

Observations of migrating gray whales  
(*Eschrichtius robustus*) at Cape St. Elias, Alaska

Walt Cunningham<sup>1</sup>

Susan Stanford

Alaska Department of Fish and Game

333 Raspberry Road

Anchorage, Alaska 99502

*\*cite as unpubl. ms.*

1. Bare Island  
Port Bailey  
Alaska 99697

## ABSTRACT

Migration, two patterns of feeding behavior and several sequences of sexual behavior of gray whales were observed at Cape St. Elias, Kayak Island, Alaska, from 8 March to 13 May 1977 and from 22 March to 9 June 1978. Peak periods of all behavior patterns were 18 April to 26 April 1977 and 12 to 18 April 1978. The peak behavior periods coincided with peak abundance of migrating whales in both years, though migration began two weeks before and continued for five weeks after these behaviors were observed.

## INTRODUCTION AND STUDY AREA

A summary of published material by Pike (1962) indicated that gray whales closely follow the coastline from the lagoons of Mexico to British Columbia. Based on a few reports from scattered locations north of the Queen Charlotte Islands, Pike (1962) suggested that the whales continue north close to the shore through the Gulf of Alaska. Incidental observations, during an Alaska Department of Fish and Game sea lion (*Eumetopias jubatus*) project in 1977, indicated Cape St. Elias in the Gulf of Alaska, lay in the path of the northward gray whale migration. This migration was closely observed in 1978.

Cape St. Elias forms the southwestern end of Kayak Island (Fig. 1). A 150 m high pyramidal rock, located 0.4 km south of the Cape, is referred to on nautical charts as "Pinnacle Rock." A submerged marine reef extends 1.5 km southwest from Pinnacle Rock and a rocky inter-tidal peninsula extends 0.4 km to the south. "Southeast Rocks" are located 3.2 km south east of Pinnacle Rock. Our observation post was 17 m above sea level on the southwestern corner of Pinnacle Rock.

## METHODS

In 1978 daily watches were kept from 22 March to 4 July. Between 22 March, 1978 and 24 April, a total of 215 hours was spent in observation, with up to 13 hours of observation per day during periods of peak activity. Whales were sighted as far as 8 km offshore, but 53 percent of those observed were within 0.4 km of shore. Observations were aided by an 80X/130X

FIGURE 1. GRAY WHALE OBSERVATION AREA LOCATED ON CAPE ST. ELIAS IN THE GULF OF ALASKA. (50° 47.4'N 144° 36.3'W)

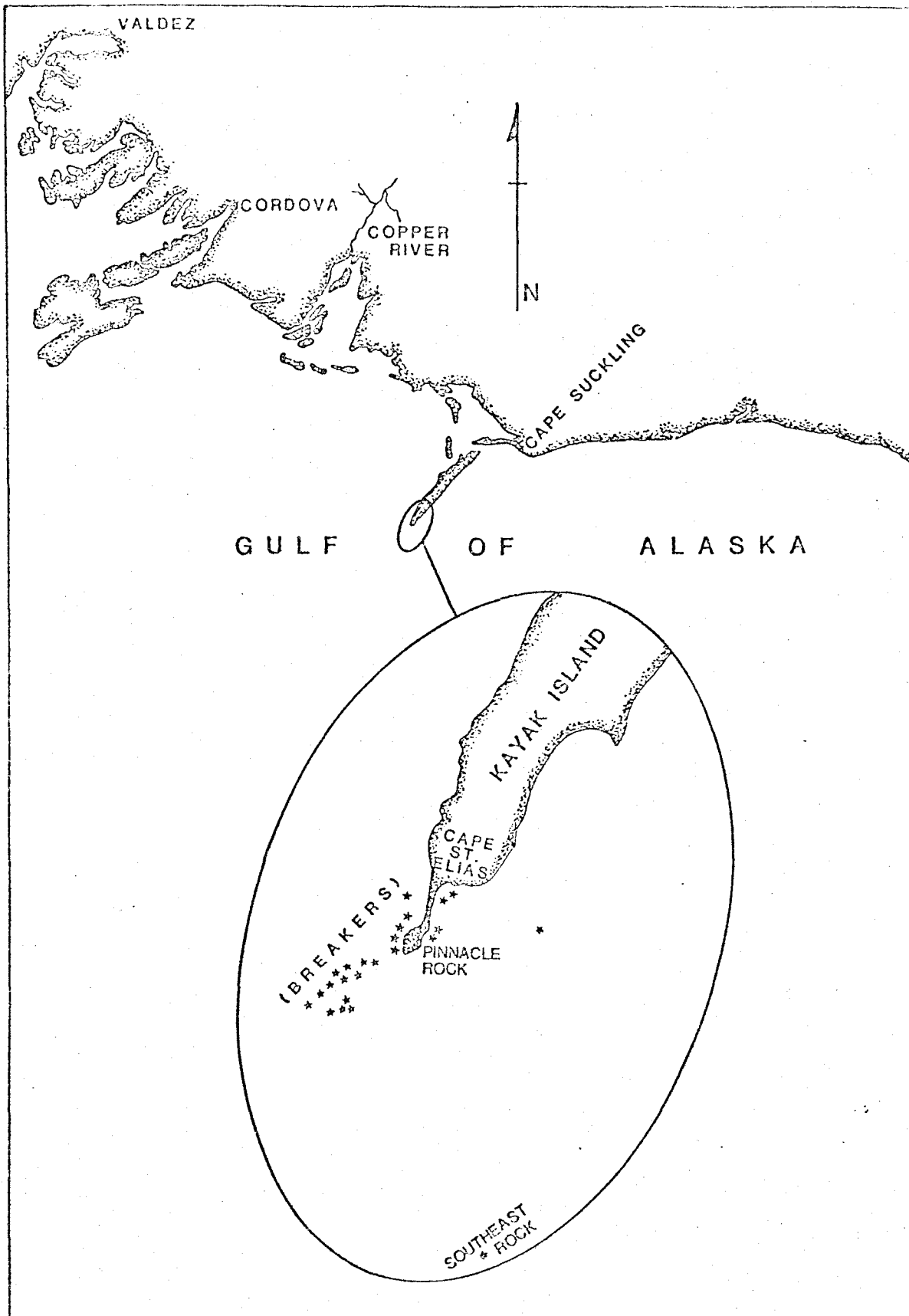


FIGURE 1. CAPE ST. ELIAS GRAY WHALE OBSERVATION AREA LOCATED IN THE GULF OF ALASKA. (59° 47.4'N 144° 36.3'W)

reflecting mirror telescope and 8 x 35 binoculars. Behavioral activity was described on a field tape recorder as it occurred. These recordings were transcribed into field notebooks each evening.

## RESULTS

### Migration

At Cape St. Elias northward migrating gray whales were observed daily in 1977 from 8 March until the last sighting of a migrating whale on 13 May. The peak migration of whales in that year was between 16 and 18 April (Fig. 2) with a season total of 408 observed. In 1978, the migration was in progress by the time of our arrival on 22 March. The peak of migration in that year was between 3 and 12 April with a season total of 2,147. Additional sightings of gray whales in the northeastern and northwestern Gulf of Alaska are given in Table 1, with selected sightings shown in Fig. 3.

On four days in March and one day in April 1978 adults accompanied by whales less than one half the adult size were observed. These small animals were doubtless calves. On 27 March an adult and a small whale spent 10 minutes at the surface near Pinnacle Rock. The small whale repeatedly was seen to lie at right angles to the adult pushing at the abdominal area, presumably nursing.

The behavior of migrating whales differed in several respects between late March and mid to late April. The former were in loosely aggregated

FIGURE 2. NUMBER OF WHALES PER DAY OBSERVED MIGRATING PAST CAPE ST. ELIAS,  
KAYAK ISLAND, GULF OF ALASKA, SPRING 1977 and 1978.

NUMBER OF WHALES

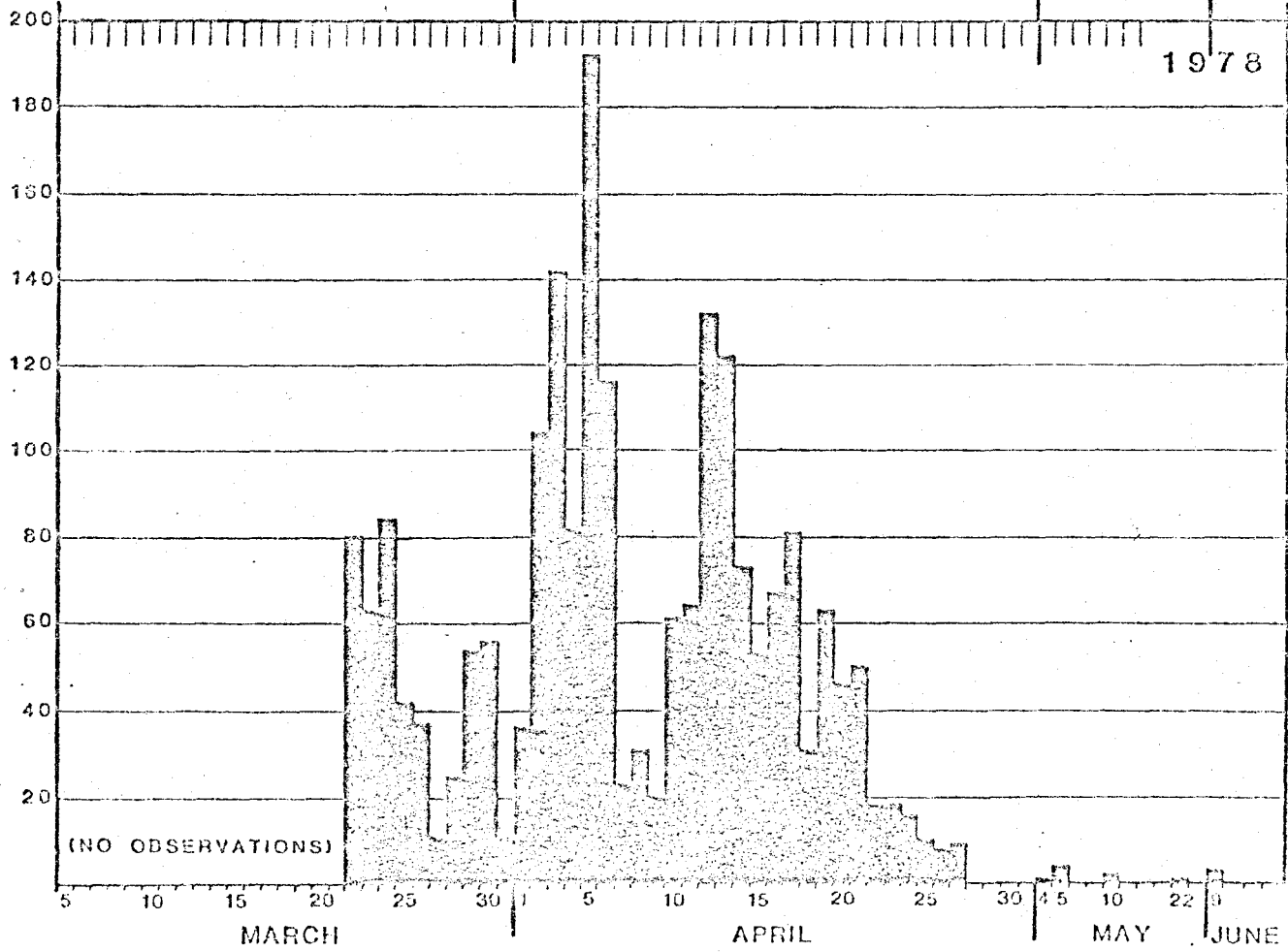
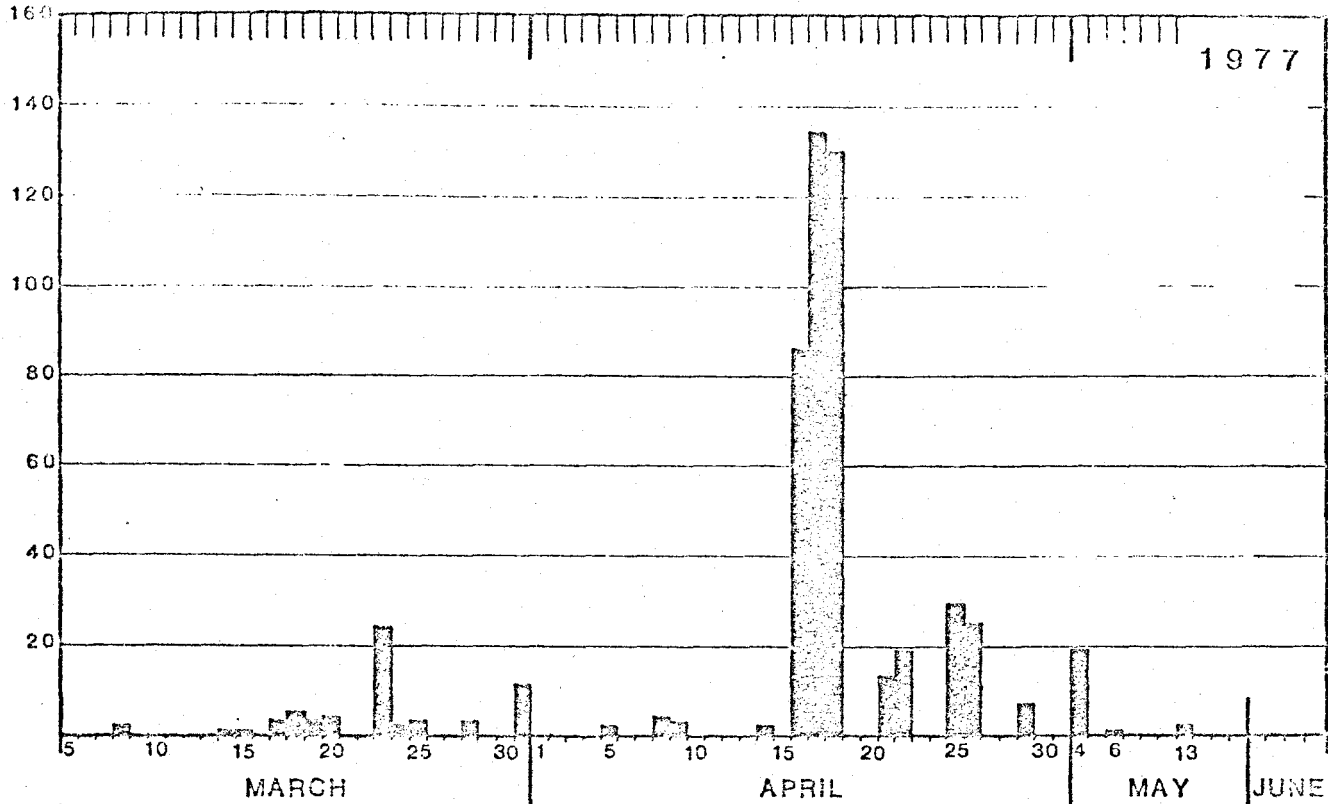




Table 1. Sightings of gray whales in the northern and western Gulf of Alaska, 1974 through 1978.

Date	Place	Number	Observer
6 April 1974	Off Fort Abercrombie, Kodiak I.	2	R. MacIntosh
18 April 1974	Between Two-headed I. and Kodiak I.	many	R. MacIntosh
21 April 1974	Cape Chiniak, Kodiak I.	12	R. MacIntosh
14 May 1975	Cape Dearborn, west side of Chichagof I.	6	K. Schneider
6 April 1976	North Cape, Baranof I.	35+	T. Copeland
12 April 1976	East end McArthur Pass, Pye I.	1 blowing	K. Pitcher
13 April 1976	South end Granite Pass, Kenai Peninsula	1	P. Peterson
13 April 1976	Chiswell Island, Kenai Peninsula	2 surfacing close to shore	K. Pitcher
15 April 1976	Mouth Resurrection Bay, Kenai Peninsula	18 at surface with sea lions	D. Calkins
18 April 1976	Mouth of Big Bay, Shuyak I.	3	D. Calkins
18 April 1976	Off Long Island, Chiniak Bay, Kodiak I.	several	R. MacIntosh
20 April 1976	Seal Bay, Afognak I.	3	D. Calkins
21 April 1976	Latax Rocks, N. of Shuyak	6 at surface with sea lions	D. Calkins
24 April 1976	Cape Greville, Kodiak I.	2	R. MacIntosh
25 April 1976	Tolstoi Pt., Afognak I.	1	R. Randall
10 June 1976	Dangerous Cape, Kodiak I.	2	D. Calkins
25 June 1976	Shelikof Bay, Sitka area	15	A. Petrabovs Jr.
Late July 1976	Spruce Cape, Kodiak I.	1	R. MacIntosh
14 Dec. 1976	Seal Bay, Afognak I.	3	R. Randall
17 March 1977	Kuinkta Bay, North of Sand Point	1	D. Calkins
18 March 1977	Unimak Bight	1	K. Schneider
25 April 1977	East of MacArthur Pass, Pye I.	3 at surface	T. Tolva
26 April 1977	East of MacArthur Pass, Pye I.	5 at surface	T. Tolva
27 April 1977	South of Nuka Island, Kenai Peninsula	4	T. Tolva
27 April 1977	Mouth Ugak Bay, Kodiak I.	1	K. Pitcher
29 April 1977	Gull Pt., Kodiak I.	4	D. Calkins
30 April 1977	Cape Barnabas, Kodiak I.	2	D. Calkins
1 Dec. 1977	Narrow Cape, Kodiak I.	95 (19 whales/hour)	R. MacIntosh
19 Dec. 1977	70 mile flight Icy Bay to Ocean Cape, Yakutat area	40+	C. Smith
Late March thru April 1978	U.S. Coast Guard flights along coast between Cape St. Elias and Cape Cleave (Montague I.)	consistent numerous sightings	U.S. Coast Guard personnel

Table 1 (cont.).

Date	Place	Number	Observer
28 March 1978	30 mile flight Biorka to Sand Bay, Baranof I.	123	L. Johnson
12 April 1978	Ushagat I., Barren Is.	numerous groups	K. Schneider
15 April 1978	Narrow Cape, Kodiak I.	27 (7.7 whales/hour)	R. MacIntosh
12 April 1978	Sugarloaf I., Barren Is.	blows seen	L. Smith
13 April 1978	Latax Rocks and Marmot Str., Afognak I.	numerous groups	K. Schneider
13 April 1978	Sugarloaf I., Barren Is.	10	L. Smith
14 April 1978	Sugarloaf I., Barren Is.	1	D. Johnson
18 April 1978	Nagii Rock, Chirikoff I.	6	K. Schneider
18 April 1978	2 mile west of Semidi Is.	2	K. Schneider
18 April 1978	Sugarloaf I., Barren Is.	numerous blows seen	L. Smith
19 April 1978	Narrow Cape, Kodiak I.	18 (3 whales/hour)	R. MacIntosh
19 April 1978	Sugarloaf I., Barren Is.	20+ seen, numerous blows	L. Smith
20 April 1978	Sugarloaf I., Barren Is.	3	L. Smith
21 April 1978	Sugarloaf I., Barren Is.	1 seen, several blows	L. Smith
22 April 1978	Sugarloaf I., Barren Is.	9	D. Johnson
25 April 1978	Sugarloaf I., Barren Is.	1	D. Johnson
1 May 1978	Sugarloaf I., Barren Is.	17	L. Smith
2 May 1978	Sugarloaf I., Barren Is.	9	L. Smith
2 May 1978	Narrow Cape, Kodiak I.	5 (1.7 whales/hour)	R. MacIntosh
4 May 1978	Sugarloaf I., Barren Is.	numerous blows seen	L. Smith
4 May 1978	Tugidak Island	2	D. McAllister
14 May 1978	Tugidak Island	4	D. McAllister
3 June 1978	Tugidak Island	5	D. McAllister
9 June 1978	Tugidak Island	5	D. McAllister
30 June 1978	Southwest Anchorage, Chirikoff I.	2	K. Pitcher
29 July 1978	Black Pt. on Sikalidak Island off Kodiak	1	K. Schneider
26 August 1978	Southeast of Tugidak	2	D. McAllister
			K. Schneider

1/ Alaska Dept. of Fish and Game, 333 Raspberry, Anchorage, Alaska 99502

2/ Alaska Dept. of Fish and Game, Box 686, Kodiak, Alaska 99615

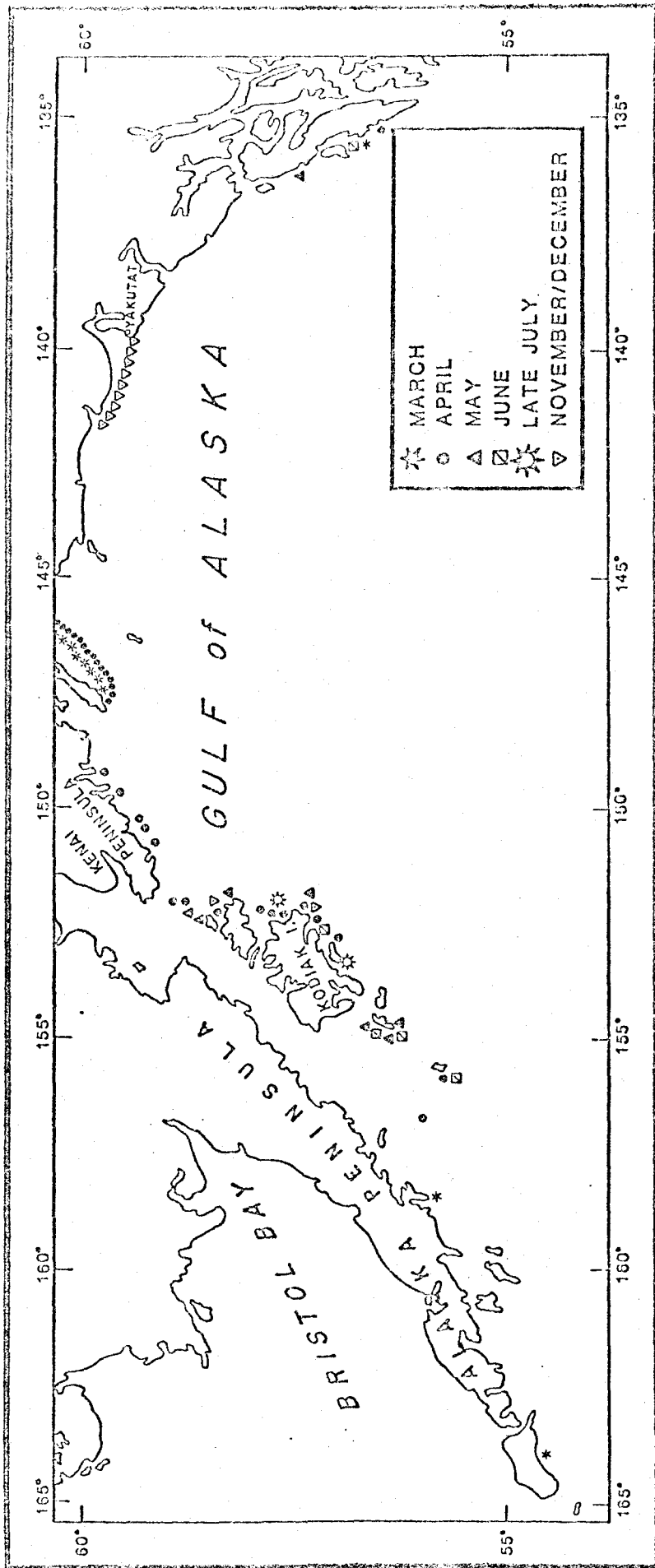
3/ Alaska Dept. of Fish and Game, Box 234, Homer, Alaska 99603

4/ Alaska Dept. of Fish and Game, Box 499, Sitka, Alaska 99835

5/ Alaska Dept. of Fish and Game, Box 37, King Salmon, Alaska 99613

6/ National Marine Fisheries Service, P.O. Box 1638, Kodiak, Alaska 99615

FIGURE 3. LOCATION OF SELECTED SIGHTINGS OF GRAY WHALES (TABLE 1) IN GULF OF ALASKA.



groups of two to five animals with gaps of several miles between the groups. By the second week of April, groups were not discernable because of the high numbers of whales present. Whales arriving in late March and early April generally passed by the Cape without stopping; whereas those arriving between 14 and 23 April remained in the vicinity of the Cape for one to five hours. After 23 April they again were observed to pass by the Cape without stopping. Also, their behavior appeared to be more feeding oriented early in the season, whereas it seemed more sexually oriented near the end of the migration (Fig. 4).

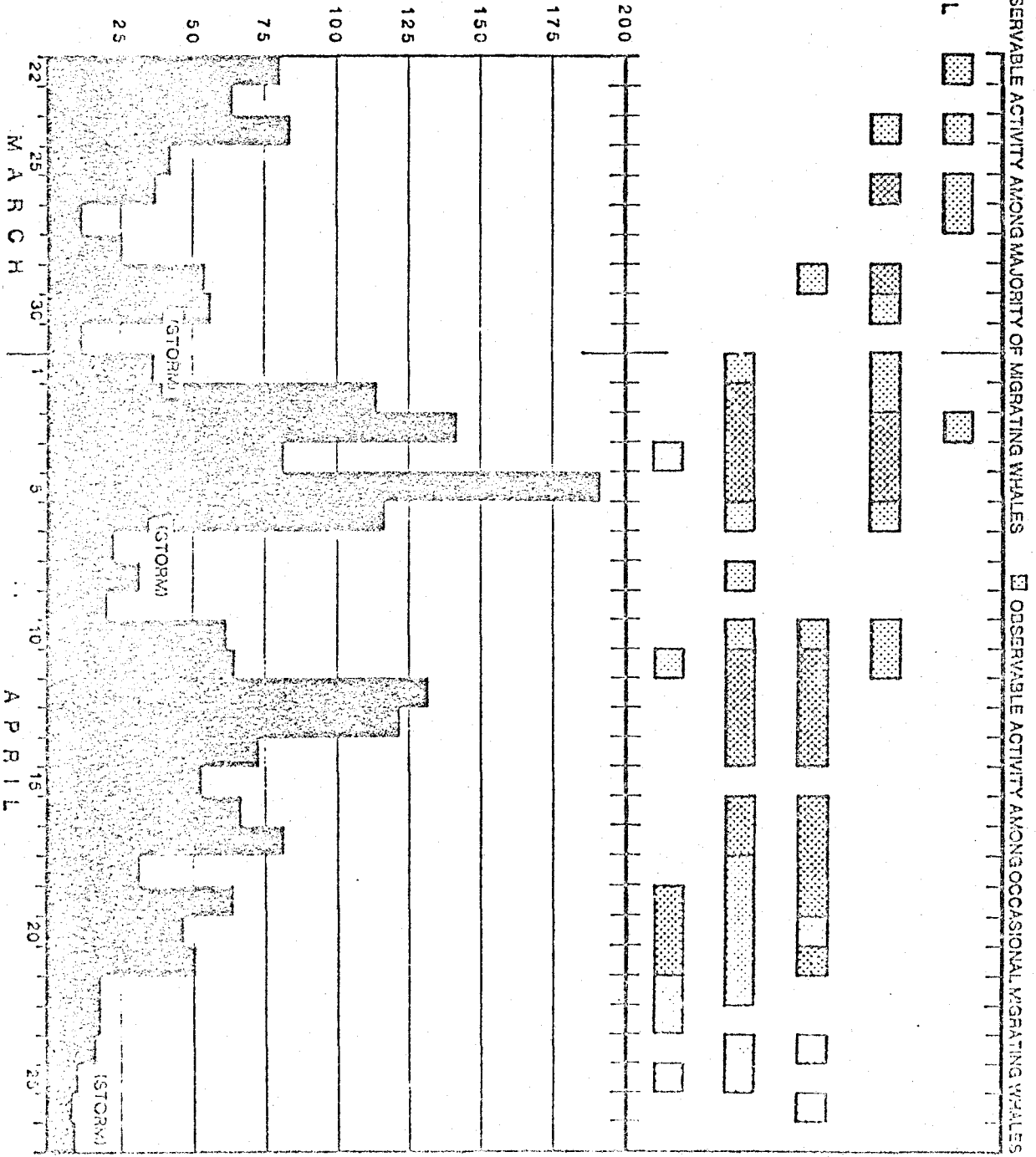
On 18 and 23 April 1978, pods of 20 to 30 killer whales (*Orcinus orca*) were observed also going northward past the Cape. Their passage within 2 km produced no visible effect among several migrating gray whales.

#### Feeding Behavior

We observed three kinds of behavior that appeared feeding oriented. We termed them "surface skimming," "surface gulping" and a "lateral position." In surface skimming, the whales swam rapidly along the surface of the water with their mouth open. The snout, baleen and top of the head were visible. After traveling in this manner for 20 to 75 m, they closed their mouth and submerged without blowing. The surface gulping behavior appeared as a series of cycles. Each cycle was five to 15 seconds long and began when a submerged animal surfaced with its jaws open. It completed the cycle when it dove forward and appeared to bite the surface of the water as it submerged. Usually during surface gulping the whale swam upright with the top of the head and thorax above water.

FIGURE 4. OBSERVED SEXUAL AND FEEDING BEHAVIOR RELATIVE TO NUMBERS OF MIGRATING GRAY WHALES  
(*Eschrichtia robustus*) AT CAPE ST. ELIAS, ALASKA, SPRING 1978.

NUMBER OF  
OBSERVED WHALES



Occasionally in the shallow water near the reef a whale rolled onto its side with its uppermost pectoral flipper and fluke lobe partly out of the water. Sometimes, the whale remained in one location for several seconds, but more often it swam laterally along the shallow bottom through the above cycle. F. H. Fay (pers. comm.) indicated that this lateral position was comparable to the behavior of feeding gray whales in the summer months near St. Lawrence Island, in the Bering Sea. This behavior is called boltering by whalers (Rice pers. comm.). Whales did not blow during either the surface skimming or surface gulping, sequence, though they usually rolled upright and blew after the lateral sequence. Periodically the feeding sequences were interrupted by a shallow dive followed by a typical blow. The surface gulping behavior was observed more often than surface skimming and occasionally a whale made a series of surface gulps and then skimmed. Often a whale skimmed through an area, made a short dive, then blew and skimmed in the opposite direction through the same area. As many as six whales were observed in the surface gulping sequence swimming close together allowing just enough room to maneuver. Frequently a large animal swam slightly ahead and appeared to guide the group. At other times during feeding activity, whales swam at right angles and gently bumped one another. Loosely aggregated groups of up to 13 whales alternated between the feeding behavior and swimming in circles gently bumping each other. The gulping and skimming activities generally took place northwest of the reef (Fig. 1) where the whales swam parallel to the reef in both directions within 30 to 100 m of the reef. Areas southwest of the reef and northwest of Pinnacle Rock were used less frequently.



## Sexual Behavior

Feeding behavior was executed in smooth fluid movements, whereas sexual behavior frequently was more violent. Most of the feeding behavior seemed to be near the surface but sexual behavior was not. The observed sexual behaviors appeared to only parts of a greater sequence, most of which took place while the whales were submerged.

On many occasions we observed behavior sequences of "penis display" and "supine positioning" which seemed to be sexually oriented. Penis display occurred when a male floated to the surface ventral side up and arched his back thrusting his abdominal and genital area above the surface. The penis did not always lay parallel with the longitudinal axis of the animal. It often lay off at an angle--even to 90°--and appeared to be distinctly curved along its length not unlike the curved baculum of the walrus (*Odobenus rosmarus*). Numerous subsequent observations indicate males may have some directional control of the erect penis. Generally, the male rolled laterally from the arched back position in the direction of the penis. A series of rapid blows and short shallow dives was a typical sequel of the penis display.

Whales attained the supine position in two ways. In some cases they rose slowly to the surface then rolled directly onto their back; in other instances, they rolled onto their back from a lateral position at the surface. While supine, their mandible, throat, ventral part of the thorax, abdomen and flukes were above the surface. The whales propelled

themselves forward by sculling with their flippers or by alternate backstrokes of the flippers. The flukes were seldom used when in this position. Sometimes when they rolled over to blow they dove, but usually they rolled 180° after blowing and resumed the supine position.

"Paired lateral rolling," "fluke display" and "spy hopping" also appeared to be parts of the sequences of sexual behavior. Paired lateral rolling began when the whale pair rolled, breached and violently thrashed their flukes. Eventually, the pair rolled laterally with ventral surfaces together, swam slowly at the surface with their flippers laying upon the opposite whale. Thus together they moved forward, rotating slowly as a unit on the long axis, flukes moving in unison, alternately blowing as they rolled. Lateral rolling usually terminated as both whales sounded.

In the fluke display, the posterior end of the body protruded vertically out of the water. One-third to one-half of the body was exposed for up to six seconds in this manner. Then the whale slowly sank, often rotating around the longitudinal axis. Sometimes they sank from this vertical position until only the flukes were exposed pausing there briefly. Then it either exerted a forceful thrust, a gentle stroke at the surface, or continued to sink slowly beneath the surface. Occasionally a pair of whales with ventral surfaces opposed rose in the fluke display together, then sank slowly beneath the surface. Some of these pairs moved their flukes in unison.

Spy hopping appeared to be similar to positions described by Gilmore (1969) and Norris et al. (1977), except that the whales at Cape St. Elias seldom surfaced higher than eye level. At times, two whales maintained the spy hopping position while one or both slowly rose and sank as they moved around each other. Both spy hopping and fluke display were observed from 30 m to 6.5 km offshore, in depths from two to 30 fathoms.

The surveillance increase was responsible for the higher number of recorded migrating whales in 1978. But, it did not account for the increase in the feeding and sexual behavior that we observed in 1978. Unless noted otherwise, the following observations were all in 1978.

On 17 April a pair of whales engaged in sexual activity was sighted northwest of Pinnacle Rock. Their actions included fluke display and paired lateral rolling with their ventral surfaces opposed. They swam toward the shore until they were in the intertidal zone in less than 4 m of water. There the penis of the male was seen seven or eight times in various stages of erection and insertion. About 35 to 40 m offshore the pair turned and swam parallel to the shore, laterally rolling as a unit and alternately blowing. After approximately five minutes the penis was again observed partially inserted. As they turned offshore, the male rolled onto his back in a penis display as previously described. Frequently, sexually active or copulating pairs were accompanied by one to four animals. These accompanying whales were at times directly under or along side the active pair as described by Hatler and Darling (1974) and Baldrige (1974). At one time on 17 April six sexually active pairs

were observed within one square km between the southwest reef and the Peninsula. A total of 24 whales were involved with these six pairs.

A lateral rolling sequence observed on 18 April appeared to involve only two animals. However, after approximately ten minutes, one of the whales surfaced ventral side up with the penises of two different males laying across its abdomen.

A whale in the supine position was observed from 0930 hours until 1200 hours on 21 April between the Peninsula and southwest Reef. Its genital area was exposed most of the time as it maintained this position. The area surrounding the genital opening was raised above the general contour of the body. Two shorter slits (mammary slits) along side and parallel to the genital opening were in this raised area. This apparently was a female. Whales in the supine position lay alone, as in this case, but more often they were accompanied. Then the supine positioning was interrupted by rapid rolling, extended sounding, heavy thrusting of the flippers and flukes at the surface and occasionally the paired lateral rolling. Other supine positioned whales were accompanied by spy hopping whales.

Sometimes spy hopping appeared to precede sexual sequences; on 17 April an exaggerated spy hopping behavior terminated in an apparent sexual sequence. For 20 minutes, two whales repeatedly rose and sank in the spy hopping mode. Suddenly, with their ventral surfaces opposed, they rose vertically out of the water beyond the level of their flippers and fell backward, away from each other.

On 14 April a whale thrust the rear third of its body vertically above the water as it dove forward. A second whale with larger flukes surfaced ventral side up, immediately behind the small whale and made a backward rolling dive from the surface. This resulted in the two whales coming together ventrally, whereupon they both slid slowly beneath the surface. Fluke displays were observed near Southeast Rocks in 1977.

During the third week of April when the sexual activity was greatest, we noticed that the whales did not always blow in a "normal" sequence. The normal progression of a gray whale blow was 1) the prow-like area ahead of the blowhole appeared first, then the blowhole, 2) exhale-inhale, 3) head disappeared beneath the surface, 4) dorsal humps broke the surface, and 5) the animal dove forward, with or without the flukes showing. However, during sexual activity, the whale occasionally appeared to float to the surface with the body arched. The dorsal humps were first to appear followed by the head and then after blowing, the body slid backward beneath the water. Sometimes, this slide continued until the head and snout came up, then all sank beneath the surface. On other occasions, after the dorsal humps broke the surface, the whale sounded without blowing.

The number of whales sighted per day began to decrease by mid April, but the groups and recognizable individuals that did arrive remained in the vicinity for extended periods. Several individuals were seen for four hours on 16 and 17 April. By 22 April a decreasing level of behavioral activities accompanied the decrease of total daily sightings (Fig. 4). These activities were sporadic after 23 April.

## DISCUSSION

The numerous observations from Cape St. Elias and sightings reported from other localities along the Gulf of Alaska indicate that the northward migration of gray whales closely follows the coast in this region. They pass Cape St. Elias, turn northwest and apparently parallel the coast toward the Copper River. Numerous sightings indicate the whales then move southwest along the east coast of Hinchinbrook Island and Montague Island. Apparently, they cross Blying Sound following the coast of the Kenai Peninsula to Kennedy Entrance. Observations beyond the Barren Islands are scattered. Sightings indicate they turn southwest in the Barren Islands and pass close to the east shore of Afognak Island and then down the east coast of Kodiak Island. Scattered sightings at Tugidak, Chirikof and the Semidi Islands suggest that some of the migrants leave the coast south of Kodiak and cross toward the Alaska Peninsula well offshore before going through Unimak Pass, into the Bering Sea.

Pike (1962) calculated that the gray whales migrate northward at approximately 50 nautical miles per day (92.5 km/day). Cape St. Elias lies approximately 1200 nautical miles north of Cape Flattery along the 50 fathom curve (Pike 1962). Assuming that the whales travel at a steady rate (Rice and Wolman 1971), they would require approximately 24 days to cover that distance. Observations published by Pike (1962) Hatler and Darling (1974) and Hart (1977) indicate the spring migration peaks off Vancouver Island from late March to mid April. At Cape St. Elias the migration peak was the second and third week of April in 1977 and 1978. This does not indicate the necessary 24 days of migration.

There are at least three possible explanations: 1) Pike (1962) feels the date of the migration peaks may differ from year to year. Our data from Cape St. Elias (Fig. 2) suggests a difference of 10 to 14 days between 1977 and 1978. 2) The northward rate of spring migration is not one half the southward rate of the fall migration (Pike 1962), but may be about equal to the southward fall migration rate. 3) The gray whale migration begins earlier now than it has in the past. The first and second explanations seem most probable to account for the apparent disagreement of our data with Pike's calculations.

In general, it seems that gray whales feed infrequently during their northward migration, stopping to do so only in a few localities along the way. (Wilke and Fiscus 1961; Pike 1962; Rice and Wolman 1971; Hatler and Darling 1974; Hart 1977). Apparently, Cape St. Elias is another area where some of the whales selectively feed for a few hours. The surface skimming behavior that we observed there has not been previously reported for gray whales. However, a comparable procedure was described for a feeding northern right whale (*Eubalaena glacialis*) by Watkins and Schevill (1976), who observed that it swam "slowly at the surface with its bonnet held well out of the water, ... (apparently) actually skimming the surface with much of the baleen above water, the mouth open wide...." Figure 1 in Watkins and Schevill (1976) closely resembles the appearance of gray whales in surface skimming behavior at Cape St. Elias. In describing the right whale's technique, Watkins and Schevill (1976) also observed that whales were "...not randomly prospecting, but...following discrete slicks or patches of concentrated plankton." This also corresponds to our observations at Cape St. Elias where the

gray whale restricted their surface skimming and surface gulping activities to a small area northwest of the reef and Pinnacle Rock (Fig. 1). The surface gulping behavior of the whales at Cape St. Elias closely resembled feeding activity reported by Wellington and Anderson (1978) of a gray whale in Southern California, except that as we saw it, it was done moving forward in open water, rather than stationary in a kelp bed. The lateral position engaged in by gray whales over the reef at Cape St. Elias was the same kind of feeding behavior engaged in by gray whales in the summer feeding grounds in the Bering Sea, according to F. H. Fay (pers. comm.), who has observed it in both localities.

The sexual behavior of gray whales observed at Cape St. Elias resembled similar activity reported from other locations along the northward migration route. Houck (1962) observed paired lateral rolling and penis display in northern California in mid March. Baldrige (1974) reported paired lateral rolling, penis display and several copulations off central California during late March and early April. Rice and Wolman (1971), citing C. E. Munson (pers. comm.) reported apparent courtship and penis display by gray whales migrating northward along the coast of Washington in April, and Hatler and Darling (1974) reported possible mating behavior off Vancouver Island on 26 April. On April 5, 6 and 14 sexual behavior was observed among gray whale pairs off Pachena Point, British Columbia by Hart (1977). The significance of these behaviors, which took place well after the late autumn-early winter breeding season (Rice and Wolman, 1971), is not clear at this time. We suggest that it may be merely sexual experimentation by subadults and other immature animals. This is indicated to us by its timing at Cape



St. Elias. The sexual behaviors were most evident there during passage of the third pulse of migrants, which, judging from Rice and Wolman's (1971:Fig. 2) data, is made up mainly of immature whales of both sexes.

#### ACKNOWLEDGEMENTS

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