0751	.85	Pt. Lull	Pt. Thatcher	8.8	20
10.A	AL	Jul 19	1130	1544	4.23	Pt. Adolphus	Pt. Gustavus	6.2	7
10.B	AL	Jul 19	2050	2300	2.17	Pt. Gustavus	E end Lemesurier Is	3.6	5
11.	AL	Jul 20	1035	1112	.62	Idaho Inlet (entrance, W shore)	Idaho Inlet	1.6	5
12.	AL	Jul 21	1420	1628	2.13	Pt. Adolphus	entrance Glacier Bay	8.8	5
+13.	AF	Jul 21	2020	2400	3.67	4 nm NNE Basket Bay, Chatham Strait	mid-strait off Angoon	11.0	20
14.	AQ	Jul 25	1320	1715	3.92	3 nm SE Pt. Tantallon	1 nm S of Grand Is.	8.6	5
15.	A misc	Aug 07	1525	1930	4.08	.5 nm off Customs, House Cove, Off Mary Is., Felice Strait	2 nm SE Pt. Winslow, Revill. Channel	3.5	5
16.	AO	Aug 13	1057	1340	2.72	South Inian Pass	W shore Lemesurier Is.	5.0	4
17.	AO	Aug 17	1300	1505	2.08	Brothers Is., Frederick Sound	False Pt. Pybus	2.7	5
18.	AR	Aug 25				Buccarelli Bay	Ulloa Channel	4.0	23
19.	AF	Aug 28	1534	1842	3.13	Pleasant Is.	Pleasant Is.	12.8	13
20.	AF	Sept 02	1226	2000	7.57	SW tip Harbor Is., Holkham Bay	E of South Is., Stephens Passage	20.0	18
21.	AG	Sept 08	0947	1112	1.42	3 nm ESE Porpoise Is.	1 nm SE Porpoise Is.	2.5	9
22.	A misc	Sept 08	1208	1610	4.03	sea lion rookery, back of Gambier Bay	Chapel Is.	4.6	2
23.	AO	Sept 10	1009	1132	1.38	Pt Glass	1 nm N of Twin Pt	9.0	4
24.	AO	Sept 10	1907	2033	1.43	N end Admiralty Is.	Pt. Macallon	2.6	5

Note: (+) preceding encounter number indicates acoustic recordings were made during that particular encounter.

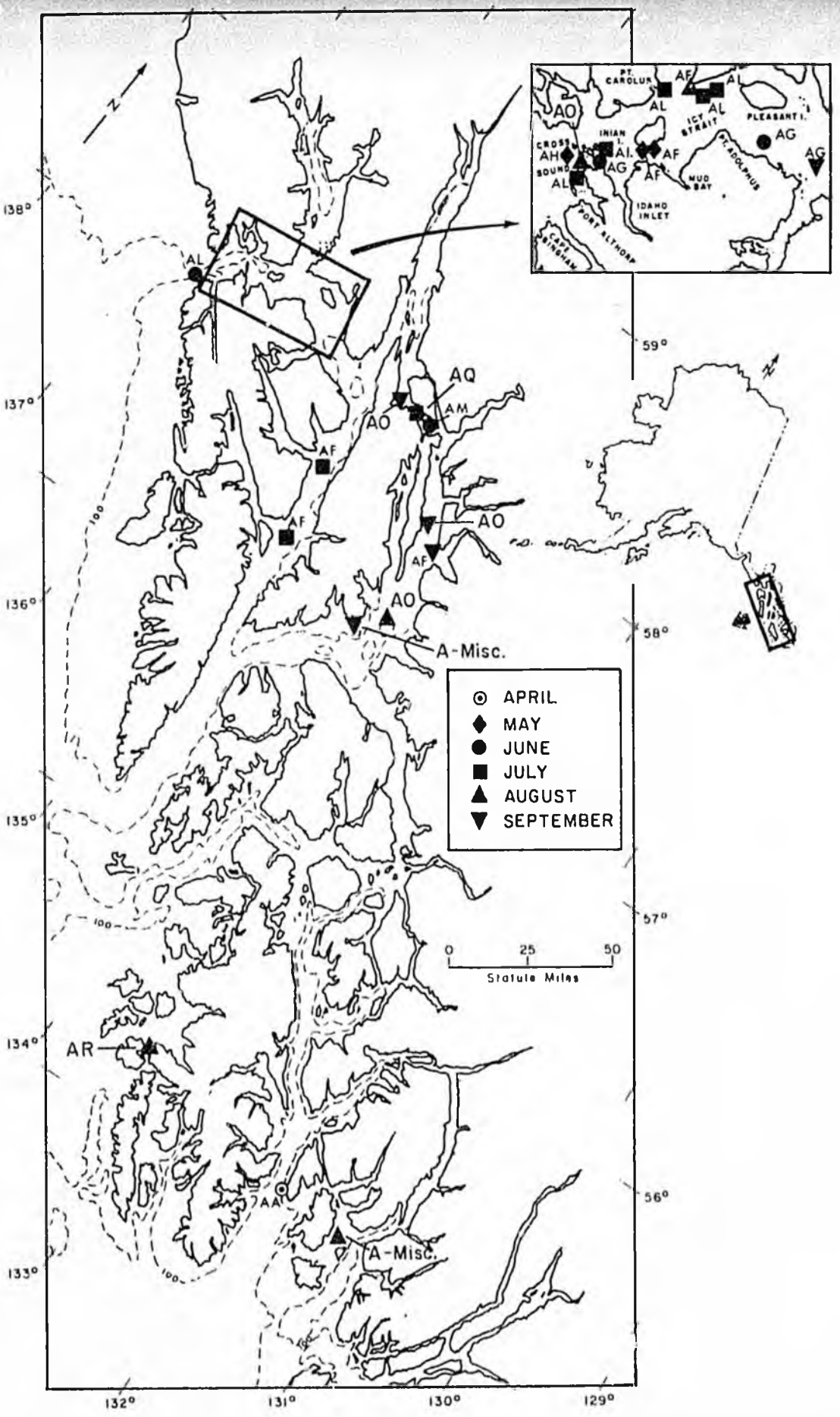


Figure 11. Locations of encounters with killer whales, Southeast Alaska, 1984.

Table 5. Size and composition of pods of killer whales encountered in southern Alaska, 1984.

Area	Pod	Resident or Transient	Number of Animals Photo-identified	Adult Males #	Adult Males ID Numbers*	Adult Females or Immature Males #	Adult Females or Immature Males ID Numbers	Juveniles or Calves** #	Juveniles or Calves** ID Numbers	Comments
SEA	AA	T	6	1	AA 1	5	AA 2,3,4,5,6	0		
	AF	R	21	4	AF 1,2,3,18	9	AF 4,5,6,8,11 13,15,20,22	8	AF 7,9,10,12,14, 16,17,23	
	AG	R	14	3	AG 1,2,3	6	AG 4,5,8,9,11,12	5	AG 6,7,10,13,15	
	AH	T	6	1	AH 1	3	AH 2,3,4	5	AH 5,6	Probably contains one additional uncataloged animal
	AL	T	11	1	AL 1	5	AL 2,4,6,7,11	5	AL 3,5,8,9,10	
	AM	T	3	1	AM 1	1	AM 2	1	AM 3	
	AO	T	4	1	AO 1	2	AO 2,3	1	AO 4	
	AQ	T	5	1	AQ 1	3	AQ 2,3,4	1	AQ 5	
	AR	R	3***	3	AR 1,6,9	15	Not Available	1	Not Available	*** Three identified in SEA Pod contains 19±1 (Bigg, 1982)
	Subtotal	-	89	16	-	49	-	24	-	
	A Misc.	T	7	2	Not Assigned	3	Not Assigned	2	Not Assigned	
	Total	-	96	14	-	52	-	26	-	
PWS	AB	R	35	5	AB 1,2,3,4,5	21	AB 6,7,8,9,10, 11,14,16,17,19, 20,21,22,23,24, 25,28,29,30,31, 32,34	9	AB 12,13,15,18, 19,26,27,33,35	
	AC	T	4	2	AC 3,4	2	AC 1,2	0		
	AD	R	14	4	AD 1,13	7	AD 2,3,4,5,7,9, 14,15,16	3	AD 6,8,10	Possibly contains 2-4 other animals not photographed
	AE	R	11	2	AE 1,9	7	AE 2,4,5,7,8,9, 10,11	2	AE 3,6	May well include three other animals not photographed
	AI	R	6	1	AI 1	2	AI 2,3	3	AI 4,5,6	
	AJ	R	25	4	AJ 1,11,16,17	13	AJ 2,5,6,8,12, 14,18,20,22,23, 24,25	8	AJ 3,4,7,9,10,13, 15,19	
	AK	R	7	0		5	AK 1,2,3,4,6	2	AK 5,7	
	AN	R	35	4	AN 1,2,3,4	4	AN 5,6,7,9,10, 13,16,17,20,21, 23,25,26,27,28, 29,31,33,34,35	10	AN 8,11,12,14,15, 18,19,22,24,30	
	AS	R	10	2	AS 1,10	4	AS 2,4,2,6,7	4	AS 3,5,9,11	Believed to contain five uncataloged animals
	AT	T	20	8	AT 1,5,11,13, 14,15,16,17	9	AT 2,4,6,7,8,9, 18,19,20	3	AT 3,10,12	
	Subtotal	-	167	32	-	91	-	44	-	
	A Misc.	-	6	7	Not Assigned	?	Not Assigned	?	Not Assigned	
Shelikof	A Misc.	?	17	7	Not Assigned	9	Not Assigned	1	Not Assigned	

Footnotes: * Not all numbers in sequence necessarily assigned (see Tables 7 and 9)
** Placement of some larger animals into this category somewhat arbitrary as animals length cannot be estimated accurately.

Table 6. Minimum numbers of killer whales in Southern Alaska documented from photograghs.

Area	Number of Animals Photo-identified and Catalogued to Pod (=Clan)	Minimum Total Documented from Photographs	Comments
Southeast Alaska	89*	96	* Includes all 19 members of R (=AR) pod (3 identified from present study;16 by M.A. Bigg).
Prince William Sound	167	173*	* Does not include the 21 animals in AF pod photographed in PWS but initially sighted and tallied in SEA.
Shelikof Strait		17	Based on only 3 days of work.
Total	256	286	

and individuals that use this large, complex area; therefore, this count should be regarded as a conservative representation of the population totals for Southeast Alaska.

The pods are characterized and their members classified by age/sex class in Table 5. Animals positively identified in each encounter are summarized in Table 7. Previous encounters with the various known pods and pod members are summarized in Table 8 and presented in detail in McSweeney et al., (in preparation). The pods as they were known at the end of the 1984 field season are described below and presented graphically in Ellis, ed., (in preparation).

AA pod - a total of seven "transient"-type whales - was encountered once, on 28 April in Clarence Strait near the west shore of Gravina Island. This pod has not been documented elsewhere or in previous years.

AF pod - a total of 21 "resident"-type whales - was encountered in Southeast Alaska five times between 27 May and 2 September 1984, in the Icy Strait, Chatham Strait, and Frederick Sound regions. This pod was also encountered in Prince William Sound four times between 4 and 14 August (Tables 9 and 10), thereby documenting a foraging range for "residents" of at least 1,110 km (600 nm). AF pod was photographed in 1983 in Prince William Sound (Table 8). Field estimates of the size of this group ranged up to 23 individuals. Several photographs which were not adequate for positive identification suggest the presence of one or two animals additional to those photo-documented.

AG pod - a total of 14 "resident"-type whales - was encountered twice in June and once in September, always in Icy Strait. In September 1983 four members of this pod were photo-identified in Glacier Bay (D. Larsen, pers comm; Table 8). Field estimates of this group ranged up to 16; hence it is possible that there are two additional animals which have not yet been photo-identified.

AH pod - a total of six "transient"-type whales - was encountered once in Cross Sound on 29 May. The pod has not been documented elsewhere or in previous years. It was estimated to include seven individuals. However, as the animals were difficult to approach, it is possible the pod contains an additional animal not yet photo-identified.

AL pod - a total of 11 "transient"-type whales - encountered five times between 28 June and 21 July, all in the Icy Strait/Glacier Bay region. Two or three members of AL pod were photographed in Frederick Sound in 1983 (Table 8). On all except one occasion in 1984 members of AL-pod were encountered in subgroups which were surmised, by virtue of repeated occurrence of certain individuals, to derive from a single pod. Such variation in group composition

Table 7. Pod members identified by encounter in Southeast Alaska, 1984.

Pod	Other Pods Present	Date	Encounter Number	ANIMAL IDENTIFICATION NUMBER																			Comments
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
AA	None	28 Apr 84	SEA 1	x	x	x	x	x	x																		
AF	None	27 May 84	SEA 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			o	x	o	x	?	
	None	16 Jul 84	SEA 9	x	x											?						o		o			
	None	21 Jul 84	SEA 13	x	x	x	?	x		x			x			x		?	?	x		x	o	?	o	x	
	AI, AB	4 Aug 84	PWS 40	x																		o		o			Pod in Prince William Sound
	AB	5 Aug 84	PWS 41	x	x		x			x	x		?			x	x			x	x	?	o	x	o	?	Pod in Prince William Sound
	AB, AI	6 Aug 84	PWS 43		x	x			x	x									?			o		o	?		Pod in Prince William Sound
	AB, AN, AI	14 Aug 84	PWS 46	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	o	x	o	?	x	Pod in Prince William Sound
	None	28 Aug 84	SEA 19	x	x	x	x	x	x	x	?	x	x	x		x	x	x	?	x	x	o	x	o	x	x	
	None	2 Sep 84	SEA 20	x	x	x	x	x	x	?	?			x	?	x		x	x		x	o	x	o	x		
AI	None	4 Jun 84	SEA 5	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x									
	None	26 Jun 84	SEA 6	x	x	x	x	x	x	x	x	x	x	x	x	x	o	?									
	None	8 Sep 84	SEA 21										?				o	?									
AH	None	29 May 84	SEA 3	x	x	x	x	x	x																		
AL	None	28 Jun 84	SEA 7	x	x	x	x	x	x	x	x	x		x													
	None	7 Jul 84	SEA 8				x	x	x	x	x		x														
	None	19 Jul 84	SEA 10	x	x	x	x					x															
	None	20 Jul 84	SEA 11	x	x	x	x					?															
	None	21 Jul 84	SEA 12		x	x	x																				
AM	None	2 Jun 84	SEA 4	x	x	x																					Known this year from BC, Wash.
AO	None	13 Aug 84	SEA 16	x	x	x	x																				
	None	17 Aug 84	SEA 17	x	x	x	x																				
	None	10 Sep 84	SEA 23	x	x	x	x																				
AQ	None	25 Jul 84	SEA 14	x	x	x	x	x																			
AR	None	25 Aug 84	SEA 18	x				x			x																Known in BC in previous years

Note: (x) indicates positive identification, (?) indicates probable identification and (o) indicates number not assigned.

Table 8. Historical encounters with known pods of killer whales in Southern Alaska, 1977-1984.*

		ANIMAL IDENTIFICATION NUMBER																																		
Pod	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Area(s)
AA	1984	x	x	x	x	x	x																														SEA
AB	1979	x	x															x							x												PWS
	1980	x	x	x																																	PWS
	1983	x	[illegible]		x	?	x				x									x																	PWS
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	PWS
AC	1983	x	x	?	?																																PWS
	1984	x	x	x	x																																PWS
AD	1977			x																																	PWS
	1983													x	x																						PWS
	1984	x	x	x	x	x	x	x	x	x	x			x	x	x	x																				PWS, SHELIKOF
AE	1977									x																											PWS
	1982	x								?	?																										PWS
	1984	x	x	x	x	x	x	x	x	x	x	x																									PWS
AF	1983	x	x	?	x							x				x																					PWS
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	o	x	x													SEA, PWS
AG	1983	x	x		x	x																															
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x																					SEA
AH	1984	x	x	x	x	x	x																														SEA
AI	1982?					x																															PWS
	1983	x	x	?		?	?																														PWS
	1984	x	x	x	x	x	x																														PWS
AJ	1977											x																									PWS
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x											PWS
AK	1983	x	x	x	x		x	?																													PWS
	1984	x	x	x	x	x	x	x																													PWS
AL	1983		x	x							?																										SEA
	1984	x	x	x	x	x	x	x	x	x	x	x																									SEA
AM	1984	x	x	x																																	SEA (BC, Wash., 1974-1984)
AN	1977			x																																	PWS
	1980				x																																PWS
	1983		x	x		?	?	x	x		x																		x	x	x						PWS
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	PWS
AO	1979	x																																			SEA
	1983	x	?																																		SEA
	1984	x	x	x	x																																SEA
AQ	1984	x	x	x	x	x																															SEA
AR	1984	x					x			x																											SEA(previous years BC)
AS	1984	x	x	x	x	x	x	x	o	x	x	x																									PWS
AT	1978							x								x	x																				PWS
	1980									x				?																							PWS
	1982					x																															PWS
	1983	x	x		x								x		x					x	x																PWS
	1984	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																PWS

Note: (x) indicates positive identification, (?) indicates probable identification and (o) indicates number not assigned.

* Summarized from materials in McSweeney et al. (in preparation) and von Ziegesar et al (in preparation).

Table 9. Encounters with killer whales in Prince William Sound, 1984.

Encounter Number	Pods Present	Date	Time Start	Time End	Hours Tracked	Location Begin	Location End	Distance Tracked (nm)	Number of Individuals (field est.)
+1.	AT	Apr 11	1639	2005	3.43	.25m SSW Little Smith Is	2m S Sphinx Is	10	025
+2.	AB	Apr 14	1150	1307	1.28	1.5m NW Ingot Is	.5m NE Eleanor Is	11	008
+3.	AB AJ	Apr 14	1307	1615	3.13	1.5m N Eleanor Is	2m E Smith Is	18	030
+4.	AT	Apr 15	1330	1540	2.17	1.5m S Little Smith Is	.5m N of E end Smith Is	13	002
5.	AT	Apr 18	1125	1239	1.23	.25m N Galena Bay	Rocky Pt	7	004
+6.	AB A-misc	Apr 19	0605	0805	2.00	.5m N Eleanor Is	.75m N Little Smith Is	8	010
+7.	AB AE AI	Apr 19	0807	1225	4.3	.75m N Little Smith Is	3m NE Montague Pt	17	025
+8.	AC	Apr 21	0835	1035	2.00	Northwest Bay	Pt Eleanor	3	004
+9.	AE	Apr 25	1740	2005	2.42	1m SE Smith Is	.75m SE Seal Is	9	011
+10.	AB AE AI	Apr 29	0904	1210	3.1	1.5m NW Storey Is	1.5m N Eleanor Is	12	016
+11.	unknown	Apr 30	1655	1800	1.08	1.5m NW Eleanor Is	1.5 N Eleanor Is	5	002
+13.	AB AS A-misc	May 11	0715	1900	11.75	.75m SW Deer Cove	3.5m W Goose Is	43	020
+14.	AB AI	May 12	0825	1215	3.83	.5m N Knolls Head buoy	9m SSE Bull Head	15	024
+15.	AT	May 19	1500	1940	4.67	.5m E Gage Is	.5m W Squire Is	17	008
+16.	AT	May 20	1220	1615	3.92	North Twin Bay	Cape Elrington	10	014
+17.A +17.B	AB AB	Jun 03 Jun 03	1019 0001	2400 1048	13.68 10.78	SW Upper Herring Bay	2m NW Green Is	78	030 030
+18.	AB AD	Jun 05	0740	1520	7.67	.5m SW Squire Is	Fox Farm Erlington Passage	28	030
19.	AT	Jun 08	1420	1940	5.33	1.5m NW Upper Herring Bay	1.5m SE Applegate Is	19	007
+20.	AE	Jun 10	1340	1920	5.67	.75 m NW Cratton Is	.5m E Chenega Pt	21	009
+21.	AI AB	Jun 17	0625	2255	16.5	.5m SW Upper Herring Bay	N tip LaTouche Is	55	012
22.	AT	Jun 18	1410	1545	1.58	.25m NE Whale Bay	.75m N Whale Bay	11	002
23.	AT	Jun 19	1230	1410	1.67	Upper Herring Bay	Upper Herring Bay	5	004
24.	AB AI A-misc	Jul 07	1400	1815	4.25	.5m SW Bligh Is	SW Glacier Is	24	030
+25.	AE	Jul 08	1900	0030	5.30	2m N Main Bay	Outside Lower Herring Bay	25	006
+26.	AI AB A-misc	Jul 09	1735	2015	2.67	Pt. Helen	1 m SE Little Green Is	13	015
+27.	AK	Jul 11	1230	1535	3.08	Entrance Sawmill Bay	Lower Prince Wales Pass	11	006
+28.	AB AI	Jul 12	1500	2100	6.00	Knight Is Pass	Fleming Is	22	040
+29.	AK	Jul 12	2200	2259	.83	Drier Bay	Drier Bay	2	006
+30.	AI AE	Jul 14	2015	2400	3.75	.5m N Pleiden Is	N Chenega Is	13	020
+31.	AB	Jul 16	1135	1505	3.5	Squire Is	Pt Helen	15	008

Table 9.(cont) Encounters with killer whales in Prince William Sound, 1984.

32.	AB	Jul 20	1030	1712	6.7	.12 nm E Little Green Is	4 nm SW Needle	34	040
33.	AJ AB	Jul 20	1450	1712	2.37	.5m E middle Latouche Is	2m S Danger Is	8	020
+34.	AK	Jul 22	1330	2110	7.67	.5m SSE Little Green Is	.5m N Green Is	25	007
+35.	AI AE AS	Jul 27	1342	2030	6.8	Channel Rock	.5m E middle Latouche Is	21	027
+37.	AI AE AS	Jul 28	1650	2130	4.67	N Squire Is	1m NW Icy Bay	13	022
+38.	AB	Jul 31	0645	1800	11.25	Squire Is	2m NNW Squire Is	38	035
39.	AB AI	Aug 02	1600	1815	2.25	1m S. Lucky Bay	1m NE Pt Helen	10	035
40.	AB AI AF	Aug 04	1430	1700	2.5	.5m N Needle	Between Needle and Montague Is	6	035
41.	AB AF	Aug 05	1540	1800	2.33	.5m W Johnson Bay	.2m E Pt. Nowell	13	040
42.	AT	Aug 05	2020	2040	.33	S Squire Is	S Squire Is	1	005
+43.	AB AF AI	Aug 06	1730	2100	3.5	Pleiden Is	.5m SE Pt Helen	11	040
+44.	AB AI AT AE	Aug 09	1250	1900	6.17	E George Is	.5m W Lower Herring Bay	16	030
+45.	AB AI	Aug 10	1250	1515	2.42	1m S Pt Helen	Pt Brazil, Montague Strait	7	030
+46.	AB AB AF	Aug 14	1210	1545	3.53	Shelter Bay	1m SE Pt Helen	12	060
+47.	AB AD	Aug 15	1130	2000	8.5	1m N Shelter Bay	1m EN Latouche Is	21	015
48.	AB	Aug 16	1130	1205	.58	1.5m W Banning Bay	1.5 W Banning Bay	2	015
+49.	AB AI AB AD	Aug 16	1330	1745	4.25	2.5m SW Pt Helen	1.5m W Pt Helen	13	045
50.	AB	Aug 17	1700	1735	.58	.5m N Shelter Bay	N Latouche Pass	2	035
+51.	AB	Aug 20	1840	2145	3.08	.5m W Pt Nowell	.5m NW Lower Herring Bay	7	008
52.	AT	Aug 23	1930	2030	1.00	N Bainbridge Pass	Pleiden Is	3	004
+53.	AB AB AI	Aug 25	1305	2100	7.92	1m SW Lower Herring Bay	.5m NW Drier Bay	32	025
+54.	AB AK AI AE AB	Aug 28	1625	2005	3.67	.5m SW Pt Helen	.25m NE Sleepy Bay	18	040
+55.	AJ	Aug 29	1615	2050	4.58	.5m SW Mummy Bay	.5m SE Hogan Bay	13	020
+56.	AB AI AJ	Aug 30	1050	1500	4.17	.5m SE Pt Helen	15m NE Bishop Rock	21	012
+57.	AB AB AD AI	Aug 31	1455	2130	6.58	1m SE Pt Helen	.5m SE Little Bay	34	055
+58.	AB AB AJ	Sept 02	1220	2150	9.5	.75m SW Little Bay	2m NW Lower Pass	26	030
+59.	AB AB AJ	Sept 15	1000	1100	8.00	.75m S Little Bay	.5m S Drier Bay	27	033
+60.	AB AB AD AJ	Sept 16	0925	1850	9.42	.75m NE Fleming Is	.5m E Pleiden	22	040
+61.	AE	Sept 18	0820	1420	6.00	.75m E Eshamy Bay	.5m N Pt Eleanor	17	013
+62.	AB AB AB AI AJ	Sept 19	0750	2000	12.17	.5m W Northwest Bay	1m S Mummy Bay	47	060
+63.	AB AB AE AB AJ	Sept 20	1255	1950	6.92	Pleiden Is	.5m W Drier Bay	26	050
+64.	AK AJ AB AB	Sept 21	1340	1910	5.5	Pleiden Is	5m SE Pleiden	22	055
+65.	AB AI AJ	Sept 22	1230	2000	7.5	.5m N Gaye Is	.75m SW Drier Bay	27	055
+66.	AJ AB AD AI AB	Sept 23	0845	1730	8.75	1m SW Drier Bay	2m NE Crafton Is	21	090

Note: (+) preceding encounter number indicates acoustic recordings made during that particular encounter.

Table 10. Pod numbers identified by encounter in Prince William Sound, 1984.

Pod	Other Pods Present	Date	Encounter Number	ANIMAL IDENTIFICATION NUMBER																																	Comments
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
AB	None	14 Apr 84	EWS 2		x			x	x	?							x	?			?				x	x	x				?							
	AJ	14 Apr 84	EWS 3	x	x		x	x			x	x	x		x	x			x	x		x		x	x	x		x				x			x	x		
	None	19 Apr 84	EWS 6			x	x	x	x			x	x															x				x							
	AE, AI	19 Apr 84	EWS 7	x	x			x				x							?			x		?				x					x						
	AE, AI	29 Apr 84	EWS 10			x																												x	x	x		
	AS	11 May 84	EWS 13		x	x		x	x	x											x			x	x				x		x	x						
	AI	12 May 84	EWS 14	x	x	x	x	x	x	x	x	x	x	x	x	x			x	?	x			x		x		x		?		x	x	x	?	?		?
	None	3-4 Jun 84	EWS 17	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	AD	5 Jun 84	EWS 18	x		x	x	x	x	x	x		x	x	x		x	x	x	x	x	x	x		x	x	x	x	x	x		x	x				x	
	AI	17 Jun 84	EWS 21		x																							x				x	x	x	x	x		
	AI	7 Jul 84	EWS 24	x		x									x																							
	AI	9 Jul 84	EWS 26	x		x											x		x			x		x			x											
	AI	12 Jul 84	EWS 28	x	x	x	x	x	x	x	x	x			x		x	x	x	?	?	x	?	x	x	x	x	x		x	x		x	x	x	x	?	
	None	16 Jul 84	EWS 31		x																							x				x	x	x	x	x		
	None	20 Jul 84	EWS 32	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	AD	20 Jul 84	EWS 33				x												?			x																
	None	31 Jul 84	EWS 38	x	x	x	x		x	x	x				x	x	x	x	x	x	x	x		x	x	x	x	x			x		x	x	x			
	AI	2 Aug 84	EWS 39	x	x	x	x	x	x	x		x	x			x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
	AI, AF	4 Aug 84	EWS 40	x	x	x	x	x		x	x	x	x	x	x				x			x		x	x						x		x				x	
	AF	5 Aug 84	EWS 41	x							x				x	x			x	x		x		x			x											
	AI, AF	6 Aug 84	EWS 43	x	x	x		x		x					x	x	x			x		x			x		x	x		x			x	x	x		x	x
	AI, AT, AF	3 Aug 84	EWS 44		x	x	x	x				x	x														x	x				x	x	x	x			
	AI	10 Aug 84	EWS 45			x			x		x								x		x		x	x			x											
	AN, AF	14 Aug 84	EWS 46	x	x		x	x		x		x	x		x		x	x	x		x	x		x														
	AN, AD, AI	16 Aug 84	EWS 49	x		x		x	x	x			x		x		x								x		x										x	
	None	17 Aug 84	EWS 50	x		x		x		x		x			x		x								x		x											
	AN, AI	25 Aug 84	EWS 53	x								x							x	x		x	x	x														
	AN, AI	30 Aug 84	EWS 56		x				x						x					x	x		x			x	x								x	x		
	AN, AI, AD	31 Aug 84	EWS 57	x	x	x	x	x	x	x		x	x		x	x	x		x	x	x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	
	AN, AI	2 Sep 84	EWS 58		x		x	x					x	x														x				x	x	x	x	x		
	AN, AI	15 Sep 84	EWS 59				x	x																			x											

Table 10.(cont) Pod members identified by encounter in Prince William Sound, 1984.

	AN, AD	16 Sep 84	IWS 60	x x x x x x x x x x x x	
	AD, AN, AI, AJ	19 Sep 84	IWS 62	x x x x x x x x x x x x x x x x x x x x x x	
	AJ, AK, AN, AD	20 Sep 84	IWS 63	x x x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AK, AJ, AN	21 Sep 84	IWS 64	x x x x	
	AJ, AI	22 Sep 84	IWS 65	x x x x x x x x x x x x x x	
	AJ, AD, AI	23 Sep 84	IWS 66	x x x x x x x x x x x x x x x x x x x	
AC	None	21 Apr 84	IWS 8	x x x x	
AD	AB	5 Jun 84	IWS 18	x x x x x x x x o o	
	AN	15 Aug 84	IWS 47	x x x x o o	
	AB, AN, AI	16 Aug 84	IWS 49	x x x x o o x x x x	
	Kodiak #1	27 Aug 84	SH1	x x x x o o	Part of pod in Kupreanof Strait
	Kodiak #2	28 Aug 84	SH2	x o o	Part of pod in Shelikof Strait
	AN, AK, AE, AI	28 Aug 84	IWS 54	o o x x x	
	AN, AB, AI	31 Aug 84	IWS 57	x x x o o	
	AB, AN	16 Sep 84	IWS 60	x x x x o o	
	AB, AI, AJ, AN	19 Sep 84	IWS 62	x x x o o x x x x	
	AB, AJ, AK, AN	20 Sep 84	IWS 63	x x x x o o	
	AB, AI, AJ	23 Sep 84	IWS 66	x x x x o o	
AE	AB, AI	19 Apr 84	IWS 7	x x x x x x x x x	
	None	25 Apr 84	IWS 9	x x x x	
	AB, AI	29 Apr 84	IWS 10	x x x x	
	None	10 Jun 84	IWS 20	x x x x x x x x x	
	None	8 Jul 84	IWS 25	x x x x x	
	AI	14 Jul 84	IWS 30	x x x x x x x	
	AI, AS	27 Jul 84	IWS 35	x x x x x x x x x x x	
	AI, AS	28 Jul 84	IWS 37	x x	
	AB, AI	9 Aug 84	IWS 44	x x x	
	AD, AN, AI, AK	28 Aug 84	IWS 54	x x x	
	None	18 Sep 84	IWS 61	x x x x x x x x x x x	
AF	None	27 May 84	SEA 2	x x x x x x x x x x x x x x x x o x o x ?	Pod in SEA
	None	16 Jul 84	SEA 9	x x ? o o	Pod in SEA
	None	21 Jul 84	SEA 12	x x x ? x x x x ? ? x x o ? o x	Pod in SEA
	AI, AB	4 Aug 84	IWS 40	x x o o	
	AB	5 Aug 84	IWS 41	x x x x x x x x x x ? o x o ?	

Table 10.(cont) Pod members identified by encounter in Prince William Sound, 1984.

	AB, AI	6 Aug 84	PWS 43	x x x x ? ? o o ?	
	AB, AN, AI	14 Aug 84	PWS 46	x x x x x x x x x x x x x x x x o x o ? x	
	None	28 Aug 84	SEA 19	x ? x x x x x ? x x x x ? x x x x	Pod in SEA
	None	2 Sept 84	SEA 20	x x x x x x ? ? x x x x x ?	Pod in SLA
AI	AB, AE	19 Apr 84	PWS 7	x x x ? x	
	AB, AE	29 Apr 84	PWS 10	x	
	AB	12 May 84	PWS 14	x x x x x x	
	AB	17 Jun 84	PWS 21	x x x x x x	
	AB	7 Jul 84	PWS 24	x x x x	
	AB	9 Jul 84	PWS 26	x x x x x x	
	AB	12 Jul 84	PWS 28	x x x x x x	
	AE	14 Jul 84	PWS 30	x x x x x	
	AE, AS	27 Jul 84	PWS 35	x x x x x x	
	AE, AS	28 Jul 84	PWS 37	x x x x x x	
	AB	2 Aug 84	PWS 39	x x x x x x	
	AB, AF	4 Aug 84	PWS 40	x x x x x x	
	AB, AF	6 Aug 84	PWS 43	x x x	
	AB, AT, AE	9 Aug 84	PWS 44	x x x x	
	AB	10 Aug 84	PWS 45	x x x x x	
	AN, AB, AD	16 Aug 84	PWS 49	x	
	AB, AN	25 Aug 84	PWS 53	x x x x x x	
	AD, AN, AE, AK	28 Aug 84	PWS 54	x x x x	
	AB, AN	30 Aug 84	PWS 56	x x x x x x	
	AD, AN	31 Aug 84	PWS 57	x x x x	
	AN, AB	2 Sep 84	PWS 58	x x x x x x	
	AD, AN, AB, AJ	19 Sep 84	PWS 62	x x	
	AN, AJ	22 Sep 84	PWS 65	x x x	
	AJ, AD, AN	23 Sep 84	PWS 66	x x x x x x	
AJ	AN	14 Apr 84	PWS 3	x x	
	AN	20 Jul 84	PWS 33	x x x x x x x x x x x x x x	
	None	29 Aug 84	PWS 55	x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AN, AN	15 Sep 84	PWS 59	x x x x x x x x x x	
	AN, AN, AD	16 Sep 84	PWS 60	x x x x x x	
	AN, AN, AD, AI	19 Sep 84	PWS 62	x x x x x x x x x x	
	AN, AN, AD, AK	20 Sep 84	PWS 63	x x x x x x x x x x x x x x x x x x x x	

Table 10. (cont) Pod members identified by encounter in Prince William Sound, 1984.

	AB, AK	21 Sep 84	PWS 64	x x x x	
	AB, AI	22 Sep 84	PWS 65	x x x x x x x x x x x x x x x x x	
	AB, AD, AI	23 Sep 84	PWS 66	x x x x x x x x x x x	
AK	None	11 Jul 84	PWS 27	x x x x x x	
	None	12 Jul 84	PWS 29	x x x	
	None	22 Jul 84	PWS 34	x x x x x x x	
	AD, AN, AE, AI	28 Aug 84	PWS 54	x x x x x x	
	AJ, AB, AN, AD	20 Sep 84	PWS 63	x x x x x	
	AJ, AB, AN	21 Sep 84	PWS 64	x x x	
AN	AB, AF	14 Aug 84	PWS 46	x x x x x x x x x x	
	AD	15 Aug 84	PWS 47	x x x x x x x x x x x x x	
	None	16 Aug 84	PWS 48	x x x x x x x x x x	
	AB, AD, AI	16 Aug 84	PWS 49	x x x x x x x x x x x x x x x x	
	None	20 Aug 84	PWS 51	x x x x x x	
	AB, AI	25 Aug 84	PWS 53	x x x x x x x x x x x x x x x x x x x x x x x x	
	AK, AE, AI, AD	28 Aug 84	PWS 54	x x x x x x x x x x x x x	
	AB, AI	30 Aug 84	PWS 56	x x x x x x x x x x x x x x x x x x x x	
	AD, AI, AB	31 Aug 84	PWS 57	x x x x x x x x x x x x x x x x x x x x x x	
	AB, AI	2 Sep 84	PWS 58	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AE, AJ	15 Sep 84	PWS 59	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AB, AD	16 Sep 84	PWS 60	x x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AD, AB, AI, AJ	19 Sep 84	PWS 62	x x x x x x x x x x x x x x x x x x x x x x x x x x x x	
	AK, AB, AD, AJ	20 Sep 84	PWS 63	x x x x x x x x x x x x x x	
	AK, AJ, AB	21 Sep 84	PWS 64	x x x x x x x	
	AJ, AD, AB, AI	23 Sep 84	PWS 66	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x	
A"	AB	11 May 84	PWS 13	x x o x x	
	AE, AI	27 Jul 84	PWS 35	x x x x x x x o x x x	
	AE, AI	28 Jul 84	PWS 37	x x x x o x	
AT	None	11 Apr 84	PWS 1	x x x x x x x x x x x x x x x	
	None	15 Apr 84	PWS 4	x x	
	None	18 Apr 84	PWS 5	x x	
	None	12 May 84	PWS	x x x x x	
	None	19 May 84	PWS 15	x x x x x x x x x	
	None	20 May 84	PWS 16	x x x x x x x x x x x x	
	None	8 Jun 84	PWS 19	x x x x x x	

Table 10.(cont) Pod members identified by encounter in Prince William Sound, 1984.

None	18 Jun 84	PWS 22								x	x		
None	19 Jun 84	PWS 23					x	x	x			?	
None	5 Aug 84	PWS 42	x		x		x	x	x			x	
A1, AE	9 Aug 84	PWS 44								x	x		2nm distant from other pods
None	23 Aug 84	PWS 52	x	x	x	x							

Note: (x) indicates positive identification, (?) indicates probable identification and (o) indicates number not assigned.

from one encounter to the next is common among pods of "transient" animals.

AM pod - a total of three "transient"-type whales - was encountered only once in Southeast Alaska this season, near Pt. Hilda in Stephens Passage on 2 June (Table 4). This pod is very well known, however, from southern British Columbia, where the two adults were maintained in captivity for about 12 months in 1970-1971 (Bigg, 1982; pers. comm.). The adults have been regular visitors to those waters and to northern Puget Sound since 1974. They are known to have produced at least two calves in the last 14 years. The present calf is three years old (M. A. Bigg, pers. comm.). Following the HSWRI encounter in Southeast Alaska this year, AM pod was photographed in greater Puget Sound, near San Juan Island on 18 September. From 2 June to 18 September the whales had traveled at least 1,445 km (780 nm). Large foraging ranges are among reported characteristics of "transient"-type whales (see Table 1).

AO pod - a total of 4 "transient"-type whales - was seen four times in Southeast Alaska in 1984, twice in August and twice in September, in Icy Strait, Stephens Passage and Frederick Sound. Members of the pod were photographed in 1979 and 1983 in Frederick Sound (Table 8).

AQ pod - a total of five presumed "transient"-type whales - was seen once, on 25 July in Stephens Passage. On the basis of this single encounter little can be said about the relationship of these animals to other whales in the region. This pod has not been documented elsewhere or in previous years.

AR pod - On 13 and 25 August approximately 11 "resident-type" killer whales were seen near Waterfall Cannery on western Prince of Wales Island. Photographs taken by W. S. Lawton document the presence of three whales (AR 1, 6 and 9) (Table 5) which were previously known from a group designated in British Columbia as "R" pod. As of the end of 1983, "R" pod contained 19 individuals, including three adult males, 15 females or juveniles, and one calf (Bigg, 1982) (Table 5).

A Miscellaneous - There were two additional encounters in which photographs were adequate to determine that uncatalogued whales were present but inadequate to permit positive identification. Therefore, the pod associations of these individuals could not be determined. This miscellaneous category includes:

Five "transient"-type whales that were encountered on 7 August during adverse weather conditions near Customs House Cove, in Felice Strait. The group consisted of one adult male, two adult females or subadult males, and two juveniles or calves.

Two "transient"-type whales that were encountered on 8 September near the Brothers Islands in Frederick Sound (Table 4). One adult male and one adult female or subadult male were present.

Assuming our provisional classifications of age/sex class are correct, the 70 members of the Southeast Alaska population photo-identified to date and assigned to pods includes 13 adult males (18.6%), 34 adult females or subadult males (48.6%), and 23 juveniles or calves (32.8%). For the only comparable category, Bigg (1982) and Bigg et al., 1983), reported 23% males in the 261 animals known through 1982 in Puget Sound and British Columbia.

Most encounters in Southeast Alaska occurred in Cross Sound/Icy Strait, Chatham Strait, Frederick Sound or Stephens Passage. The three southern encounters were along the seaward coast or in or near the mouth of Clarence Strait (Figure 11). Though sightings and reports (Figure 10) suggest a slightly broader distribution, they, too, concentrate in the entrances and along the outer coast.

The observed density (rate of encounters) in southern Southeast Alaska was relatively low, as expected from experience in Northern British Columbia, where surveys have yielded few encounters (Bigg, 1982). Based on experience in other areas, "resident" animals can be expected to occur relatively frequently year-round in inshore marine waters while the occurrence of "transients" is likely to be more episodic. The proportion of "transient" (39.3%) to "resident" (60.7%) animals in the photo-identified sample to date indicates Southeast Alaska has few if any "preferred areas" (areas of regular concentration). Repeated encounters with "resident" pods AF and AG in northern waters suggest Cross Sound/Icy Strait and contigious waters inland from them may be one such area.

Prince William Sound

Between 11 April and 26 September we logged data on 151 observations of killer whales in Prince William Sound. Eighty-six were sightings from the R/V Pelican [4] or reports from other vessels or aircraft which resulted in no further data (Figure 12). (Details from these 96 observations are on file at HSWRI and will be provided on request.) Sixty-five were encounters from the R/V Kestrel in which whales were approached, tracked, photographed and sometimes recorded (Table 9; Figure 13). During such encounters whales were tracked for a total of 326.6 hrs (range 0.3 to 24.5, x=5.10) and a total distance of 1,156 nm (x=18.1 nm per encounter). Average rate of travel was 3.54 knots. A total of 264 rolls of Tri-X (approximately 9,500 frames) was exposed. Killer whale vocalizations (total 2,200 minutes) were recorded in 50 of the 66 encounters. Recordings are being analyzed and will be reported separately.

4. As an experiment with new methods, some photographs from the R/V Pelican were taken with Varicolor 1000 film using the techniques described in the Materials and Methods section. The film was examined but appears substandard for these applications; results are not included.

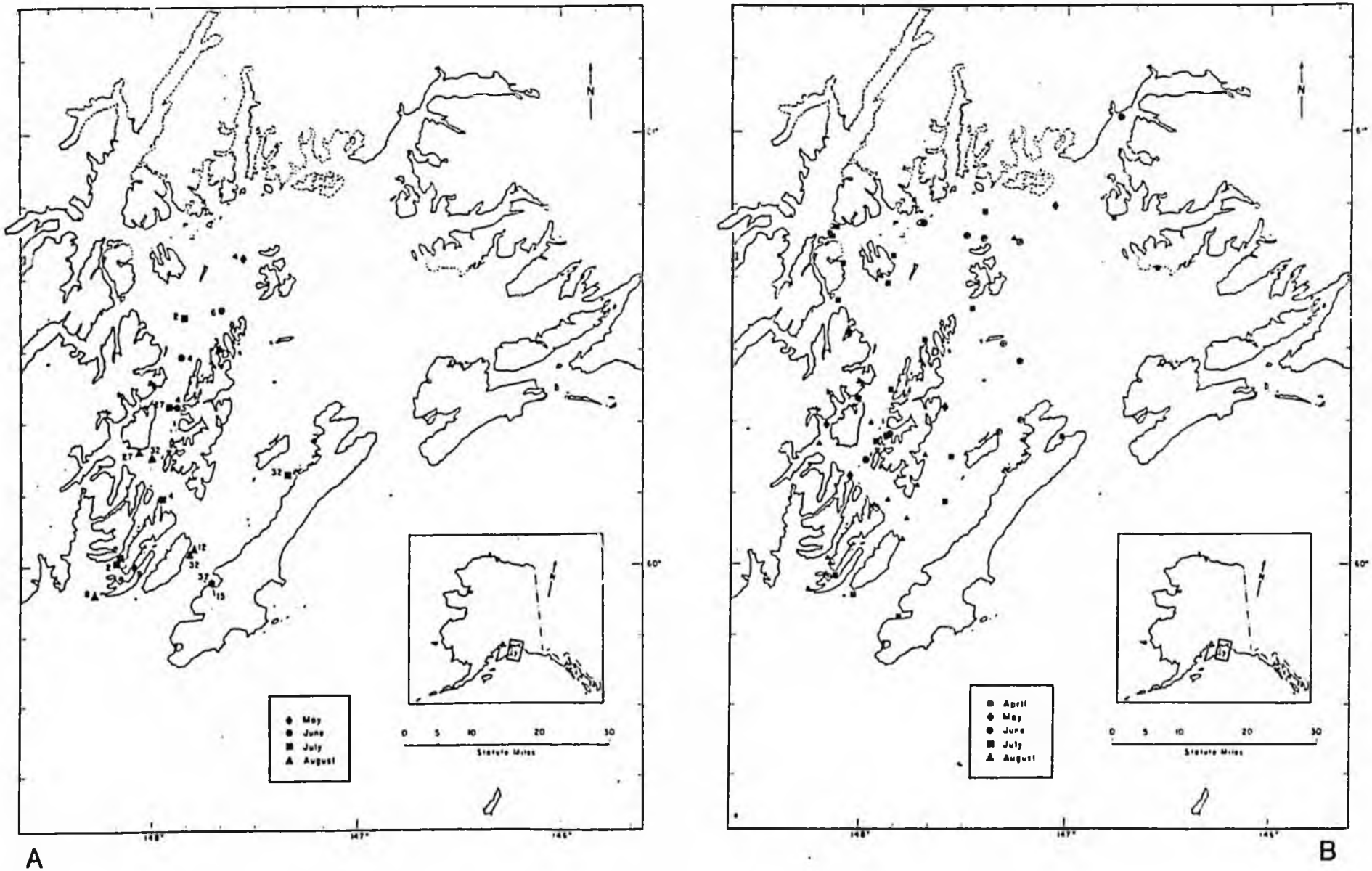


Figure 12. Locations of sightings (A) and reports (B) of killer whales, Prince William Sound, 1984. Numbers indicate estimated group size (A).

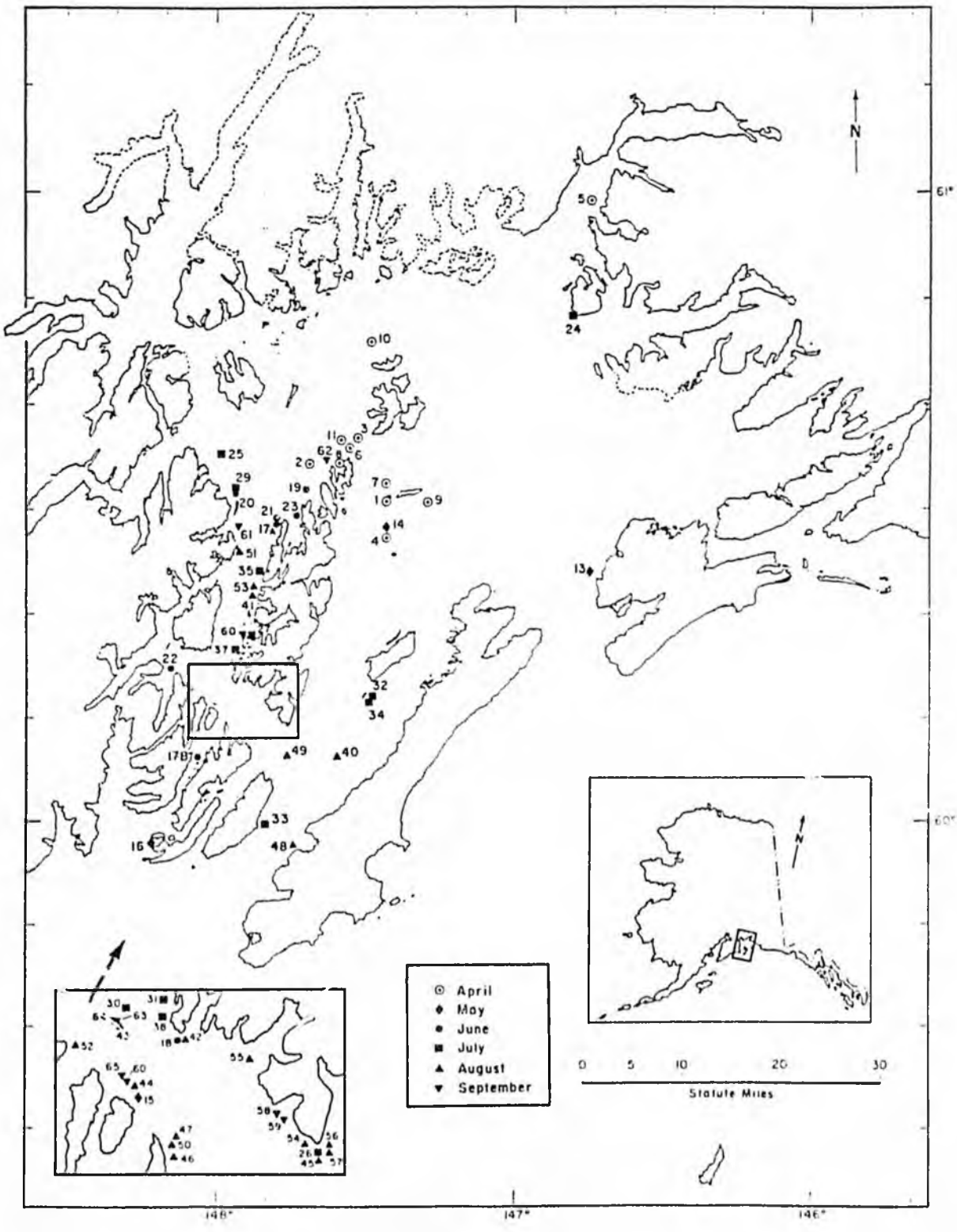


Figure 13. Locations of encounters with killer whales, Prince William Sound, 1984.

A total of 167 individual killer whales was positively identified from photographs and catalogued into the 10 pods (or clans) we identified as occurring in Prince William Sound in 1984 (Tables 5 and 10). In addition, six animals identified in poor quality photographs were known to be different from others photographed in 1984 but could not be assigned to a specific pod. They are listed in a miscellaneous category pending further photographs. When the above figures are combined one derives a minimum count of 173 killer whales in Prince William Sound based on photographs (Table 6). For reasons discussed under Southeast Alaska above, this count should be regarded as a conservative representation of the population totals for Prince William Sound.

Pods encountered in Prince William Sound in 1984 tended to aggregate and mix. Therefore, numerous resightings were often necessary to delineate the pod affinities of some individuals. The present pod assignments (Tables 5 and 10) have been made cautiously and appear to us to be accurate. Nevertheless they will be tested by additional field observations and photography.

Three pods (designated AD, AE and AS) are suspected of having additional members not yet photo-identified. One pod (designated AT) is likely an aggregation of several smaller pods of "transient"-type whales and contains most "transients" identified thus far in the Sound.

The pods are characterized and their members classified by age/sex class in Table 5. Animals positively identified in each encounter in 1984 are summarized in Table 10. Previous encounters with the various known pods and pod members, 1976-1983, are shown in Table 8 are presented in detail in von Ziegesar et al. (in preparation). The pods as they were known at the end of the 1984 field season are described below and are presented graphically in Ellis, ed. (in preparation).

AB pod - a total of 35 "resident"-type whales - was by far the most frequently encountered and easily approached pod in Prince William Sound. It was encountered 36 times between 14 April and 23 September (Table 10). In 29 of those encounters its members were traveling with one or more other pods, most frequently AI pod. During much of the 1984 field season AB pod appeared to remain in a home range centered in Knight Island Passage but it was encountered in such other areas as the eastern side of the Sound, Hinchinbrook Entrance, and Montague Strait. Members of this pod were previously photographed in Prince William Sound in 1979, 1980 and 1983 (Table 8).

AC pod - a total of four "transient"-type whales - was encountered once in 1984, traveling alone on 21 April (Table 9). They were photographed in the Sound in 1983 (Table 8).

AD pod - a "resident"-type group - was traveling with at least one other pod during each of the nine encounters in 1984 (Table 10). It was seen once on 5 June, then eight times between 15 August and 23 September. AD pod was

associated most frequently with AN pod (7 of 9 encounters). One pod member was photographed in the Sound in 1977, two others in 1983 (Table 8; von Ziegesar, et al., in preparation). The pod is difficult to photograph. In addition to the 14 animals photo-identified to date AD pod possibly contains another two to four animals that have not been adequately photographed.

AE pod - a total of at least 11 "resident"-type whales was photographed on 19 April and 18 September, and at regular intervals between. In four of the 11 encounters in 1984 the pod was traveling alone (Table 9). It is likely that this pod centered its activities in Prince William Sound, though its presence was often difficult to confirm. Members of AE pod were photographed in the Sound in 1977 and 1983 (Table 9). AE pod has proven illusive, difficult to photograph, and extremely clean of nicks and scratches. It may well include three other individuals not yet adequately photographed.

AF pod - a total of 21 "resident"-type whales - is described in the Southeast Alaska segment of this summary; so, it is not included in the final tally of individuals for Prince William Sound. It was the only pod observed to travel between the two areas in 1984. It had also been photographed in Prince William Sound in 1983 (Table 8).

AI pod - a total of six "resident"-type whales - was observed 24 times in 1984, never without at least one other pod in the area, although members of AI pod frequently swam as a separate, cohesive unit some distance from other whales. They were seen with whales from AB pod in 19 of the 24 encounters (Table 9) and appear closely associated with them. Whales from AI pod were first encountered on 19 April, after which they were observed repeatedly through the end of the field season (23 September). Apparently, the pod centered its activities in the Sound during the entire field season. This is the smallest "resident"-type pod documented in Prince William Sound to date and was the second most frequently encountered. Members of AI pod were also photographed in the Sound in 1982 and 1983 (Table 8).

AJ pod - a total of 25 "resident"-type whales - was encountered on 10 occasions in 1984, only once alone (Table 9). Although a portion of this pod was photographed on 14 April (with AB pod) and again on 20 July, the pod was not resighted consistently until after 29 August. The last documented encounter was on 22 September. One member of this pod was photographed in the Sound as early as 1977 (Table 9).

AK pod - a total of seven "resident"-type whales - was photo-identified alone on three of six encounters in 1984 (Table 10) over a three month period, 11 July to 21 September. This group was also documented in Prince William Sound

in 1983, when all members except AK 5 and possibly 7 were seen and photographed (Table 8). Despite its unusual composition (no adult males), this appears to be a complete pod.

AN pod - a total of 35 "resident"-type whales - was frequently found mixed with AB (on 12 of 16 encounters) and other pods. AN pod was not encountered and photographed until 14 August but was repeatedly encountered from that time until the conclusion of fieldwork on 23 September (Table 9). Prior to 14 August it may have used areas of Prince William Sound not searched routinely but was more likely in areas outside the Sound. These animals were frequently encountered in Montague Strait and lower Knight Island Passage. Some members had been photographed in Prince William Sound in 1977, 1980 and 1983. (Table 9).

AS pod - a total of at least 10 "resident"-type whales- was encountered three times in 1984 (11 May, 27 and 28 July), always mixed with other pod(s) (Table 10). AS pod may well spend most of its time outside of Prince William Sound. It has not been photographed in previous years. Although 10 animals have been photo-identified this pod is believed to contain up to 15 individuals.

AT pod - a total of 20 "transient"-type whales - is likely an aggregation of several small "transient"-type pods since many of the animals were observed traveling in small subgroups on most occasions. In 1984, animals from this group were encountered first on 11 April and last observed on 23 August (Table 9). However, some individuals from these groups were photographed in 1978, 1980, 1982 and 1983 (Table 9).

The six A-miscellaneous whales recorded from Prince William Sound appeared in the background of encounters with other "resident" pods. Substandard photos prevented certain identification but they were determined to be "resident-type" whales, and were classified as three adult males and three adult females or immature males.

Assuming our provisional classifications of age/sex class are correct, the 167 members of the Prince William Sound population photo-identified to date include 32 adult males (19.2 percent), 91 adult females or subadult males (54.5 percent) and 44 juveniles or calves (26.3 percent). In Prince William Sound as in Southeast Alaska, the only category comparable to those from British Columbia/Washington is "adult males", which Bigg (1982) found to comprise 23 percent of the catalogued population.

Centers of concentration of whale sightings shifted during the field season. In early April to mid-May animals were most frequently encountered in the west-central Sound, in waters around Smith Island and the Naked Island group. After mid-May most encounters occurred in the Southwestern region, particularly in Knight Island Passage and Montague Strait. During the late August and September surveys pods or aggregations of pods were encountered in these areas on a daily basis.

At all times the density (frequency of encounter) of whales was greatest on the west side of the Sound. The proportion of "resident" type whales (85.6%) to "transient" whales (14.4%) indicates that Prince William Sound is a "preferred area" for "resident" whales although centers of concentration may shift seasonally.

Shelikof Strait

There was no concerted effort around Kodiak Island. Nevertheless we logged data from 15 observations of killer whales in that area (Figure 9D). During the only three days of dedicated boat survey (Figure 9C) there were two encounters, one on 27 August in Kupreanof Strait and one on 28 August in Shelikof Strait. From the 27 August encounter, 10 whales were identified from substandard photographs but could not be catalogued. Six of the identified animals (five adult females or subadult males and one juvenile or calf) were not documented from any other area. The remaining four were believed to be AD 1, 3, 4 and 10, known from Prince William Sound. From the 28 August encounter, 18 whales were identified from photographs but could not be catalogued. Five, including AD 1, had been identified the previous day; one was believed to be AD 9; and one had been photographed in Prince William Sound on 7 July but not catalogued. [(This last animal was included in the A-Miscellaneous category for Prince William Sound (Table 5)]. The remaining 11 whales photo-identified on 28 August, including seven adult males and four adult females or subadult males, were not documented from any other time or place. Thus, at least 17 new animals were present. Given that the observers estimated that 28-30 whales were present on 27 August, at least 103 were present on 28 August and that most major pods known from Prince William Sound can be accounted for during these two days, it is likely that there were many other uncatalogued animals present in Shelikof Strait.

SUMMARY

(1) Photographic research was undertaken between April and September 1984 to identify individual killer whales in Southeast Alaska and Prince William Sound and to study their group composition and behavior. Similar activities were conducted for three days in Shelikof Strait in August. All research activities are part of a five-year study of population dynamics of southern Alaskan killer whales.

(2) Two hundred and eighty-six different killer whales were identified from photographs. These include 96 in Southeast Alaska (counting all 19 members of R (=AR) pod known from encounters in British Columbia though only three were photo-identified when the group was encountered in Southeast Alaska), 173 in Prince William Sound and 17 in Shelikof Strait. It is improbable that all pods using southern Alaskan waters were encountered. Further it is known that not all animals encountered were photographed. Therefore the figure 286 is a minimum count, not a population estimate. An estimate of 356-372, calculated based on these known individuals and using rates of encounter with new whales in the long-term studies in British Columbia/Washington, is provided in Appendix I.

(3) Animals catalogued by pod (=clan) include 89 whales in nine pods in Southeast Alaska and 167 in 10 pods in Prince William Sound. Other animals

photo-identified could not yet be reliably assigned to pods.

(4) The 256 catalogued whales classified by age/sex class include 48 adult males (18.8 percent), 140 adult females or subadult males (56.7 percent), and 68 juveniles or calves (26.5 percent), Adult males are the animals most likely to be correctly classified. The proportion of adult males observed in southern Alaska is comparable to that in 261 whales known from Washington/British Columbia (23 percent), The other two categories require further observation.

(5) Relative frequencies of encounters, distribution of encounters and observed proportions of "transients" to "residents" in Southeast Alaska (39.3 percent), to 60.7 percent), and Prince William Sound (14.4 percent), to 85.6 percent), suggest that there are few if any "preferred areas" in Southeast Alaska (possibly Cross Sound/Icy Strait and the immediately contiguous waters east and southeast of the Strait) but that western Prince William Sound is a "preferred area" within which centers of abundance may shift seasonally. This latter situation is comparable to that off Vancouver Island where preferred areas are known and the identified population through 1983 consisted of 47 "transients" (18 percent), and 214 "residents" (82 percent), The southern Alaskan population(s) known to date consists of 23 percent "transients" and 77 percent "residents".

(6) The goals for 1985 field work will be (a) to refine population counts by identifying yet undocumented animals in known pods and photo-identifying all animals in new pods encountered, (b) to refine the classification of animals into age/sex class by sexing individuals and documenting calves born after the 1984 field season, and (c) based on pods in which all members are identified, to begin to monitor births and deaths for calculations of vital statistics.

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In Prince William Sound research, valuable background data were available from previous work by John D. Hall, Olga von Ziegesar and Beth Goodwin 1976-

1983, Wendell Jones, a local fisherman/pilot, provided invaluable assistance from the air and on the water. Harry Curran, Jim van Sant and Richard Randall of the ADFG provided information on killer whale sightings. Jim Bishop of Bishop Brothers' Flying Service volunteered time reporting sightings of killer whales from the air. Brad Maynard, Dan Warren and Brian Allee, and the rest of the crew at the Port San Juan Hatchery provided cheerful assistance and support throughout the project. Kirsten Englund, David Grimes and Rick Steiner all provided valuable assistance in the fieldwork.

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APPENDIX I

Estimated Number Of Killer Whales In Portions Of Southern Alaska Based On Photo-identified Individuals

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The distribution of killer whales in Alaska has been reviewed most recently by Fiscus et al. (1976), Braham et al. (1972), Leatherwood and Dahlheim (1978), Dahlheim (1981), Braham and Dahlheim (1982), Lowry et al. (1982), Perrin, editor, (1982) and Leatherwood et al. (1983 and 1984a). Killer whales are known to occur in inland marine waters of Southeast Alaska, Prince William Sound and Cook Inlet and in northern waters of the Gulf of Alaska particularly over the continental slope and shelf. They occur both north and south of the Aleutians, particularly near the eastern islands. North of the Aleutians, killer whales are widely distributed in the Bering Sea north to Diomede Islands and Bering Strait. Above Bering Strait they range into the western Chukchi Sea and into the eastern Chukchi at least as far north and east as Pt. Barrow. Presumably some individuals travel farther north to the ice edge. At least in summer some continue eastward into the Beaufort Sea.

Prior to 1984 there was little published information on the status of Alaskan populations. Rates of encounter, estimated densities and estimated number in various areas of the state, based on surveys, are summarized in Table I-1. In addition to figures included in that table we note but are unable to evaluate anecdotal accounts of sightings of 500 killer whales near Middleton Island and 2,500 near Unimak Pass (J. Branson, ADFG, cited in Braham and Dahlheim, 1982) or the National Marine Fisheries Service (NMFS) 1984 estimate that there are 3,000 killer whales in Alaskan waters.[1]

The most reliable numbers to date on size of Alaskan killer whale populations are those contained in Leatherwood et al. (1984b) (see Table I-1). The total of 286 whales presented in that paper must be regarded as a minimum count as it includes only individuals photo-identified (i.e. recognizable in photographs). Another 11-13 whales in the studied population(s) were visually recognizable but were not photographed at all. Thus, the minimum population size in the studied portions of southern Alaska (principally Southeast Alaska and Prince William Sound but also including Shelikof Strait) is 297-299 whales. It is clear that even the highest of these figures is conservative; so, we looked for a logical reasonable basis for using these counts to estimate the size of the killer whale population(s) of southern Alaska.

Bigg et al. (1976, 1983) and Bigg (1982) presented data concerning rates of identification of new killer whale pods and individuals during photo-identification studies of the species off British Columbia, 1972-1982. After

1. Brooks, NMFS, Alaska Region, Juneau, Alaska, Testimony to House Resources Standing Committee. Juneau, Alaska, 29 February 1984.

Table I-1. Rates of encounter, estimated densities and estimated numbers of killer whales in various areas of Alaska.

Reference	Basis	Area			
		Southeast	Prince William Sound	Shelikof Strait	Other
Hall (1979, 1981)	Systematic aerial surveys				
	1976	—	0.070/nm		
	1977	—	0.043/nm		
	Systematic vessel surveys				
	1976	—	0.168/nm		
	1977	—	0.115/nm		
	Apr '80,81	—	0.00-0.03/nm		
	Jun '78,82	—	0.00-0.024/nm		
	Aug '76,82	—	0.08-0.51/nm		
Leatherwood, Reeves and Bowles (1983)	8 randomized, semi-serial aerial surveys	—	—	0.15/nm searched (summer)	S.E. Bering Sea, east of 174 W, south of 62 N
					Spring .010-.016/nm searched
					Summer .003-.007/nm searched
					Fall .002-.005/nm searched
					Winter .001-.002/nm searched
Brueggeman, Grotenfendt and Erickson (1984)	Aerial and vessel surveys	—	—	—	Navarin Basin
					Spring 129 seen, 396±713 estim.
					Summer 68 seen, 42±118 estim.
					Fall 136 seen, 798±1658 estim.
					Bering Sea, density 1.71/100 nm
Leatherwood et al. (1984a)	Fishermen's reports, aerial and vessel surveys	—	—	—	—
	Minimum counts same day surveys	93	80	60	—
	Conservative estimated minimums, from above	93	100	100	—
Leatherwood et al. (1984b)	Minimum number of animals photo-identified	96*	173*	17**	286 Total
	Above plus other animals known present but not photographed	97	183-185	17	297-299 Total

* Based on coverage April - September
** Based on 3 days of survey in August

four years of work researchers there had catalogued 19 pods and 210 individuals, after nine years 30 pods and 26[illegible] individuals. Therefore, only 80.45 percent of the population known in British Columbia by the end of 1982 had been catalogued after four years of research involving intensive effort. When this proportion is used to correct the southern Alaskan counts from 1984 one obtains an estimate of 356-372 killer whales for the three areas of southern Alaska studied. We regard even these figures as conservative estimates for at least four reasons: (a) The proportion is based on four years of work; the Alaskan work represents only one year; (b) Not all areas of southern Alaska were surveyed in 1984 and the areas that were surveyed are considerably larger than studied portions of Washington/British Columbia; (c) It is improbable that all pods or clans that use southeast Alaska and/or Prince William Sound were encountered in a single season. In British Columbia for example, though all known "residents" were encountered in 1982 no more than 75% of known "residents" are typically encountered in a given year. In 1983, three of 13 known "resident" pods and 50 of 155 known "resident" animals (32.3%) in Northern British Columbia apparently did not visit the area at all. Further, catalogued "transient" pods are usually seen in only one of three or more years and new "transient" pods continue to be identified and catalogued in British Columbia even after 11 years (All B.C. data courtesy M.A. Bigg, pers.comm. 2 Dec. 1984); and (d) The brief survey of Shelikof Strait in 1984 (three days) provided evidence of the existence there of a significant population, which overlaps with that from Prince William Sound but also contains animals not known from elsewhere in Alaska. The 17 new whales catalogued on those days can reasonably be assumed to be only a small part of the population(s) using the Kodiak Island region.

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SJR

32

FERC deadline 3/11/84

DZINICH 1/31/84

Susitna financing plan
should include:
- amt needed up front from state
- where other $ will come from
- loan period
- interest rate
- cost to consumer (need commitment from utilities)

MUST [illegible] REQUIRE 15-20% RESERVE
BEYOND DEBT SERVICE

for St. Aff. hearing?

Contact REA on willingness/ability to finance

REA issues loans to their co-ops Co-ops then pass [illegible] to power projects

SENATE RESOURCES COMMITTEE
LEGISLATION CHECKLIST

IDENTIFICATION:

BILL NUMBER: SJR 32

BILL NAME: amending constitution to create a Capital Projects Fund

SPONSOR(S): governor (Rules)

DATE INTRODUCED: 1-23-84

REFERRALS: Resources
Judiciary
Finance

RELATED BILLS PENDING:
HJR 57 - Rules
1/23/84
Resources
Judiciary
Finance

INITIAL RESEARCH:

BILL SUMMARY COMPLETED:

SUMMARY BY LEGAL DIVISION:

SPONSOR CONTACTED FOR BACKUP MATERIALS:

DEPT. OF LAW SUMMARY:

FISCAL NOTE:

AGENCY RESPONSE:

OTHER INTERESTED SENATORS OR REPS. NOTIFIED:

BACKGROUND RESEARCH:

SIMILAR BILLS INTRODUCED IN PREVIOUS LEGISLATURES:

RESPONSES FROM INTERESTED PERSONS/GROUPS:

OTHER STATE OR FEDERAL PRECEDENTS, REGULATIONS, LAWS:

HEARING PREPARATION:

CHAIRMAN BRIEFED:

DATE AND PLACE SET:

STAFF MEMO TO COMMITTEE:

TELECONFERENCE:

BACKGROUND MATERIAL DISTRIBUTED:

PSA/PRESS RELEASE:

LIST OF WITNESSES:

SUGGESTED AMENDMENTS/COMMITTEE SUBSTITUTES DRAFTED:

Ray Gillespie for Governor

David Rogers

Rosa King 586-1740

Linn Asper Legal

BETTYE FAHRENKAMP, Chairman
ROBERT H. ZIEGLER, SR., Vice Chairman
DICK ELIASON
PAUL FISCHER
VIC FISCHER
BOB MULCAHY
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Senate

Committee on Resources

March 5, 1984

SB 522 AN ACT SPECIFYING HOW REVENUES DEDICATED TO THE MAJOR PROJECTS FUND SHALL BE EXPENDED.

Sec. 1 (a) 70% of revenues paid into the fund is reserved for hydroelectric development, which is defined as construction and rate stabilization. Qualifies the first hydro project to be financed from the fund.

(b) 10% of revenues is reserved for power cost assistance, for equalizing rates statewide (mean of Anchorage, Juneau, Fairbanks as calculated by the Alaska Public Utility Commission).

(c) Specifies that APUC will annually submit through the Alaska Power Authority the request for power cost assistance monies.

(d) Authorizes the legislature to appropriate additional monies to the power cost assistance program in any year in which the revenues in section (b) are insufficient to meet the program's needs.

Sec. 2 The legislature will designate the agency to administer each project.

Sec. 3 The designated agency will make determinations of grace period, interest rate, payback period, and value of public worth that might be credited against money appropriated from the fund.

Sec. 4 Clarifies that repayments on projects financed from the fund will be deposited into the major projects fund.

Sec. 5 A contractual agreement between the executive branch and a project's sponsor governing repayment that has been entered into prior to the effective date of this act satisfies the requirements of this act.

Sec. 6 Specifies grace period and payback period for the Watana hydroelectric project.

Sec. 7 Clarifies that any excess funds appropriated to a project lapse back to the major projects fund.

Sec. 8 Clarifies that appropriations made from the fund are for capital projects and do not lapse.

Sec. 9 Grants the Permanent Fund Board the authority to invest and manage the assets of the major projects fund.

Sec. 10 Repeals the so-called "Susitna equity clause", which requires that $5 billion be invested in the state's energy program by 1991, or state grants to other hydro projects must be repaid as interest bearing loans.

Sec. 11 Takes effect upon passage of the Constitutional amendment creating the major projects fund.

Introduced: 3/5/84
Referred: Resources and Finance

IN THE SENATE BY THE RESOURCES COMMITTEE

CS SENATE BILL NO. 522

IN THE LEGISLATURE OF THE STATE OF ALASKA

THIRTEENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act specifying how revenues dedicated to the major projects fund shall be expended; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. As established in Article IX, Section 17 of the Constitution of the State of Alaska, the revenues dedicated to the major projects fund are for financing the construction of hydroelectric and other capital projects that exceed $100,000,000 in cost, and an account for the financing of the power cost assistance fund program. Of the money in the fund:

(a) Not less than seventy percent of the annual revenues dedicated to the fund shall be reserved for hydroelectric energy development. Hydroelectric energy development consists of capital construction costs and rate stabilization funds for hydroelectric projects the state. The hydroelectric project for which a FERC license application has been accepted by 12/31/83, that will serve the greatest percentage of the state's population per month and will produce the greatest number of kilowatt hours shall be the first project funded under this subsection.

(b) [Not more than] ten percent of the annual revenues dedicated to the fund shall be used for the power cost assistance program as provided in AS 44.83.162.-.164. However, at no time may disbursements to the power cost assistance program fund exceed what is necessary to provide for power cost stabilization statewide equal to the mean of the cost per kilowatt hour in Anchorage, Fairbanks, and Juneau as calculated by the Alaska Public Utility Commission.

(c) The Power Cost Assistance Program account shall be used t. fully fund the Power Cost Assistance Program established under A: 44.33.162-164. The Alaska Public Utilities Commission shall calculat: the amount necessary to fully fund the Power Cost Assistance Progra: each fiscal year and shall submit through the Alaska Power Authorit: the appropriate budget request for consideration by the legislature.

(d) During any fiscal year in which the revenues in subsection (b) are fully insufficient to meet the obligations in AS.44.83.162 - .164, the legislature may appropriate the amount necessary to satisfy the obligation in AS 44.83.162 - .164.

* Sec. 2. PROJECT AGENCY. The legislature by appropriation or otherwise shall designate the appropriate agency to administer a project under the major projects fund.

* Sec. 3. PROJECT PAYBACK. For each project under Article IX, Section 17 of the Constitution of the State of Alaska, the legislature shall designate a state agency to determine a grace period, if any; rate of interest, if any; length of term over which the fund shall be repaid; and public worth or other values of the project and allow a credit for these values against money appropriated from the fund.

* Sec. 4. REPAYMENT TO MAJOR PROJECT FUND. All repayments and interest on projects financed from the Fund shall be deposited into the major projects fund.

* Sec. 5. PRIOR AGREEMENTS. If the executive branch has entered into a contractual agreement with the project sponsors on a repayment schedule for a project prior to the enactment of a constitutional amendment creating the major project fund the agreement satisfies the requirements of this Act.

* Sec. 6. In Article IX, Section 17, the project entitled the Watana hydroelectric development project shall have a grace period from the date of operation with a payback period with no interest.

* Sec. 7. Unexpended and unobligated portions of appropriations from the fund shall lapse back to the major projects fund account from which the appropriation was made except as otherwise provided in this Act.

* Sec. 8. The appropriations made under Article IX, Section 17 of the Constitution of the State of Alaska are for capital projects or are otherwise not one-year appropriations and do not lapse under AS 37.25.010.

* Sec. 9. AS 37.13.120 is amended by adding a new subsection to read:

(m) invest and manage the assets of the major projects fund.

* Sec. 10. AS 44.83.398(b)(2) is repealed.

* Sec. 11. This Act takes effect upon passage of a constitutional amendment creating the major projects fund and a bill appropriating $2,535,000,000 for the Watana Dam.

Alaska State Legislature

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Senate

Committee on Resources

March 5, 1984

SB 523 AN ACT MAKING APPROPRIATIONS FROM THE MAJOR PROJECTS FUND.

Sec. 1 Appropriates $2,535,000,000 from the major projects fund for construction of and rate stabilization for the Watana dam project in the Susitna River hydro project, and establishes an annual appropriation schedule.

Sec. 2 Takes effect upon passage of the Constitutional amendment creating the major projects fund.

MEMORANDUM State of Alaska

TO: The Honorable Bettye M. Fahrenkamp
Alaska State Senate

DATE: March 6, 1984

FILE NO: 84E-3

TELEPHONE NO: 465-3568

FROM: Gordon S. Harrison
Associate Director
Division of Strategic Planning
Office of Management and Budget

SUBJECT: Revenue Projections for CSSJR 32

In response to a request from your staff, we are providing long-term revenue projections which may be useful to the work of your committee on CSSJR 32. These projections incorporate current royalty and severance tax revenue estimates published by the Department of Revenue. Other petroleum and non-petroleum revenue projections are those of OMB, but they are similar to the estimates used by the Department of Revenue internally.

We have analyzed the cash flow of the Major Projects Fund with both 30th and 50th percentile estimates of severance tax and royalty income. Note that our revenue estimates are based on current law, and do not take account of potential future new State revenue sources such as a personal income tax, Permanent Fund dividends, etc.

mm

PETROLEUM REVENUE: 50TH PERCENTILE
($ Million; Nominal)

FY	DOR 50% Gross Royalties	DOR 50% Severance Taxes	OMB Estimate Corporate Petroleum Income Tax	OMB Estimate Property Tax (Oil/Gas)	OMB Estimate Federal Mineral Revenue Sharing	Total Petroleum Revenue
1985	1,370	1,370	300	222	17	3,279
1986	1,480	1,450	325	226	18	3,499
1987	1,670	1,630	350	259	18	3,9[illegible]
1988	1,820	1,520	363	257	18	3,978
1989	2,080	1,730	384	277	18	4,489
1990	2,140	1,770	374	280	18	4,582
1991	1,950	1,540	361	285	18	4,154
1992	1,940	1,460	359	309	18	4,086
1993	1,940	1,430	350	337	18	4,075
1994	1,900	1,370	341	352	18	3,981
1995	1,770	1,270	331	364	18	3,753
1996	1,650	1,100	322	339	18	3,429
1997	1,700	1,140	325	388	18	3,571
1998	1,750	1,150	327	405	18	3,650

OMB

3-6-84

PETROLEUM REVENUE: 30TH PERCENTILE

($ Million; Nominal)

FY	DOR 30% Gross Royalties	DOR 30% Severance Taxes	OMB Estimate Corporate Petroleum Income Tax	OMB Estimate Property Tax (Oil/Gas)	OMB Estimate Federal Mineral Revenue Sharing	Total Petroleum Revenue
1985	1,260	1,250	300	222	17	3,049
1986	1,320	1,300	325	226	18	3,189
1987	1,470	1,440	350	259	18	3,537
1988	1,590	1,310	363	257	18	3,538
1989	1,770	1,460	384	277	18	3,909
1990	1,680	1,350	374	280	18	3,702
1991	1,560	1,150	361	285	18	3,374
1992	1,540	1,090	359	309	18	3,316
1993	1,470	990	350	337	18	3,165
1994	1,390	920	341	352	18	3,021
1995	1,300	880	331	364	18	2,893
1996	1,230	760	322	339	18	2,669
1997	1,260	770	325	388	18	2,761
1998	1,270	790	327	405	18	2,810

OMB

3-6-84

UNRESTRICTED GENERAL FUND REVENUE: 50TH PERCENTILE

($ Million)

FY	50th Percentile Pet. Rev. Minus P.F. Contr.	OMB Estimate Investment Income	OMB Estimate Other (Non-Pet.) Revenue	Unrestricted Gen. Fund Revenue	Unrestricted Gen. Fund Revenue (1985 dollars)
1985	2,932	250	253	3,435	3,435
1986	3,124	250	272	3,646	3,440
1987	3,505	250	287	4,042	3,609
1988	3,518	250	303	4,071	3,421
1989	3,964	250	320	4,534	3,598
1990	4,042	250	337	4,629	3,454
1991	3,662	250	356	4,268	3,006
1992	3,557	250	376	4,183	2,789
1993	3,546	250	397	4,193	2,637
1994	3,444	250	420	4,114	2,434
1995	3,252	250	443	3,945	2,204
1996	2,945	250	469	3,664	1,928
1997	3,056	250	495	3,801	1,891
1998	3,120	250	524	3,894	1,828

OMB

3-6-84

UNRESTRICTED GENERAL FUND REVENUE: 30TH PERCENTILE

($ Million)

FY	30th Percentile Pet. Rev. Minus P.F. Contr.	OMB Estimate Investment Income	OMB Estimate Other (Non-Pet.) Revenue	Unrestricted Gen. Fund Revenue	Unrestricted Gen. Fund Revenue (1985 dollars)
1985	2,730	250	253	3,233	3,233
1986	2,854	250	272	3,376	3,185
1987	3,165	250	287	3,702	3,305
1988	3,136	250	303	3,689	3,100
1989	3,462	250	320	4,032	3,200
1990	3,277	250	337	3,864	2,884
1991	2,979	250	356	3,585	2,525
1992	2,895	250	376	3,521	2,347
1993	2,763	250	397	3,410	2,145
1994	2,627	250	420	3,297	1,951
1995	2,524	250	443	3,217	1,797
1996	2,307	250	469	3,026	1,593
1997	2,378	250	495	3,123	1,554
1998	2,424	250	524	3,198	1,501

OMB

3-6-84

CONTRIBUTIONS TO MPF
($ Million; Nominal)

	At 50th Percentile		At 30th Percentile	
FY	Total Petroleum Revenue	10% to MPF	Total Petroleum Revenue	10% to MPF
1985	3,279	328	3,049	305
1986	3,499	350	3,189	319
1987	3,927	393	3,537	354
1988	3,978	398	3,538	354
1989	4,489	449	3,909	391
1990	4,582	458	3,702	370
1991	4,154	415	3,374	337
1992	4,086	409	3,316	332
1993	4,075	408	3,165	317
1994	3,981	398	3,021	302
1995	3,753	375	2,893	289
1996	3,429	343	2,669	267
1997	3,571	357	2,761	276
1998	3,650	365	2,810	281
TOTAL		5,446		4,494

OMB

3-6-84

CONTRIBUTIONS TO PERMANENT FUND
($ Million; Nominal)

	At 50th Percentile			At 30th Percentile		
FY	Non-Tax. Pet. Rev. (Excl. Bonuses)	Perm. Fund Contribution Rate	Perm. Fund Contributions	Non-Tax. Pet. Rev. (Excl. Bonuses)	Perm. Fund Contribution Rate	Perm. Fund Contributions
1985	1,387	.25	347	1,277	.25	319
1986	1,498	.25	375	1,338	.25	335
1987	1,688	.25	422	1,488	.25	372
1988	1,838	.25	460	1,608	.25	402
1989	2,098	.25	525	1,788	.25	447
1990	2,158	.25	540	1,698	.25	425
1991	1,968	.25	492	1,578	.25	395
1992	1,958	.27	529	1,558	.27	421
1993	1,958	.27	529	1,488	.27	402
1994	1,918	.28	537	1,408	.28	394
1995	1,788	.28	501	1,318	.28	369
1996	1,668	.29	484	1,248	.29	362
1997	1,718	.30	515	1,278	.30	383
1998	1,768	.30	530	1,288	.30	386

OMB

3-6-84

MPF CUMULATIVE BALANCE: 50TH PERCENTILE
($ Million)

Deposit Date	Deposit Amount	9% Interest	Balance	Balance Date	Balance in $ 1985 (6% inflation)
1-1-85	328	30	358	12-31-85	358
1-1-86	350	64	772	12-31-86	728
1-1-87	393	105	1,270	12-31-87	1,134
1-1-88	398	150	1,818	12-31-88	1,528
1-1-89	449	204	2,471	12-31-89	1,961
1-1-90	458	264	3,193	12-31-90	2,383
1-1-91	415	325	3,933	12-31-91	2,770
1-1-92	409	391	4,733	12-31-92	3,155
1-1-93	408	463	5,604	12-31-93	3,525
1-1-94	398	540	6,542	12-31-94	3,871
1-1-95	375	623	7,540	12-31-95	4,212
1-1-96	343	709	8,592	12-31-96	4,522
1-1-97	357	805	9,754	12-31-97	4,853
1-1-98	365	911	11,030	12-31-98	5,178

Assumptions: 1) No expenditures from the fund.

2) MPF lump sum deposit in the middle of the fiscal year.

OMB

841-57

3-6-84

MPF CUMULATIVE BALANCE: 30TH PERCENTILE
($ Million)

Deposit Date	Deposit Amount	9% Interest	Balance	Balance Date	Balance in $ 1985 (6% inflation)
1-1-85	305	27	332	12-31-85	332
1-1-86	319	59	710	12-31-86	670
1-1-87	354	96	1,160	12-31-87	1,036
1-1-88	354	136	1,650	12-31-88	1,387
1-1-89	391	184	2,225	12-31-89	1,766
1-1-90	370	234	2,829	12-31-90	2,111
1-1-91	337	285	3,451	12-31-91	2,430
1-1-92	332	340	4,123	12-31-92	2,749
1-1-93	317	400	4,840	12-31-93	3,044
1-1-94	302	463	5,605	12-31-94	3,317
1-1-95	289	530	6,424	12-31-95	3,589
1-1-96	267	602	7,293	12-31-96	3,838
1-1-97	276	681	8,250	12-31-97	4,104
1-1-98	281	768	9,299	12-31-98	4,366

OMB

3-6-84

Alaska State Legislature

POUCH V
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Senate

Committee on Resources

M E M O R A N D U M

TO: Senate Resources Committee Members

FROM: Senate Resources Committee Staff

RE: Committee Meeting, March 9, 1984

DATE: March 6, 1984

On Friday, March 9 at 3:00 pm in the Beltz Room, the Senate Resources Committee will hear the following bills:

SJR 32, Proposing an amendment to the Constitution of the State of Alaska creating a fund to finance the construction of capital projects and to provide equity for power cost assistance.

SB 423, An Act relating to the Alaska Power Authority

SB 522, An Act specifying how revenues dedicated to the major projects fund shall be expended; and providing for an effective date.

SB 533, An Act making appropriations from the Major Projects Fund; and providing for an effective date.

Information on these bills is attached.

Alaska State Legislature

BETTYE FAHRENKAMP, Chairman
ROBERT H. ZIEGLER, SR., Vice Chairman
DICK ELIASON
PAUL FISCHER
VIC FISCHER
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Senate

Committee on Resources

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SJR 32 proposes an amendment to the State Constitution creating a major projects fund.

Purposes: To finance capital projects that exceed $100 million in cost.

To provide money for power cost assistance.

Consists of: 10% of state revenue earned beginning July 1, 1984.

Appropriations made by the legislature.

Interest earned from investment of money in the major projects fund.

Revenue earned by a capital project financed from the fund.

Use of funds: 70% of revenues paid into the fund is reserved for hydroelectric energy development, which is defined as construction and rate stabilization. The hydro project for which a FERC license application was accepted prior to 12/31/83, and which will serve the greatest number of people with the greatest kilowatt hour production will be the first one funded.

10% of revenues paid into the fund is reserved for power cost assistance, for equalizing rates statewide (mean of Anchorage, Fairbanks, Juneau).

Balance of revenues unallocated, and may be used for any project that meets the requirements of the fund.

Once the first hydro project is built, future monies accruing to the hydro portion of the fund revert to the unallocated section. Likewise, in any year in which 10% is not needed for power cost assistance, the excess reverts to unallocated.

Project requirements: 2/3 legislative vote needed to appropriate from the fund.

Capital project must be revenue generating.

Expenditure may not be for refinancing of a project.

The 1st hydro project built and power cost assistance are exempted from these requirements.

Other: Provides a mechanism for a public vote on continuation of the fund at some future date if the fund's integrity is threatened.

IN THE SENATE BY THE RESOURCES COMMITTEE

CS FOR SENATE JOINT RESOLUTION NO. 32 (Resources)

IN THE LEGISLATURE OF THE STATE OF ALASKA

THIRTEENTH LEGISLATURE - SECOND SESSION

Proposing an amendment to the Constitution of the State of Alaska creating a fund to finance the construction of capital projects and to provide equity for powercost assistance.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*Section 1. Article IX, Constitution of the State of Alaska, is amended by adding a new section to read:

SECTION 17 MAJOR PROJECTS FUND. (a) There is created in the State treasury a major projects fund. The purpose of the major projects fund is to finance capital projects that exceed $100,000,000 in cost and to provide money for equity for power cost assistance. Money in the fund may be invested in the manner specified in section 15 of this article for the Alaska Permanent Fund. The major projects fund consists of

(1) an annual deposit of ten percent of state revenue earned during the period beginning July 1, 1984 from the following sources:

(A) corporate income tax on oil and gas producers;

(B) severance tax;

(C) oil and gas production property tax:

(D) mineral lease rentals;

(E) royalties;

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(F) royalty sale proceeds; and

(G) federal mineral revenue-sharing payments and bonuses;

(2) appropriations made by the legislature;

(3) interest earned each fiscal year from investment of miney in the major projects fund; and

(4) revenue dedicated to the major projects fund under (f) of this section.

(b) Not less than 70% of the annual revenue paid into the major projects fund is reserved for hydroelectric energy development. Interest accruing to monies reserved under this subsection shall also be reserved for hydroelectric energy development. "Hydroelectric energy development" means construction of hydroelectric capital projects and stabilization of rates for hydroelectric projects in the state. The hydroelectric project for which the Federal Energy Regulatory Commission had accepted a license application by December 31, 1983, that will serve the greatest percentage of the state's population, and that will produce the greatest amount of kilowatt hours per month shall be the first project funded under this subsection. Upon completion of the first project which qualifies under this subsection, any future monies accruing to the hydroelectric portion of the major projects fund shall revert to the unallocated account in subsection (d).

(c) 10% of the annual revenue paid into the fund is reserved for the equity account for power cost assistance for the purpose of power cost equity statewide equal to the mean of the cost per kilowatt hour in Anchorage, Fairbanks, and Juneau. During any fiscal year in which the total amount available under this subsection remains unspent, the balance will revert to the unallocated account in subsection (d).

(d) The balance of the annual revenue paid into the fund shall be reserved in an unallocated account. Funds in the unallocated account may be used for any project that meets the requirements of the major projects fund.

(e) Money may not be expended from the major projects fund unless

(1) the expenditure is in accordance with an appropriation bill passed by the affirmative vote of two-thirds of the membership of each house of the legislature;

(2) the capital project will earn revenue during the useful life of the project to repay all or a substantial part of the money expended from the fund to finance the project; and

(3) the expenditure is for the original financing of a project. This section does not allow refinancing of a project.

(f) The legislature may dedicate by law revenue earned by a capital project financed by the major projects fund to repay all or a substantial part of the money expended from the fund to finance the prc ct.

(g) Notwithstanding (e) of this section money may be expended from the major projects fund for the project indentified in (b) of this section and for power cost assistance in (c) of this section.

(h) Notwithstanding the dedication of revenue required by this section, the legislature may, by the affirmative vote of two-thirds of the membership of each house, appropriate revenue dedicated under this section to meet a state of disaster declared by the governor as prescribed by law.

* Sec. 2. Article IX, sec. 7, Constitution of the State of Alaska is amended to read:

SECTION 7. DEDICATED FUNDS. The proceeds of any state tax or license shall not be dedicated to any special purpose, except as provided in sections [SECTION] 15 and 17 of this article or when required by the federal government for state participation in federal programs. This provision shall not prohibit the continuance of any dedication for special purposes existing upon the date of ratification of this section by the people of Alaska.

* Sec. 3. Article IX, sec. 16, Constitution of the State of Alaska i
amended to read:

SECTION 16. APPROPRIATION LIMIT. Except for appropriations fo
Alaska permanent fund dividends, appropriations from the major proj
ects fund established by section 17 of this article, appropriations o
revenue bond proceeds, appropriations required to pay the principa
and interest on general obligation bonds, and appropriations of mone
received from an non-State source in trust for a specific purpose, in
cluding revenues of a public enterprise or public corporation of th
State that issues revenue bonds, appropriations from the treasury mad
for a fiscal year shall not exceed $2,500,000,000 by more than th
cumulative change, derived from federal indices as prescribed by law
in population and inflation since July 1, 1981. Within this limit, a
least one-third shall be reserved for capital projects and loan appro
priations. The legislature may exceed this limit in bills for appro
priations to the Alaska permanent fund and in bills for appropriation
for capital projects, whether of bond proceeds or otherwise, if eac
bill is approved by the governor, or passed by affirmative vote o
three-fourths of the membership of the legislature over a veto or ite
veto, or becomes law without signature, and is also approved by th
voters as prescribed by law. Each bill for appropriations for capita
projects in excess of the limit shall be confined to capital project
of the same type, and the voters shall, as provided by law, be in
formed of the cost of operations and maintenance of the capital proj
ects. No other appropriation in excess of this limit may be made ex
cept to meet a state of disaster declared by the governor as pre
scribed by law. The governor shall cause any unexpended and unappro
priated balance to be invested so as to yield competitive market rate
to the treasury.

* Sec. 4. The amendments proposed by this resolution shall be place
before the voters of the state at the next general election in conformit
with art. XIII, sec. 1, Constitution of the State of Alaska, and the elec
tion laws of the state.

Sec. 5 If the governor determines that art. IX, sec. 17 of the Constitution of the State of Alaska should be repealed at any time after it has been adopted, the governor shall propose an amendment to the Constitution of the State of Alaska. If the proposed amendment is approved by two-thirds vote of each house of the legislature the lieutenant governor shall place the question on the ballot for the next general election for approval or rejection by a majority of the qualified voters of the state.