

Distribution and Abundance of Sea Otters,  
Sea Lions and Harbor Seals in Prince  
William Sound, Summer 1973

By Kenneth W. Pitcher and  
John S. Vania

Survey Team: Don Calkins, Ed Klinkhart,  
Ken Pitcher, Karl Schneider, Ron Somerville,  
and John Vania

A Preliminary Report  
Alaska Department of Fish and Game  
Game Division  
Anchorage, Alaska  
21 December 1973

# ABSTRACT

A shoreline survey of the Prince William Sound area was conducted to determine summer distribution and abundance of marine mammals. Emphasis was placed on sea otters (Enhydra lutris), Steller sea lions (Eumetopias jubata) and harbor-seals (Phoca vitulina). Observations of other marine mammals were recorded.

Sea otter observations totaled 2,015 animals and the population was estimated at about 5,000. Current distribution patterns were established. Recently populated areas include Knight Island, Naked Island and the Knowles Head - Port Gravina area.

The total count of sea lions was 5,134 with nearly all animals found on five rookeries and summer hauling grounds; Cape St. Elias, Seal Rocks, Lewis I., The Needle and Pt. Elrington. Total numbers appeared to be about the same as in 1956-57 although changes in two rookeries were noted. An estimate of total numbers of sea lions in the area is 6,500 to 7,500.

The total number of harbor seals seen was 5,640. The population far exceeds this figure but survey techniques are not adequate to make an estimate. Some haul out areas were located and an idea of summer distribution was obtained.

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## INTRODUCTION

Prince William Sound has received considerable attention in recent years due to increased concern for the coastal environment. This attention was specifically focused on the area when the Valdez terminus was announced for the proposed trans-Alaska pipeline. Location of oil storage and loading facilities in Valdez and heavy tanker traffic through the Sound will introduce the potential for contamination of marine habitats. Degradation of the marine environment whether resulting from chronic small scale contamination or massive spills will affect marine mammal populations. Baseline data on abundance are needed in order to detect and evaluate any changes which might occur. Seasonal distribution information will be required to base sound recommendations on development in the area. Contingency plans must be based on knowledge of areas important to marine mammal populations.

A review of available information indicated a definite need to increase our knowledge of marine mammal populations in the area. In order to provide information which will be needed by governmental and industrial organizations research efforts must be accelerated.

## METHODS

As the first step in providing needed information, a shoreline survey of the Prince William Sound area from Cape Puget to Cape St. Elias was conducted to collect information on summer distribution and abundance of sea otters (Enhydra lutris), Steller sea lions (Eumetopias jubata) and harbor seals (Phoca vitulina) (Fig. 1). Incidental observations were recorded of minke whales (Balaenoptera acutorostrata), humpback whales (Megaptera novaeangliae), Dall porpoises (Phocoenoides dalli), harbor porpoises (Phocoena phocoena), killer whales (Orcinus orca) and a northern fur seal (Callorhinus ursinus).

Department of Fish and Game biologists participating in the survey as observers and recorders were Don Calkins, Ed Klinkhart, Ken Pitcher, Karl Schneider, Ron Somerville and John Vania.

Most of the survey was flown with two, five place jet turbine helicopters; a Jet Ranger (Bell 206A) and FH1100. Survey dates for the helicopter portion were 24,26-29 June 1973. A Cessna 180 and Piper Super Cub (PA-18) were used to survey the Copper River Delta, Controller Bay and Bering River on 25,26 July 1973. A Boston whaler 17' skiff was used to survey the Esther I. area on 7 June 1973.

Total helicopter time required for the survey was 61 hours of which 40 hours were actual survey time. The remaining 21 hours included ferry time, dead head time, travel to and from fuel caches and flights to check weather conditions. The fixed wing survey of the Copper River Delta and Bering River area took 2.5 hours of flight time. Transportation of fuel and gear in support of the helicopter survey required 14.3 hours of fixed wing charter.



The helicopter survey was flown at an altitude of 200 - 400 feet about 200 yards offshore. The contour of the shoreline was followed. Offshore rocks and islets were circled. Airspeed was usually about 80 knots but when concentrations of animals were found, speed was reduced. Two observers and one recorder-observer were in each helicopter. One observer was seated in the front and the helicopter was always flown so he was on the shore side. The recorder-observer was seated directly behind the front seat observer and helped with observations when not recording. The third observer was in the back, on the offshore side of the aircraft. The pilot also assisted in making observations. All observations were called out to the recorder who was equipped with large scale (1:80,000) nautical charts and notebooks in which all data were recorded in a standardized method. In some instances, visual counts were supplemented with photographs to provide a more accurate estimate of numbers. A 35mm camera with 50 or 105mm lens and a medium speed, black and white film was used. Such photographs were useful when concentrations of animals were found such as sea lion rookeries, large pods of sea otters and large seal hauling areas.

Fixed-wing surveys were flown with a single observer-recorder seated directly behind the pilot in the PA-18 or alongside the pilot in the Cessna 180. Airspeed was 70-100 knots and the altitude was 300-700 feet. Data were recorded in a similar fashion to the helicopter survey. Photographs were used to supplement visual counts.

#### SURVEY CONDITIONS

Weather conditions affect the efficiency of marine mammal surveys and any factors which reduce visibility will be detrimental. Kenyon (1969) used the following criteria to subjectively describe sea otter survey conditions.

Excellent - no wind, high overcast (water glassy) and no glare.

Good - light wind (to 6 or 8 knots) and overcast, or no wind (glassy water) but sun glare present.

Fair - light wind to 10 knots and surface glare, or wind 8 to 15 knots and sky overcast.

Poor - winds over 10 knots and glare on water, or wind over 15 knots regardless of sky cover.

Following is a summary of survey weather conditions taken from field notes.

Kayak I.	26 July 1973 - <u>good</u> conditions, some surface glare offshore.
Bering River, Controller Bay	26 July 1973 - <u>good</u> conditions, calm, overcast, some fog.
Copper River Delta	25 July 1973 - <u>good</u> conditions, calm, overcast, some fog.
Hawkins I.	24 June 1973 - <u>fair to poor</u> , surface calm but rain on bubble made forward visibility poor.

Hinchinbrook I.	24 June 1973 - <u>fair to excellent</u> , surface conditions calm, rain on north side reduced visibility from front, excellent on south side.
Montague I., north end	24 June 1973 - <u>fair to poor</u> , surface conditions calm, rain in Zaikof Bay.
Green I.	24 June 1973 - <u>excellent</u> , calm and overcast
Montague I., south end	26 June 1973 - <u>excellent to good</u> , surface conditions calm, some glare at Cape Cleare and offshore.
Cordova to Pt. Freemantle	26 June 1973 - <u>excellent to good</u> , surface conditions calm, rain squalls at head several bays.
Columbia Bay, Glacier I., Unakwik	28 June 1973 - <u>good</u> , light west wind, some glare.
Naked, Storey I.	28 June 1973 - <u>good</u> , 5 knot west wind, some glare.
Seal, Smith I.	27 June 1973 - <u>excellent</u> , calm surface, broken overcast, no glare.
Knight I., north end, Eleanor, Ingot, Disc I.	27 June 1973 - <u>good</u> , calm but glare in some areas.
Knight I., south end	27 June 1973 - <u>good to poor</u> , some light winds, glare very bad at times on offshore side.
Dutch Group, Axel Lind, Perry I.	29 June 1973 - <u>good</u> , light wind, overcast.
Ports Wells, College and Harriman Fiords	29 June 1973 - <u>excellent</u> , calm surface, overcast.
Crafton I. to Whittier	29 June 1973 - <u>excellent to good</u> , calm, overcast, some shadows near shore.
Latouche, Elrington I.	27 June - <u>fair to poor</u> , some chop on water, glare.
Evans, Bainbridge I.	27 June 1973 - <u>fair to poor</u> , some bad glare when heading south.
Port Bainbridge	28 June 1973 - <u>poor</u> , choppy in middle of bays, bad glare.
Whale Bay to Crafton I.	28 June 1973 - <u>good</u> , glare, sky clear.

## SEA OTTER

Historical records indicate that sea otters were fairly abundant in Prince William Sound prior to 1742, the beginning of Russian exploitation. However, by 1800, aboriginal populations of sea otters in the Prince William Sound area had been reduced to very low levels. Continued Russian hunting through 1867 and then intensive American exploitation until 1911 prevented any recovery (Lensink, 1962).

Remnant groups of animals apparently survived as shown by Kenyon's (1969) report of two illegally taken sea otter skins seized by the government at Seward in 1924. The repopulation of Prince William Sound and the Kayak I. area undoubtedly resulted from the buildup and dispersal of these remnant groups. The pattern of population recovery is fairly evident when Lensink's (1962) summary of pre 1961 observations is examined along with Department records and results of this survey (table 1).

Sizable groups of otters were reported during the late 1940's and early 1950's from Montague I., Hinchinbrook I., Latouche-Elrington I. and the Kayak I. area. Rare sightings of one or two animals were made in other areas (Lensink, 1962). In the early 1960's distribution remained about the same but numbers appeared to have increased. Now several additional areas are well populated including Knight I., Naked I. and the Knowles Head - Port Gravina area. A group of 34 sea otters was recently found in Harriman Fiord, far from any well populated area. Additional small groups and singles are occasionally seen almost anywhere in Prince William Sound. Sightings from the formerly barren northwestern portion of the Sound are increasingly frequent.

During the same time period, sea otter numbers around Kayak I. appear to have dropped. Aerial surveys in 1959 and 1960 produced 138 and 122 animals. Five Department surveys between 1964 and 1973 failed to find more than 39 sea otters although a pilot reported seeing 85-100 otters in 1965. Reasons for the apparent decline are not known but several possibilities have been advanced. Changes in habitat resulting from the 1964 earthquake might have reduced carrying capacity although some areas in Prince William Sound appeared to experience more severe disturbance without corresponding reductions in numbers. Reports of otters down the coast toward Yakutat have caused speculation of emigration.

Helicopter surveys for sea otter are useful in determining and monitoring changes in distribution. They are of limited value in determining magnitude and changes in population size. Survey results vary as numerous factors influence the number of animals seen. Distribution of sea otters will affect the number seen. When animals are scattered offshore, many are missed during a shoreline survey. Higher counts will be obtained when otters are found in large pods close to shore as they are less likely to be missed. Some otters are diving for food and will be missed. Kenyon and Spencer (1960) assumed that nearly 25% of the otters in the flight path will be submerged and missed during a survey. Weather conditions, time of day, observer experience and ability, and pilot ability all affect survey results.



Table 1. Summary of sea otter surveys and sightings,  
Prince William Sound - Kayak I.

Area	Pre-1959 <sup>a</sup>	1959 <sup>b</sup>	1960 <sup>c</sup>	1964 <sup>d</sup>	1970 <sup>e</sup>	1973 <sup>f</sup>
Kayak I.	N.S.	163	122	39	5	7
Hawkins I.	1 (1951)	N.S.	N.S.	N.S.	1	10
Hinch. Egg I.	150 (1951)	58	48	167	101	367
Montague I.	78 (1957)	349	100	42	259	514
Green I. area	N.S.	42	101	116	103	135
Galena Bay to Fish Bay	N.S.	N.S.	N.S.	N.S.	1	6
Fish Bay to Cordova	N.S.	0	N.S.	N.S.	104	200
Esther Pass. to Valdez Arm	N.S.	0	N.S.	N.S.	N.S.	18
Naked, Storey, Peak I.	1 (1959)	N.S.	0	0	N.S.	159
Knight, Eleanor I.	2 (1956)	N.S.	1	3	145	208
Port Wells, College, Harr. Fiords, Esther I.	N.S.	N.S.	N.S.	N.S.	N.S.	35
Nellie Juan to Passage Canal	N.S.	0	N.S.	N.S.	1	28
P. Bainbridge, Latouche area	64 (1949)	96	149	41	133	293

Other Sightings of Interest

1. Whittier	6	winter 1969-70
2. Perry I.	5	1968
3. Falls Bay	4	1968
4. Dangerous Pass	5	1968
5. Kayak I.	35	1968
	85-100	1965

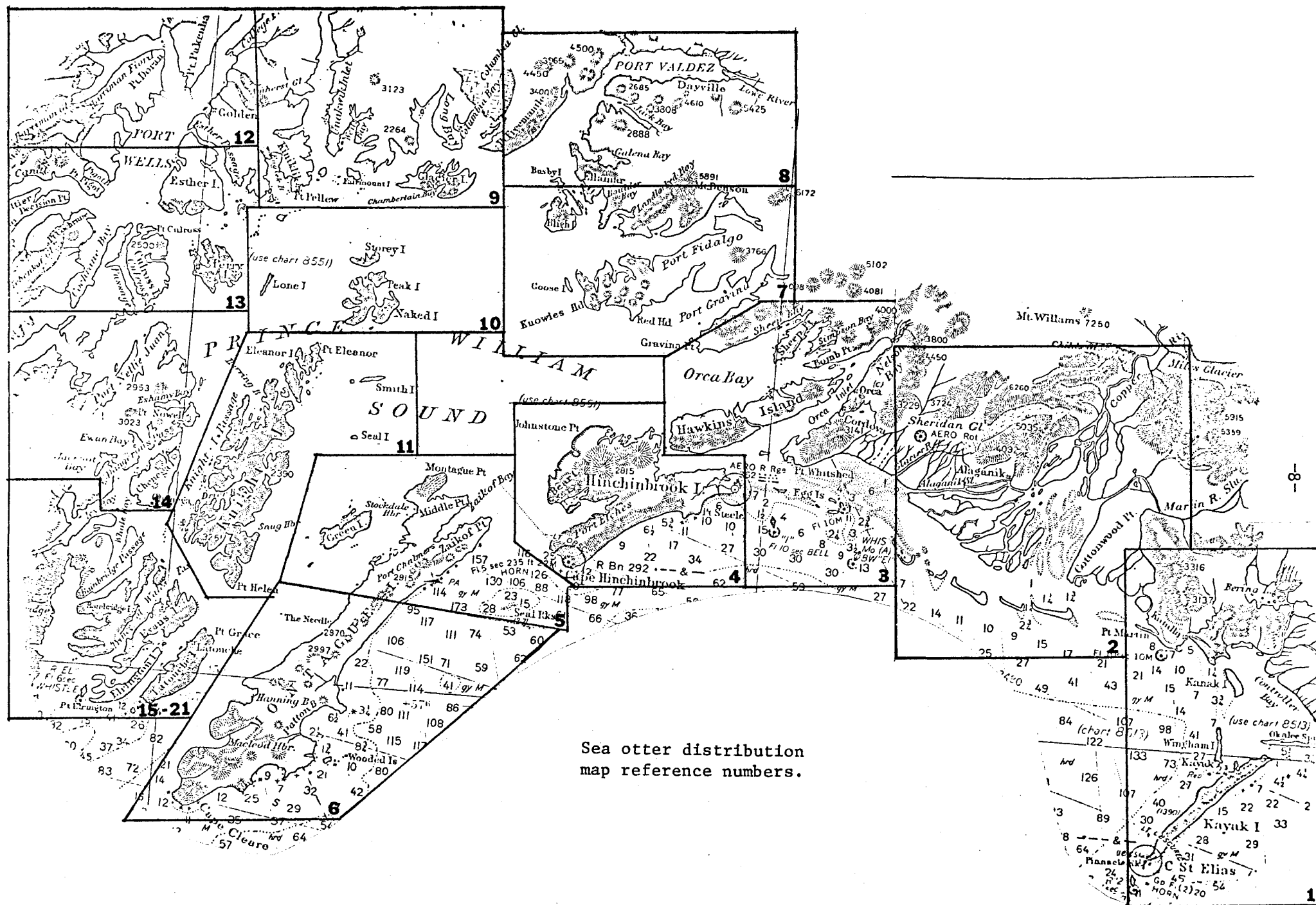
- a. Lensink (1962) - summary of miscellaneous observation.  
b. Lensink (1962) - fixed wing aerial survey.  
c. Lensink (1962) - fixed wing aerial survey.  
d. ADF&G - fixed wing aerial survey.  
e. ADF&G - fixed wing aerial survey.  
f. ADF&G - Helicopter survey.

Lensink (1962) estimated the Prince William Sound - Kayak I. populations at 1,000-1,500 based on actual observations of 702 otters during a fixed wing survey. Considering recent information on the accuracy of various types of sea otter surveys (Schneider, 1971), his estimate was probably conservative, possibly by 100%. The Alaska Department of Fish & Game (1973) estimates the population at 5,000. This figure seems reasonable in light of the 2,015 otters counted on this survey (map nos. 1 - 21). Comparative shore - helicopter counts on Amchitka Island showed that two to four times as many animals could be counted from the shore and even then some are missed (Schneider, 1971).

In the Aleutian Islands, sea otters form sexual segregations which have been studied by several observers; Lensink (1962), Kenyon (1969), and Schneider (1972,1973). These workers found discrete "female areas" composed of females, pups and some mature males and "male areas" in which numerous subadult males and some older males are found. Number of males in the female areas varies directly with the number of estrous females. In the Aleutians, male areas are usually found where shallow water extends farther offshore than normal, often near an exposed point of land or a pass between islands. Female areas are often points with water sheltered by rocks and islets (Schneider, 1971).

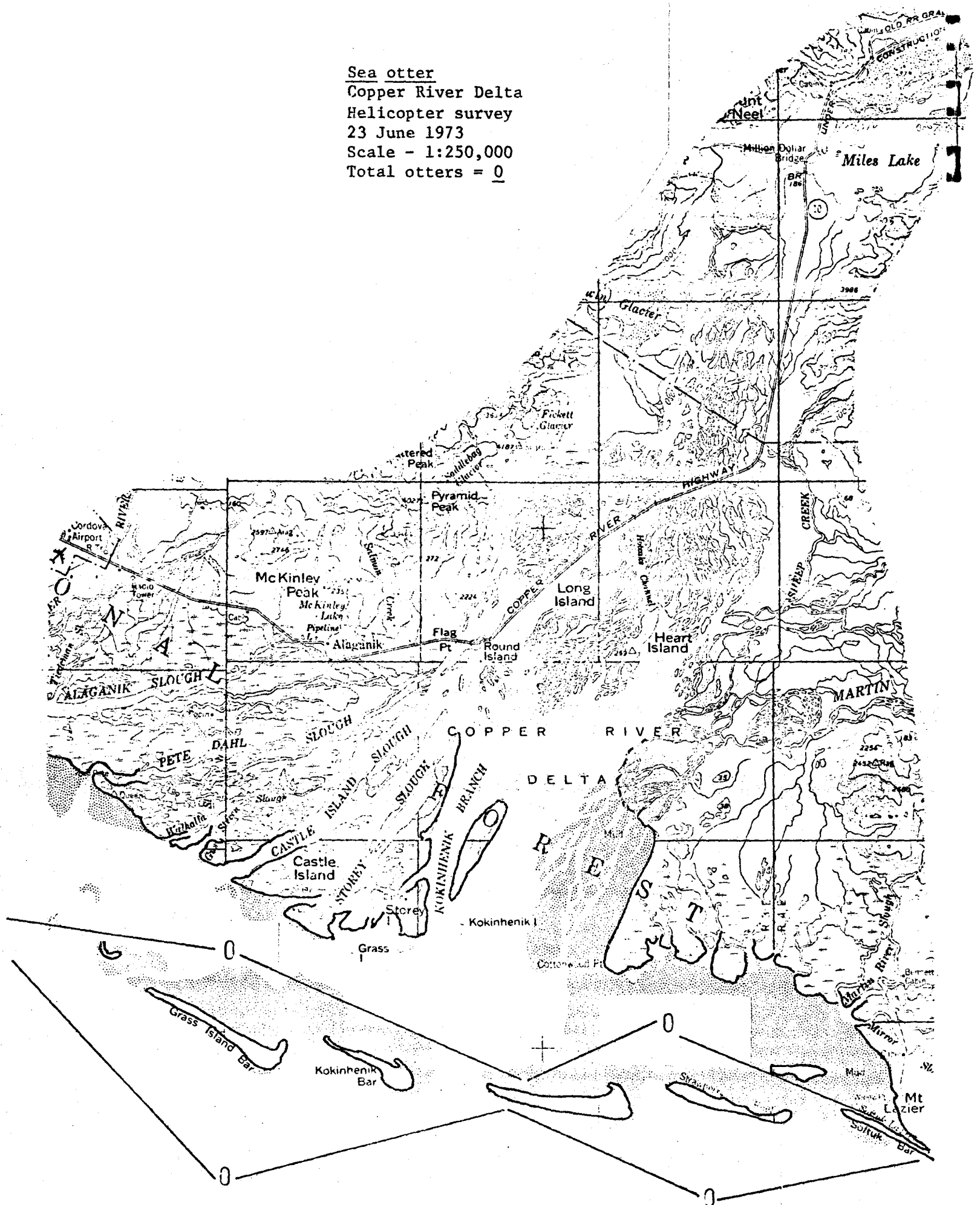
If sexual segregation exists in Prince William Sound, it doesn't appear to take the same form as in the Aleutians. Some areas seem to have characteristics of female areas but no discrete male areas have been found (Schneider, 1973). Habitat is considerably different from the Aleutians and sexual segregation could be expressed in a different way.

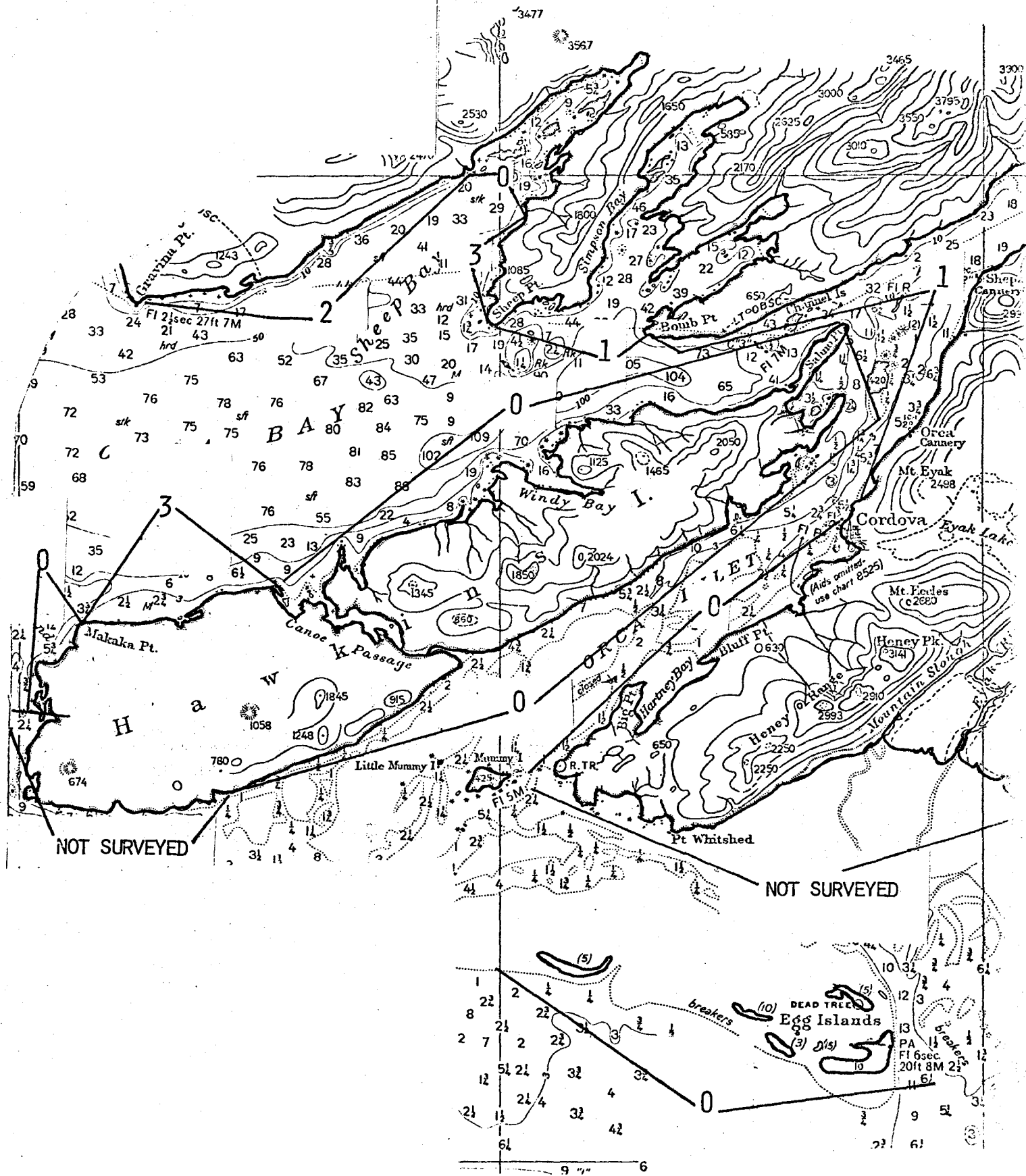
Accurate knowledge of segregation and identification of specific areas would be important in event of localized kills of sea otters. It would be impossible to adequately evaluate effect on the population without knowing which segments were involved. The desired information could be obtained with shore and skiff counts in certain areas and selective collecting.



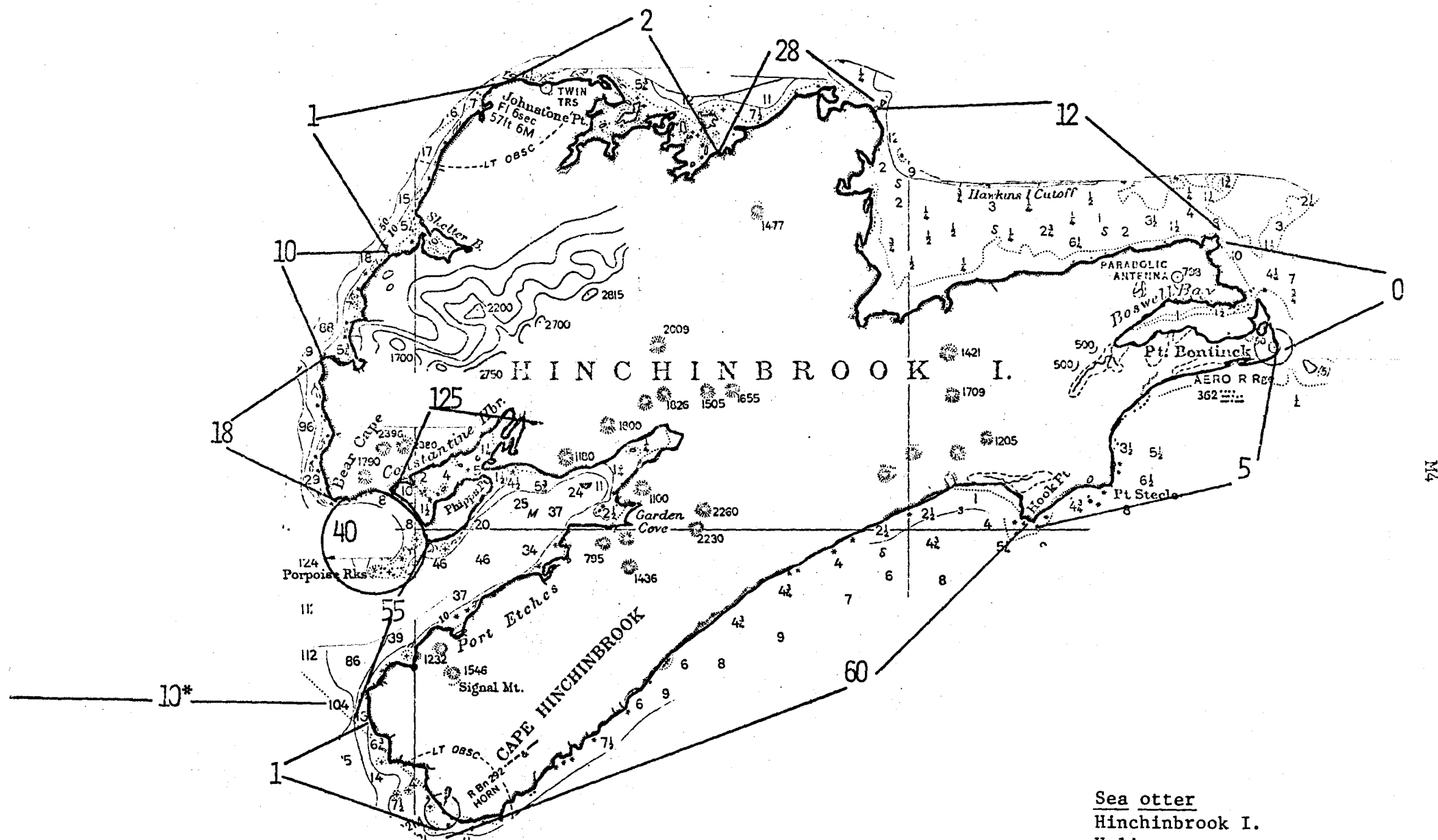


Sea otter  
Copper River Delta  
Helicopter survey  
23 June 1973  
Scale - 1:250,000  
Total otters = 0

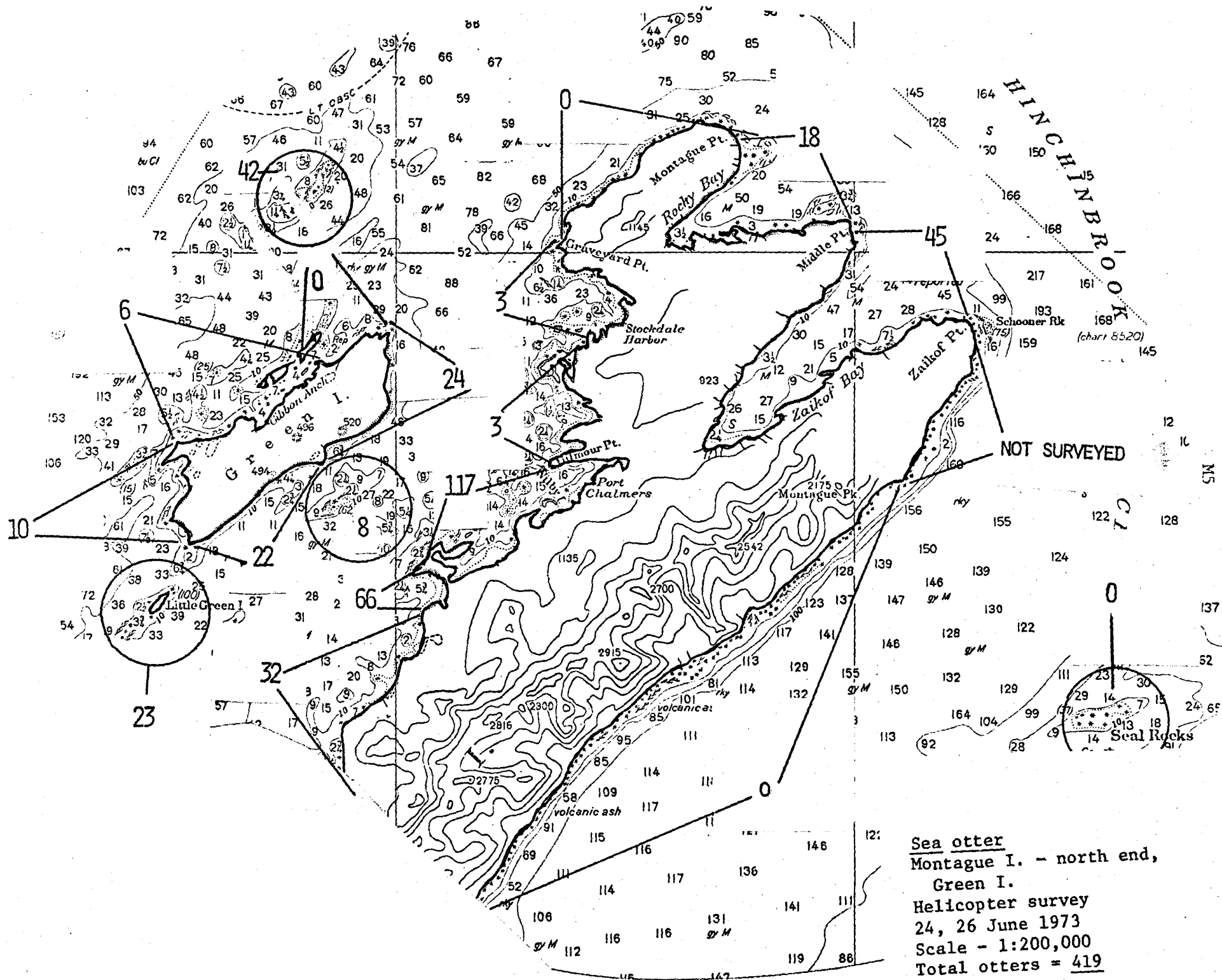




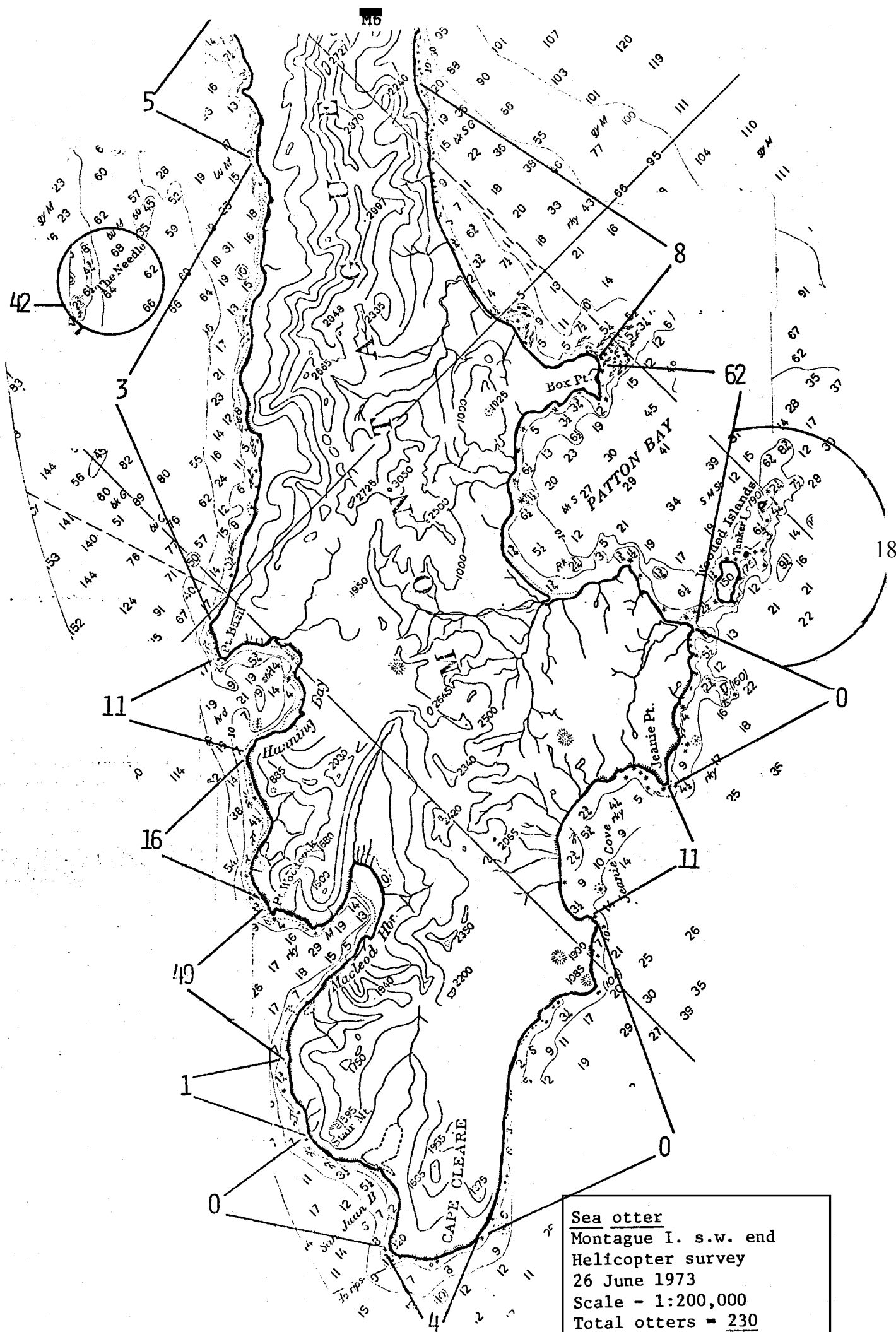
Sea otter  
 Hawkins I., Orca Bay  
 Helicopter survey  
 24, 26 June 1973  
 Scale - 1:200,000  
 Total otters = 10



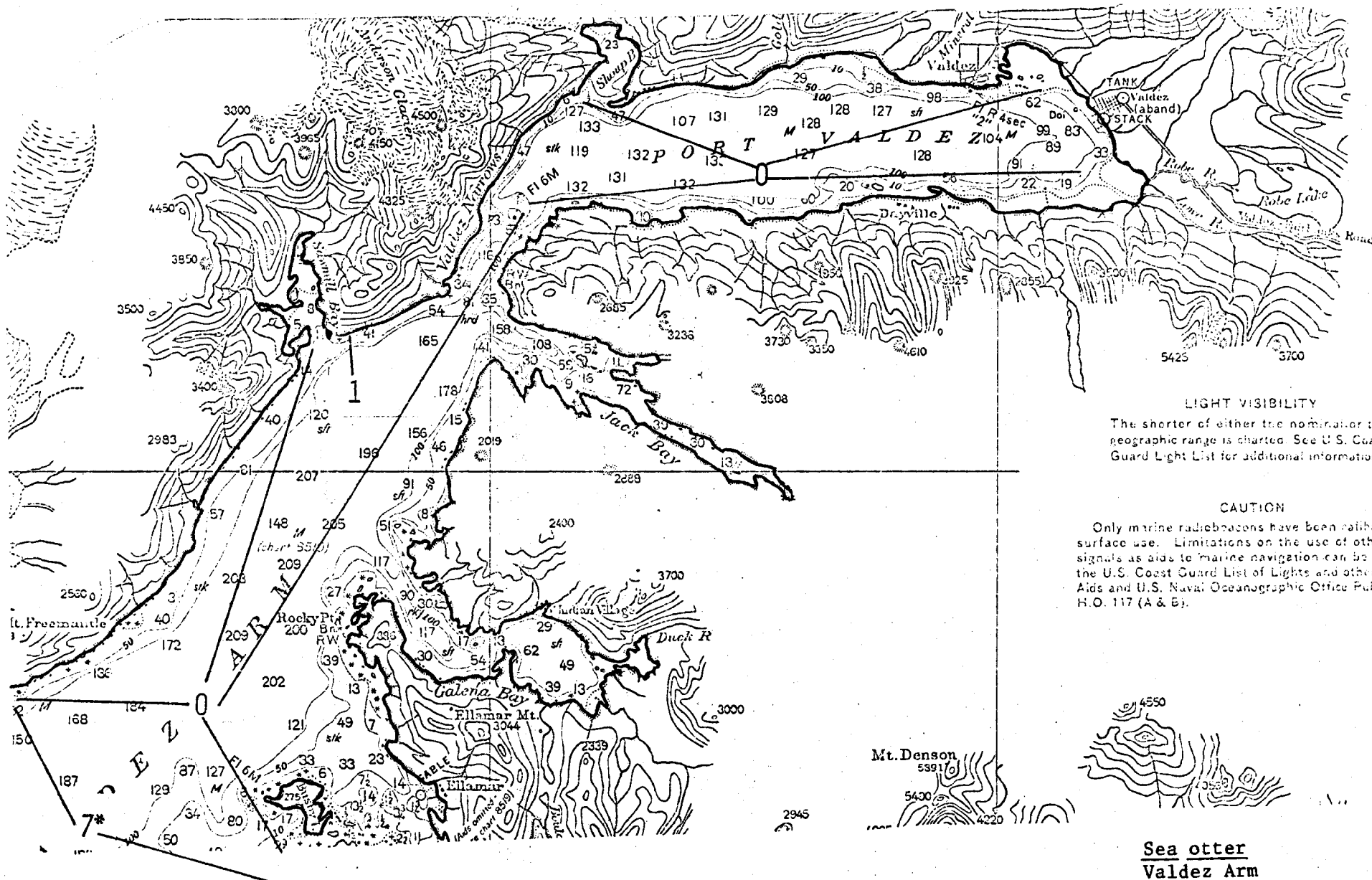
Sea otter  
 Hinchinbrook I.  
 Helicopter survey  
 24 June 1973  
 Scale - 1:200,000  
 Total otters = 367  
 \*Offshore flight line











#### LIGHT VISIBILITY

The shorter of either the nominal or the geographic range is charted. See U.S. Coast Guard Light List for additional information.

#### CAUTION

Only marine radiobeacons have been calibrated for surface use. Limitations on the use of other radio signals as aids to marine navigation can be found in the U.S. Coast Guard List of Lights and other Marine Aids and U.S. Naval Oceanographic Office Publication, H.O. 117 (A & B).

Sea otter  
Valdez Arm

Helicopter survey

26 June 1973

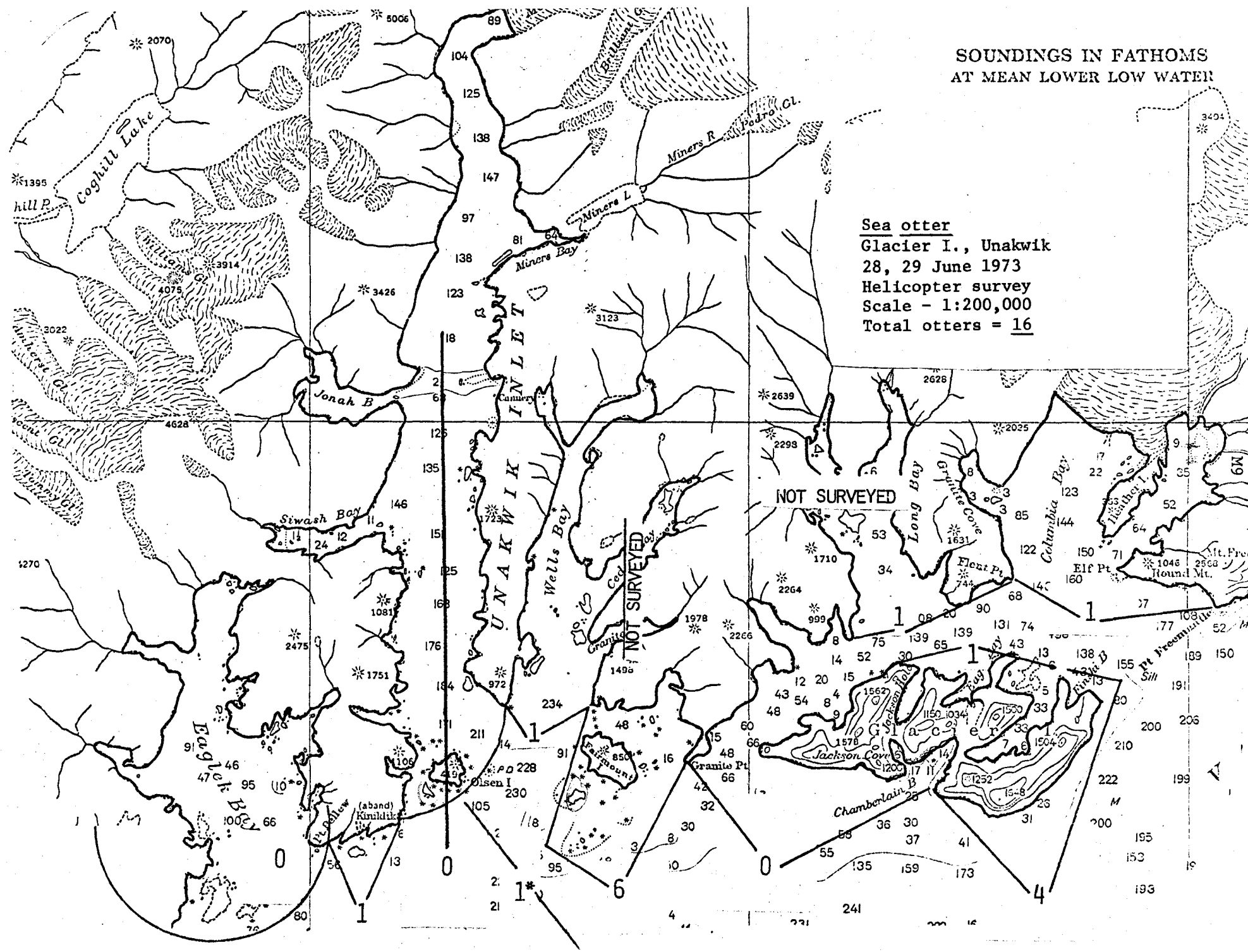
Scale - 1:200,000

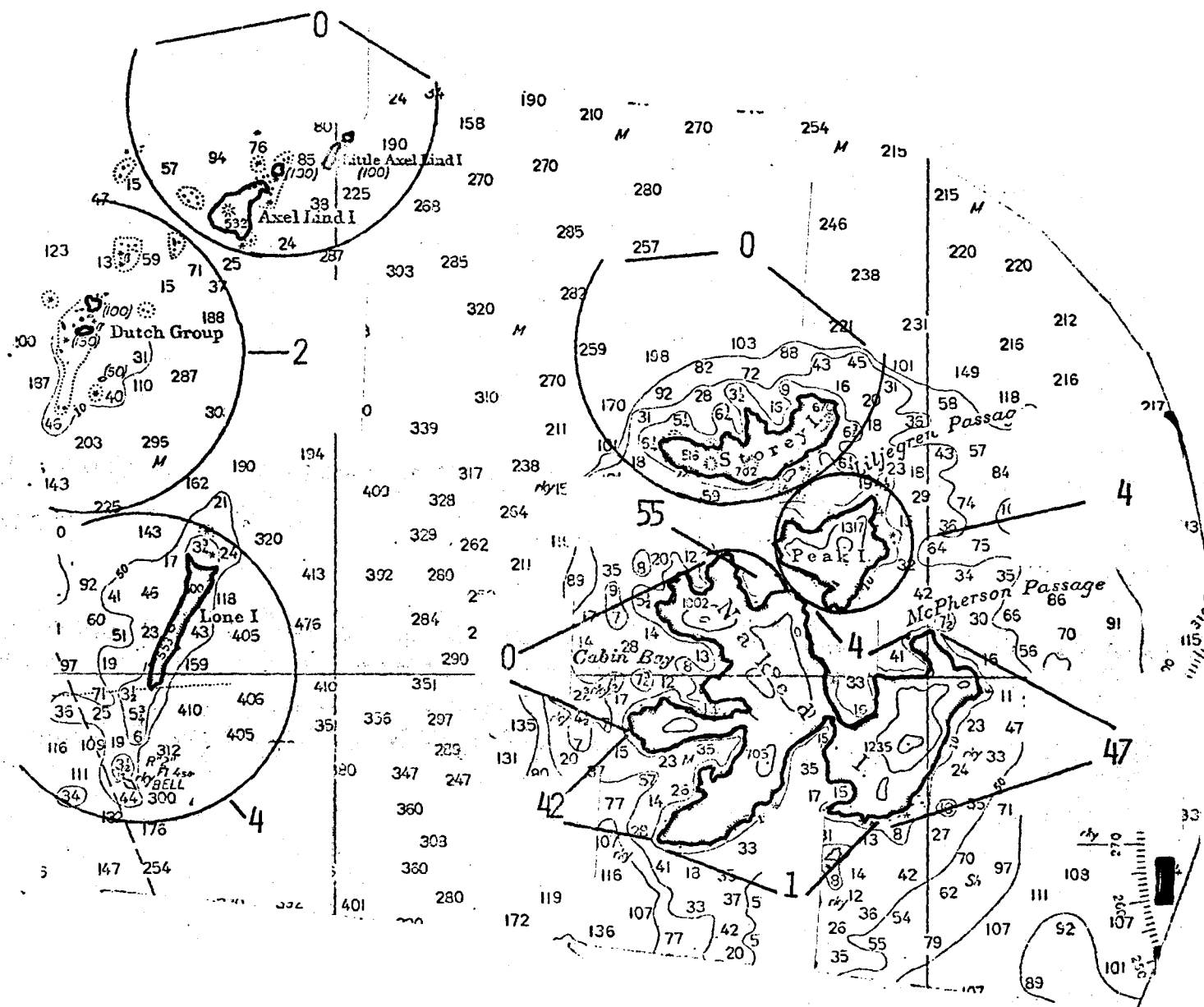
T ot =

\*Offshore flight line

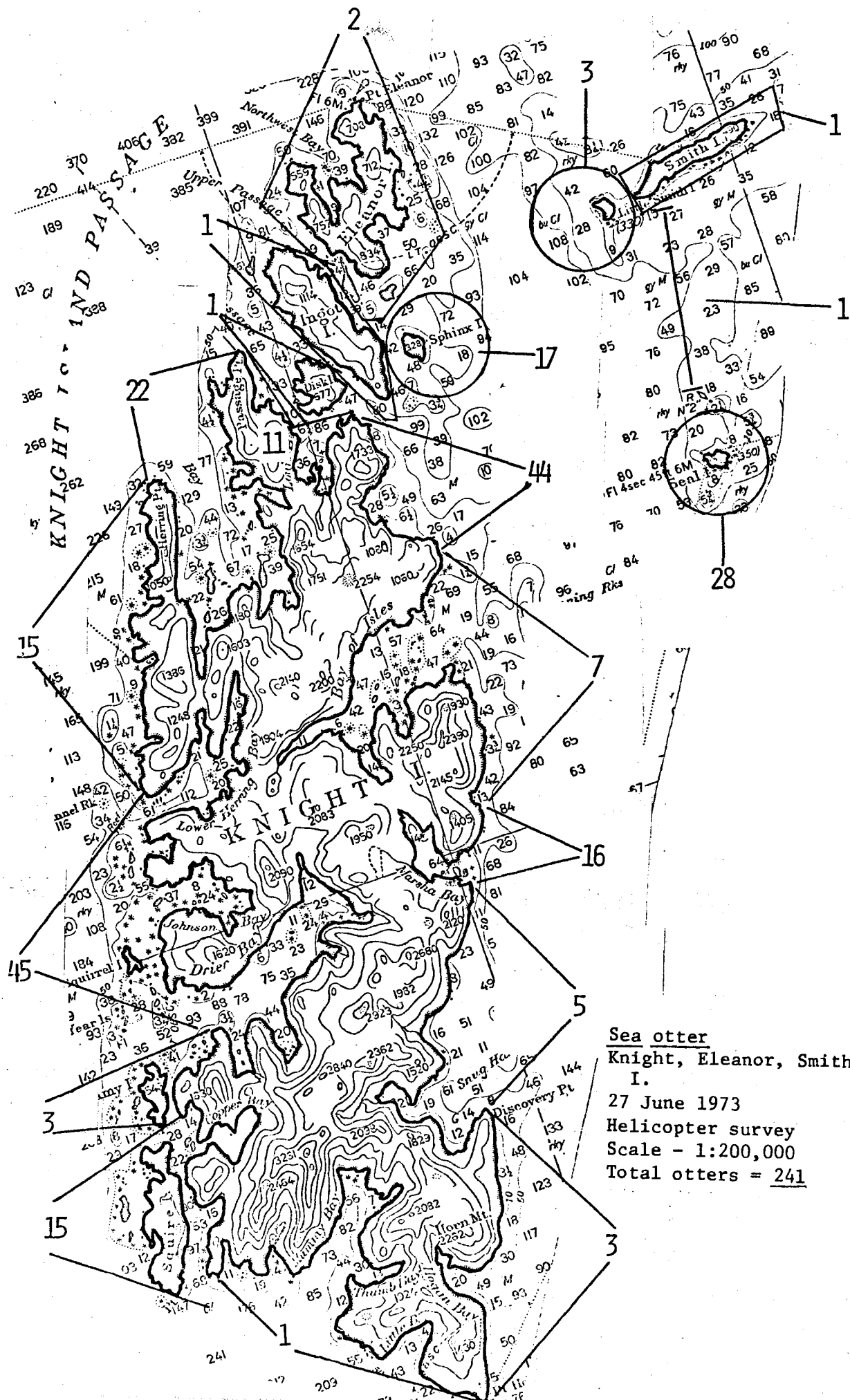
SOUNDINGS IN FATHOMS  
AT MEAN LOWER LOW WATER

Sea otter  
Glacier I., Unakwik  
28, 29 June 1973  
Helicopter survey  
Scale - 1:200,000  
Total otters = 16

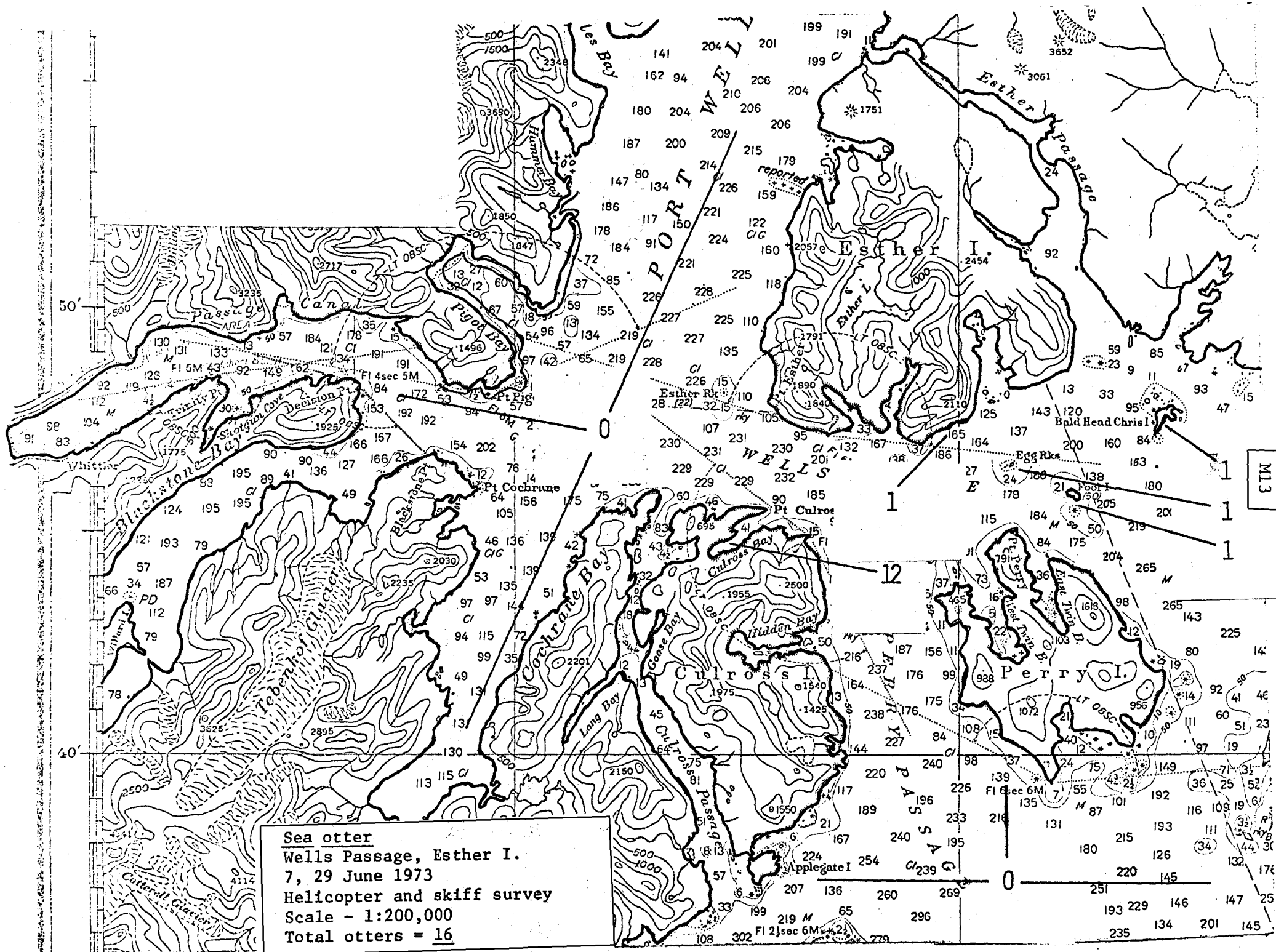




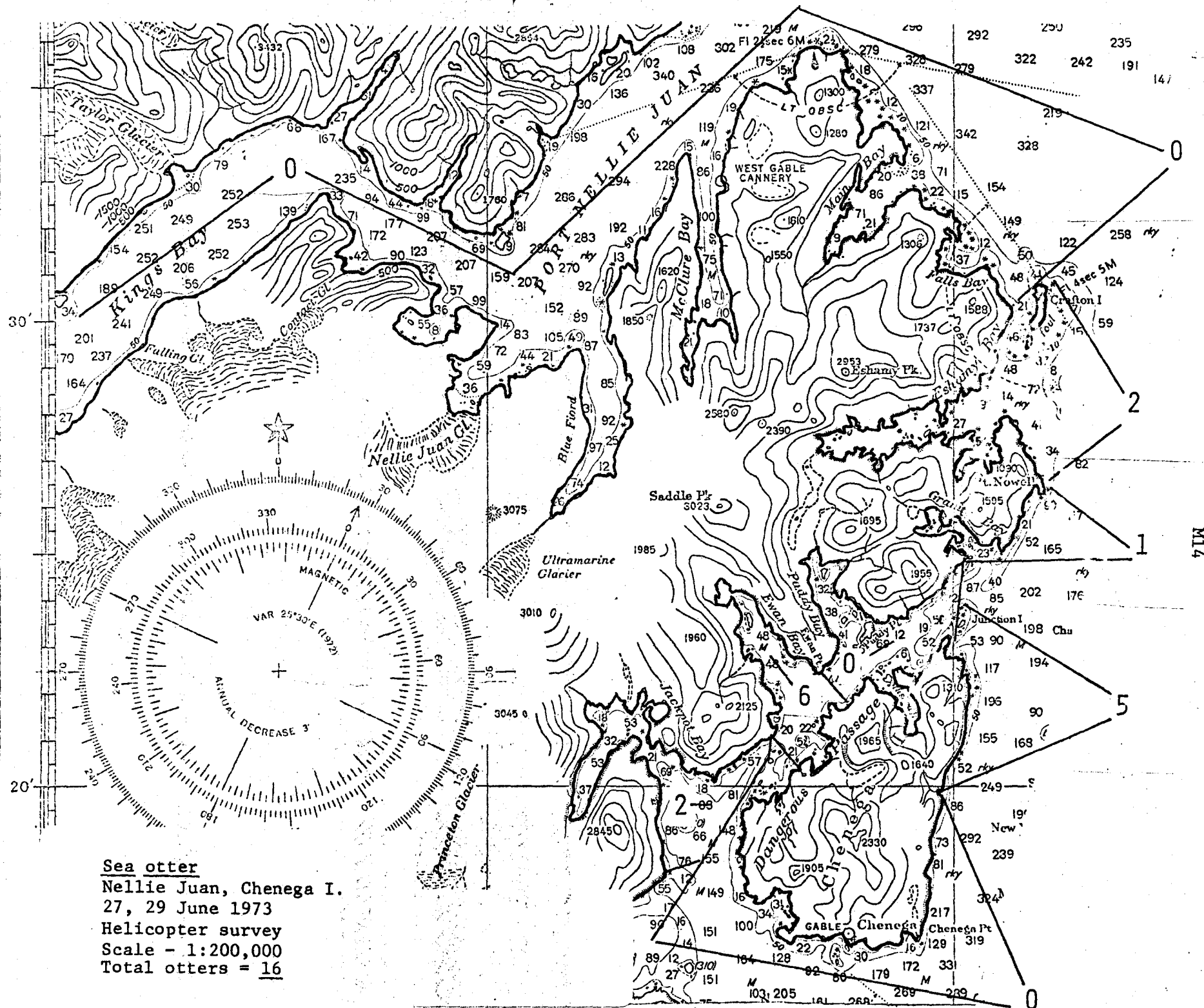
Sea otter  
 Naked, Lone I.  
 28, 29 June 1973  
 Helicopter survey  
 Scale - 1:200,000  
 Total otters = 159

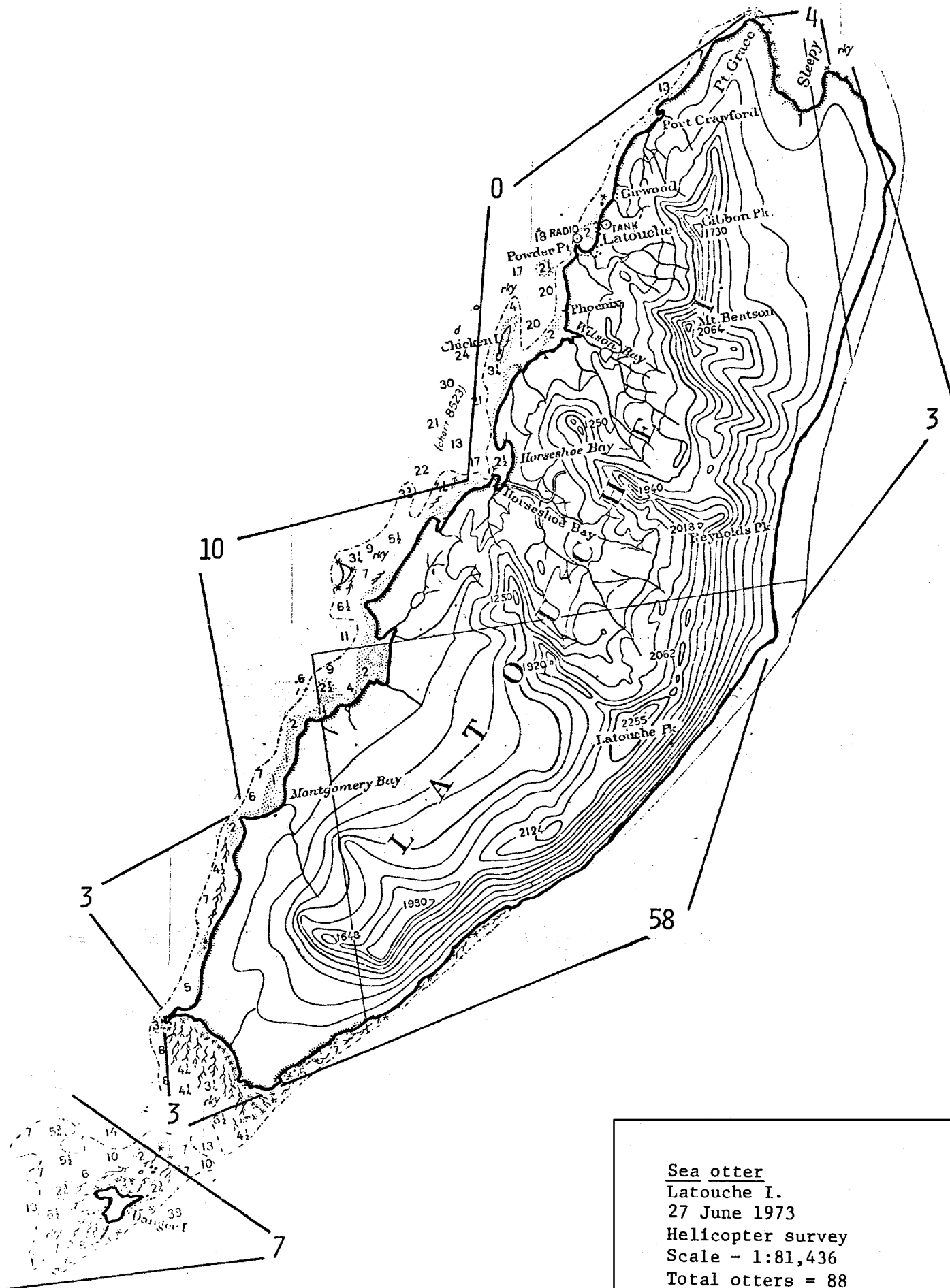


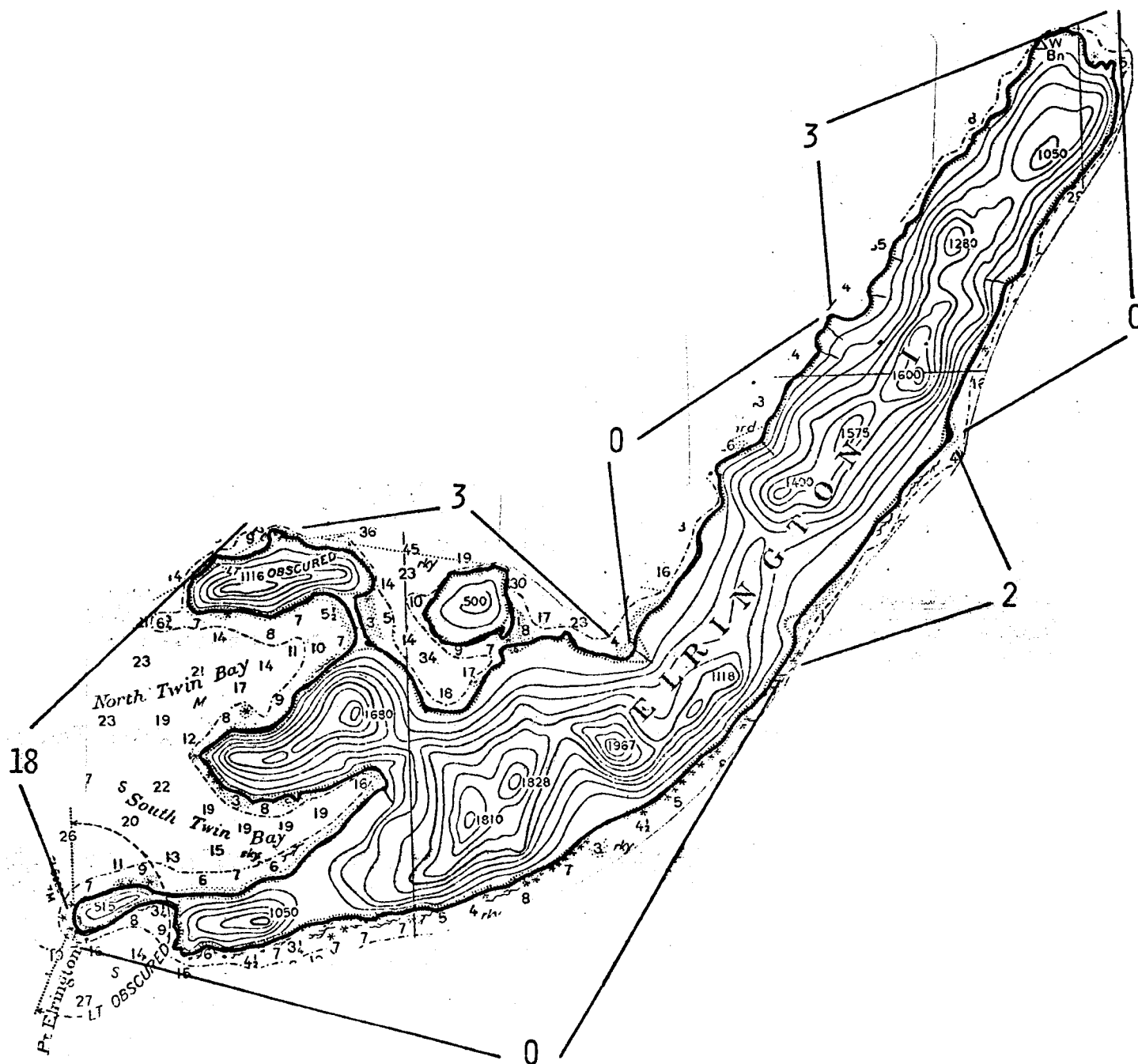
Sea otter  
College Fiord, Harriman Fiord  
29 June 1973  
Helicopter survey  
Scale - 1:200,000  
Total otters = 34



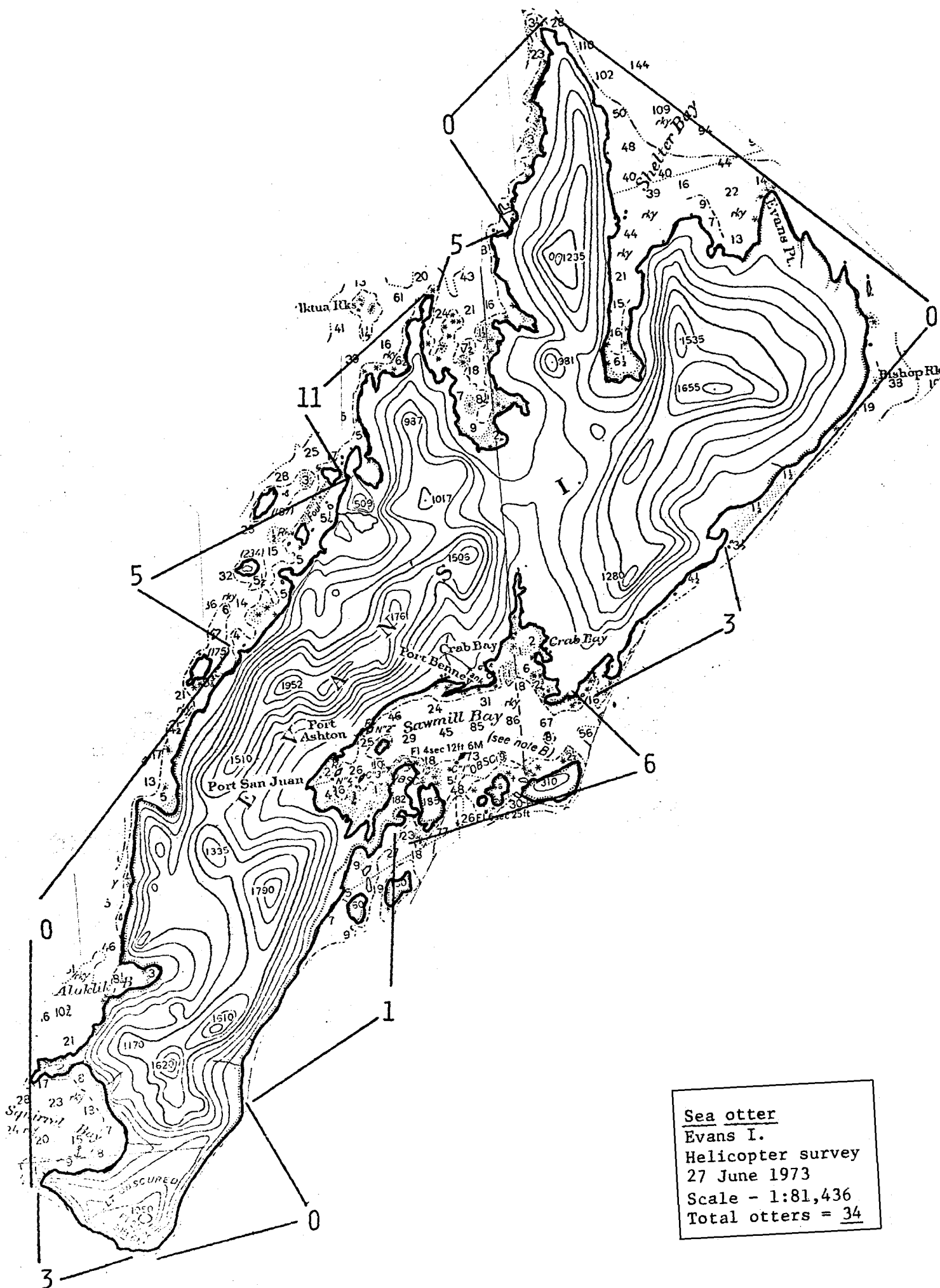








Sea otter  
 Elrington I.  
 27 June 1973  
 Helicopter survey  
 Scale - 1:81,436  
 Total otters = 26



Sea otter

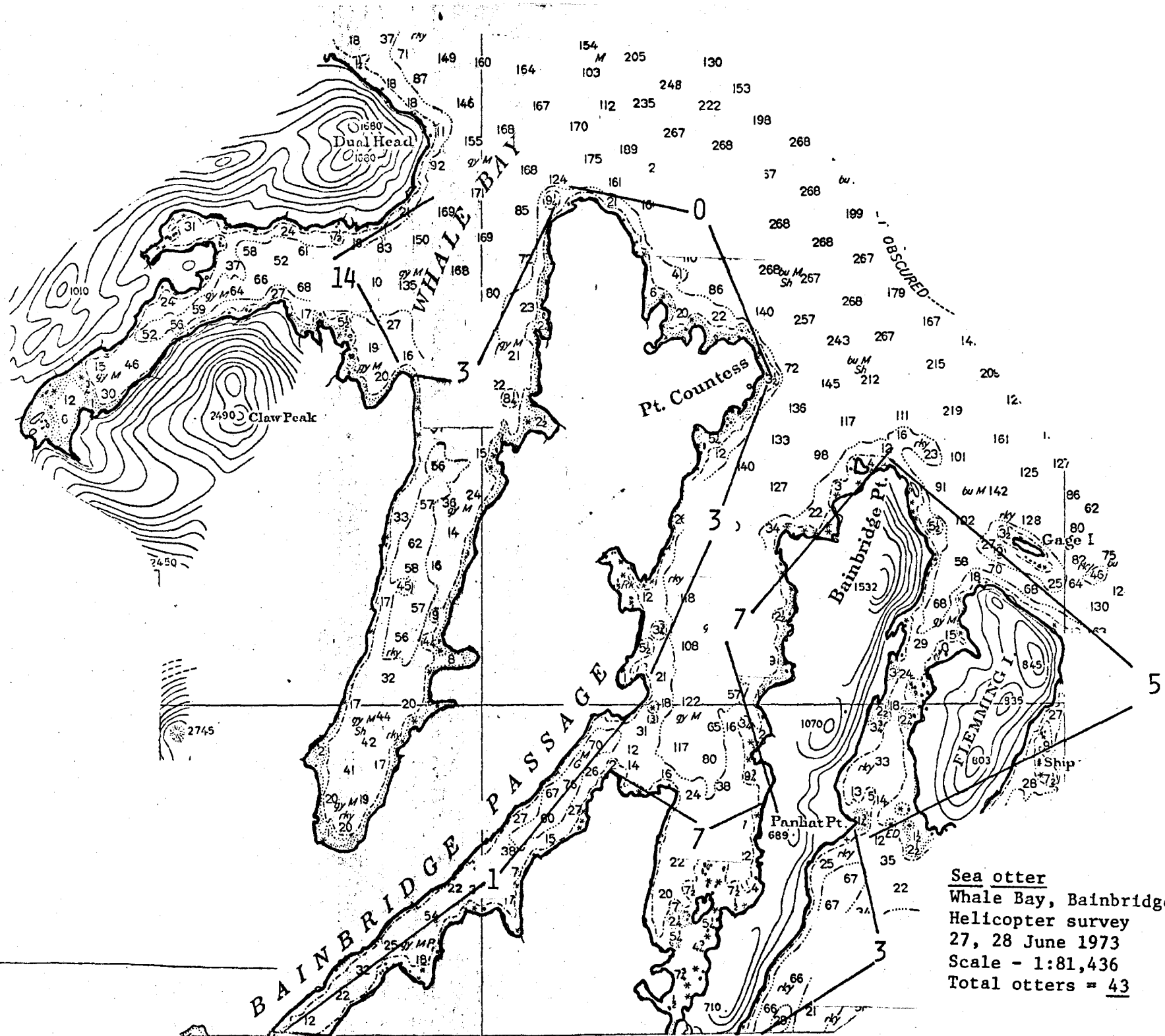
Evans I.

Helicopter survey

27 June 1973

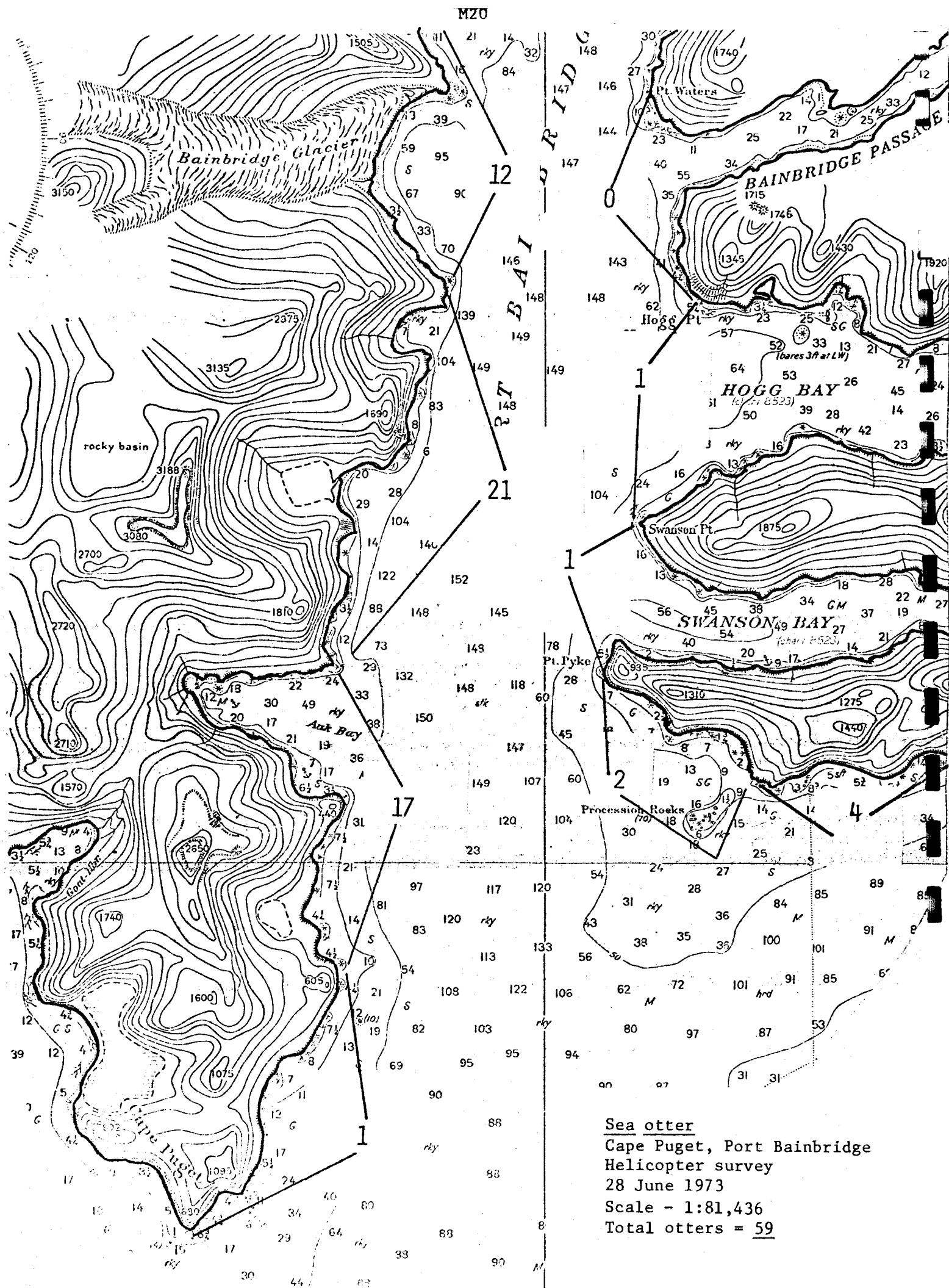
Scale - 1:81,436

Total otters = 34



Sea otter  
 Whale Bay, Bainbridge Pas  
 Helicopter survey  
 27, 28 June 1973  
 Scale - 1:81,436  
 Total otters = 43

Icy, Bay, Upper Port Bainbridge  
Helicopter survey  
28 June 1973  
Scale - 1:81,436  
Total otters = 43



# Sea otter

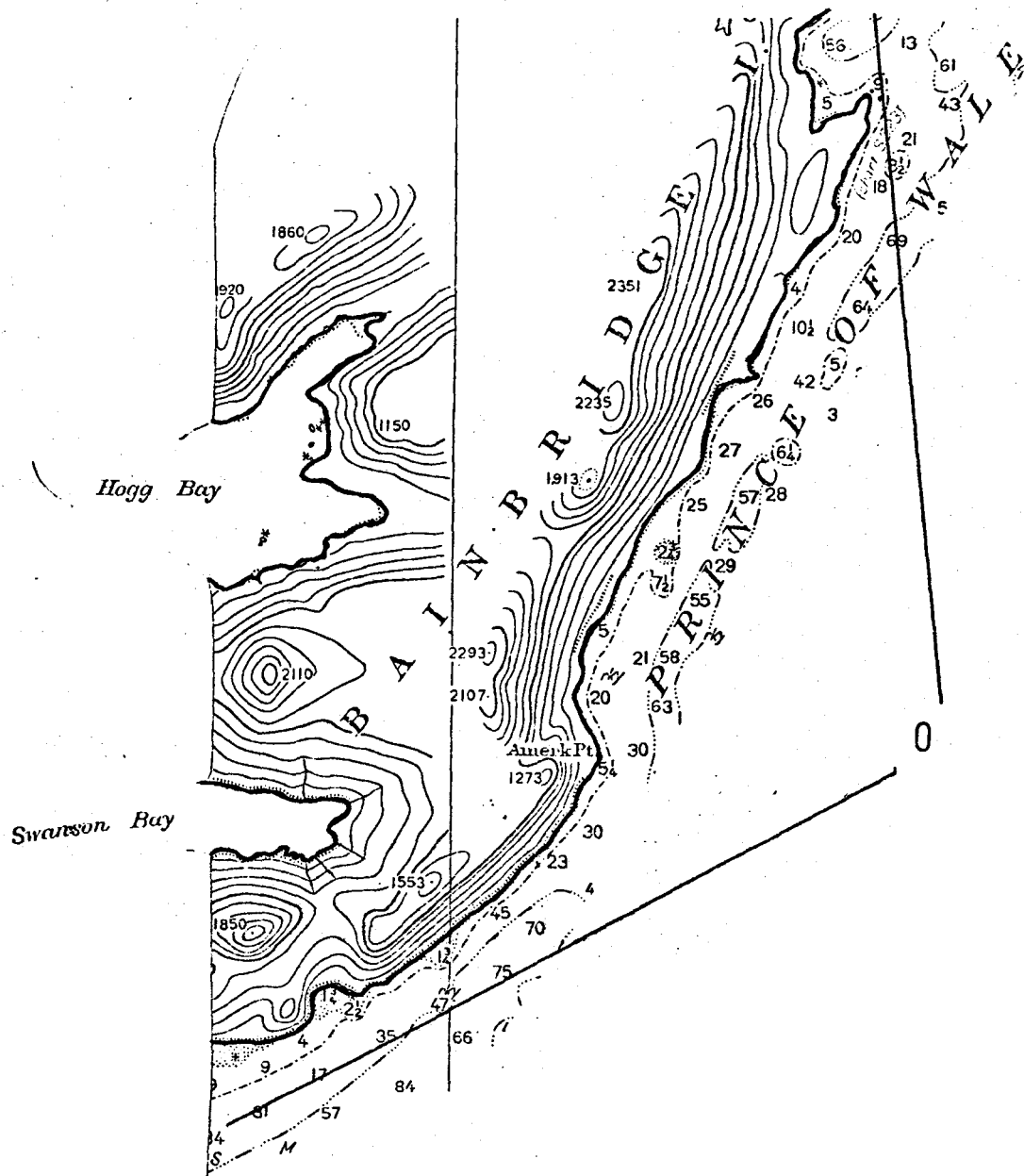
Cape Puget, Port Bainbridge

Helicopter survey

28 June 1973

Scale - 1:81,436

Total otters = 59



Sea otter

Bainbridge I. s.w. end

Helicopter survey

27 June 1973

Scale - 1:81,436

Total otters = 0



## SEA LION

Locations of major sea lion breeding rookeries and summer hauling grounds in the Prince William Sound - Kayak I. area are well known (fig. 2). Previous investigations by James Brooks (Alaska Fisheries Board and Alaska Department of Fisheries, 1956), Mathisen and Lopp (1963) and Finn Sandegren (1970) provide background data on population status (Table 2).

An apparent large proportion of sea lion populations haul out on traditional rookeries and hauling grounds. Highest numbers of animals are usually found during the summer (Mathisen and Lopp, 1963). Breeding females and mature territorial bulls are strongly tied to rookeries. Sandegren (1970) found considerable movement to and from a rookery. Some territorial bulls went to sea occasionally while other remained on the rookery for over 60 days. Females tend to make periodic trips to sea, probably for feeding purposes but cows about to give birth, who have just given birth or are estrous are reluctant to leave the rookery. Peak numbers of animals are usually ashore about midday (Mathisen and Lopp, 1963 and Sandegren, 1970). Stormy weather, high surf, high tides, disturbance and high solar radiation all appear to cause animals to return to the water. Population estimates made on rookeries and hauling ground counts must be considered minimal as some animals will almost certainly be in the water at any given time. The various factors which influence haul out behavior should be considered when planning a rookery count or when interpreting the results.

The locations of rookeries and hauling grounds were known prior to our survey. When these areas were approached in the helicopter, the observers were prepared to photograph and estimate numbers of sea lions. The initial pass was made at an altitude of about 500 feet and approximately 75 yards offshore. Airspeed was reduced to allow for photographs to be taken and estimates of numbers. The front seat observer estimated numbers while the backseat observer - recorder photographed the animals. When the initial pass was completed, most of the adults had entered the water and pups were counted. The approach and method of coverage varied slightly from area to area as topography differed.

The Cape St. Elias rookery (map no. 22) had been previously surveyed only once. Mathisen and Lopp (1963) photographed the sea lions on 2 Oct 1957 and counted 1,253 adults and 90 pups. We photographed the rookery on this survey and found 1,548 adults and 18 pups.

Seal Rocks (map no. 23) with 1,533 adults and 200 pups was much higher than previous surveys. In 1956, Mathisen and Lopp (1963) counted 162 adults and 21 pups. The Bureau of Land Management took aerial photographs in 1966 which revealed a total of 846 sea lions. Pups were restricted to two areas of the rookery. The central gravel-rock portion produced most of the pups. Nine pups were seen among 72 adults on a rocky point. All other areas had many immature animals.

Lewis Island sea lions (map no. 24) have been studied more intensively than any others in Prince William Sound. Population figures from 1956 to 1973 are summarized in table 2. It appears that numbers are now about half of 1956-1957 levels. Counts have dropped from 3,000 in 1957 to 1,269 in 1973.



Table 2. Summary of sea lion rookery and summer hauling ground counts.

Area	Date	Population Numbers
Cape St. Elias;	2 Oct. 1957 <sup>a</sup>	- 1,253 adults + 90 pups = <u>1,343</u>
	26 June 1973 <sup>b</sup>	- 1,548 adults + 18 pups = <u>1,566</u>
Seal Rocks;	22 July 1956 <sup>a</sup>	- 162 adults + 21 pups = <u>183</u>
	4 Sept. 1966 <sup>c</sup>	- total = <u>846</u>
	26 June 1973 <sup>b</sup>	- 1,533 adults + 200 pups = <u>1,733</u>
Lewis Island;	22 July 1956 <sup>a</sup>	- 466 adults + 213 pups = <u>679</u>
	Summer 1956 <sup>d</sup>	- 2,400 adults + 100 pups = <u>2,500</u>
	3 June 1957 <sup>a</sup>	- total = <u>3,000</u>
	27 May 1968 <sup>e</sup>	- 1,500 adults + 49 pups = <u>1,549</u>
	26 June 1973 <sup>b</sup>	- 1,243 adults + 26 pups = <u>1,269</u>
The Needle;	22 June 1956 <sup>a</sup>	- 179 adults + 16 pups = <u>195</u>
	3 June 1957 <sup>a</sup>	- 179 adults + 0 pups = <u>179</u>
	26 June 1973 <sup>b</sup>	- 234 adults + 2 pups = <u>236</u>
Pt. Elrington;	22 June 1956 <sup>a</sup>	- 25 adults + 6 pups = <u>31</u>
	3 June 1957 <sup>a</sup>	- 250 adults + 0 pups = <u>250</u>
	27 June 1973 <sup>b</sup>	- 250 adults + 0 pups = <u>250</u>

- a. Mathisen and Lopp, 1963
- b. Alaska Department of Fish & Game survey
- c. Bureau of Land Management aerial photo - pups not distinguishable
- d. Alaska Fisheries Board and Alaska Department of Fisheries, 1956
- e. Sandegren, 1970 - using maximum count of adults and total number of pups known born.

Sandegren (1970) describes extensive changes in the topography of Lewis I. resulting from the 1964 earthquake. Present distribution of animals is much different than pre-earthquake distribution. Pupping and breeding areas are completely different. The rookery area is now on the southern point of the island while the main hauling ground is near Harbor Point on the north side. Changes in the rookery and hauling areas caused by the earthquake may be responsible for reduction in numbers.

The Needle (map no. 25) in 1956 had 179 adults and 16 pups. In 1957, 179 adults and no pups were found while in 1973, 234 adults and two pups were counted. No changes in population status were apparent.

Point Elrington (map no. 26) had 267 adult sea lions and no pups. One mature bull fur seal was seen on a rock with 17 immature bull sea lions about 1 mile from the main hauling ground. Previous surveys show 25 adults and six pups in 1956 and 250 adults and no pups in 1957.

Danger Island, south of Latouche Island, has previously been used as a summer hauling ground. Mathisen and Lopp (1963) reported 298 sea lions in July 1956 and no animals in June of 1957. None were seen on Danger Island during our June 1973 survey.

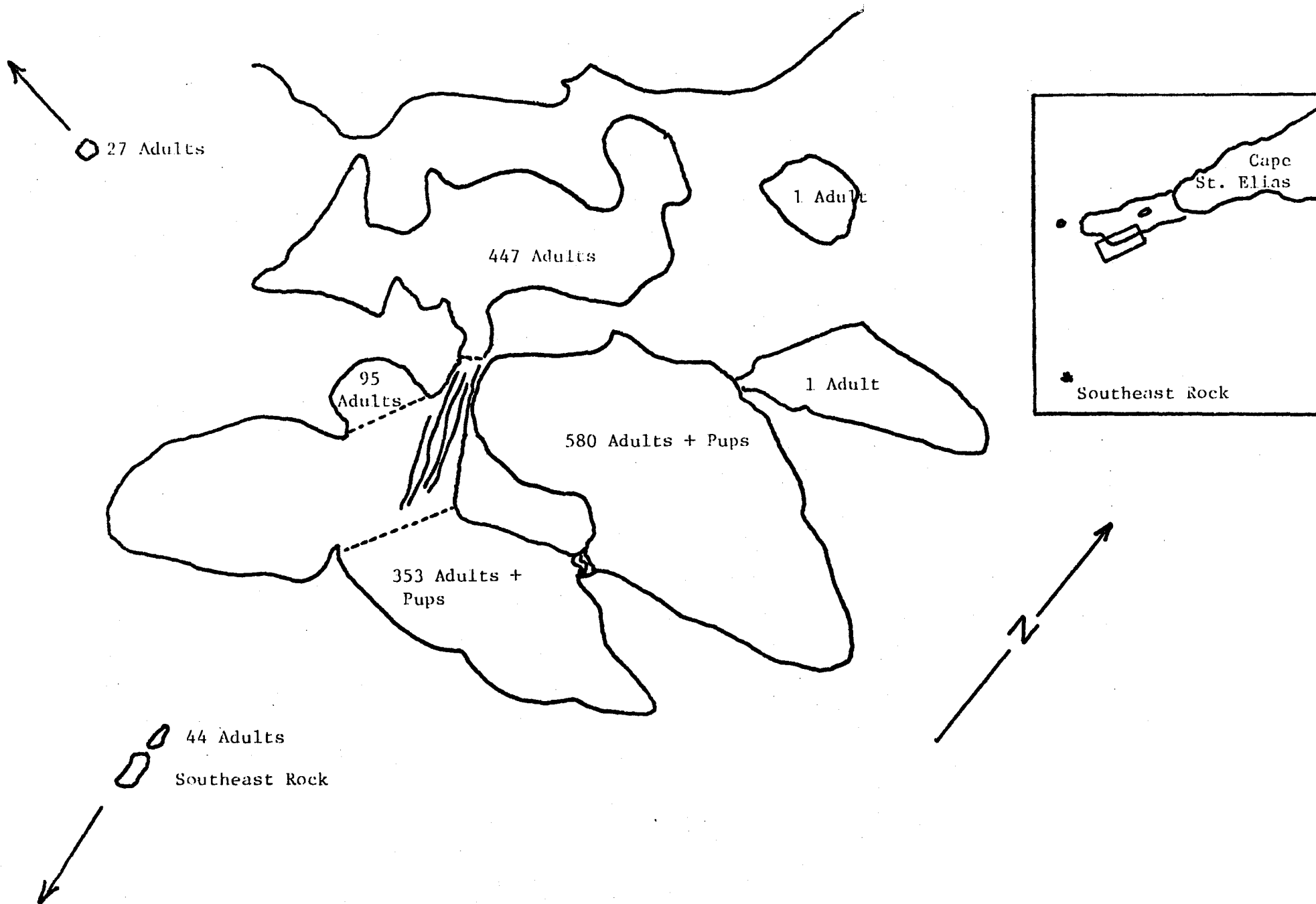
Fountain Rocks about 45 miles south southeast of Cape Hinchinbrook is reported as a sea lion rookery or hauling ground (Alaska Department of Fish and Game, 1973). The population is given as 300. This area was not covered during our survey.

A total of 5,134 sea lions were recorded during the survey of the Prince William Sound - Cape St. Elias area. Most of the animals were seen on the rookeries and summer hauling grounds previously discussed. An additional 63 animals were recorded, mostly along the outside coast of Montague and Hinchinbrook I. Only four sea lions were seen in inside waters. The total number of animals seen is certainly a minimum population figure as some animals are undoubtedly missed when they are in the water. A minimal total estimate is 6,500-7,500 sea lions.

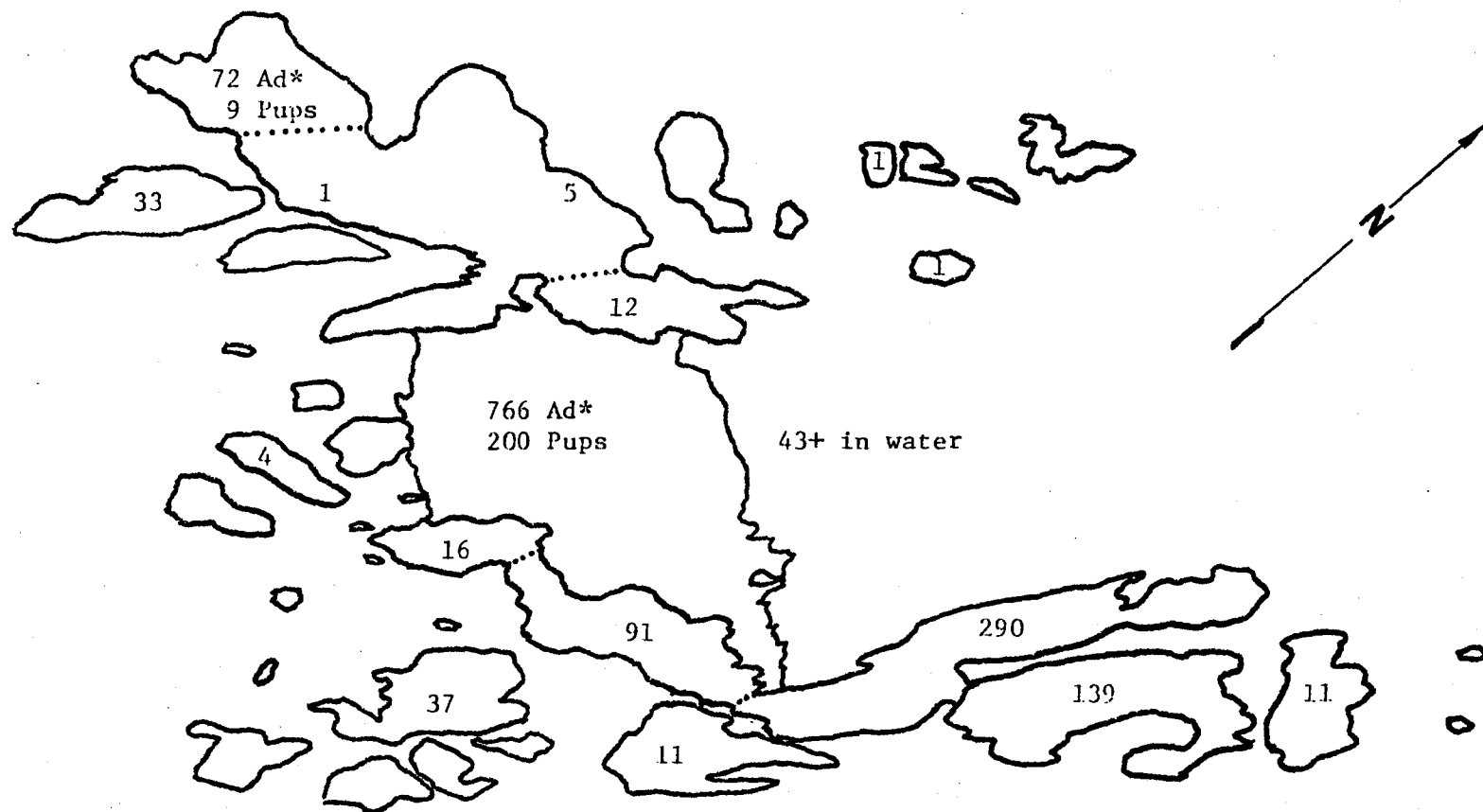
Only 246 pups were seen during this survey. Pups are difficult to see and undoubtedly some were overlooked. Even when this is considered, pup production is quite low in relation to the total number of animals seen. All of the hauling areas appeared to have a very high proportion of immature animals. Sandegren's (1970) data show a high proportion of nursing subadults in comparison to pups produced. These data suggest that the sea lions in Prince William Sound - Kayak Island area are not a discrete population but that there may be considerable interchange with other areas, possibly from the large rookeries of the Kenai Peninsula and Kodiak area.

Mathisen and Lopp's (1963) population data from 1956 and 1957 are comparable with our figures in all areas except Seal Rocks which seems to have increased considerably and Lewis Island which apparently has decreased. Tectonic changes in hauling and rookery areas resulting from the 1964 earthquake may be related to this apparent change in numbers. Both areas uplifted considerably, Lewis Island about 16 feet and Seal Rocks about 8 feet (U.S. Geological

Survey, 1969). The effects, however, were quite different; at Lewis I. there was an apparent loss of hauling and breeding areas (for description of changes see Sandegren, 1970) while the uplift at Seal Rocks appears to have increased sea lion hauling habitat. Cape St. Elias may also have gained additional sea lion hauling grounds because of the earthquake. That general area uplifted about 9 feet (U.S. Geological Survey, 1969) and appears to have exposed an intertidal bench. However, no corresponding increase in sea lion numbers has been found.



Cape St. Elias 1600 hr. 26 June 1973  
 Sea Lions 1548 Adults (counted from photos) many immature animals  
 18 Pups (counted visually)  
 Scale Approximately 1:3100



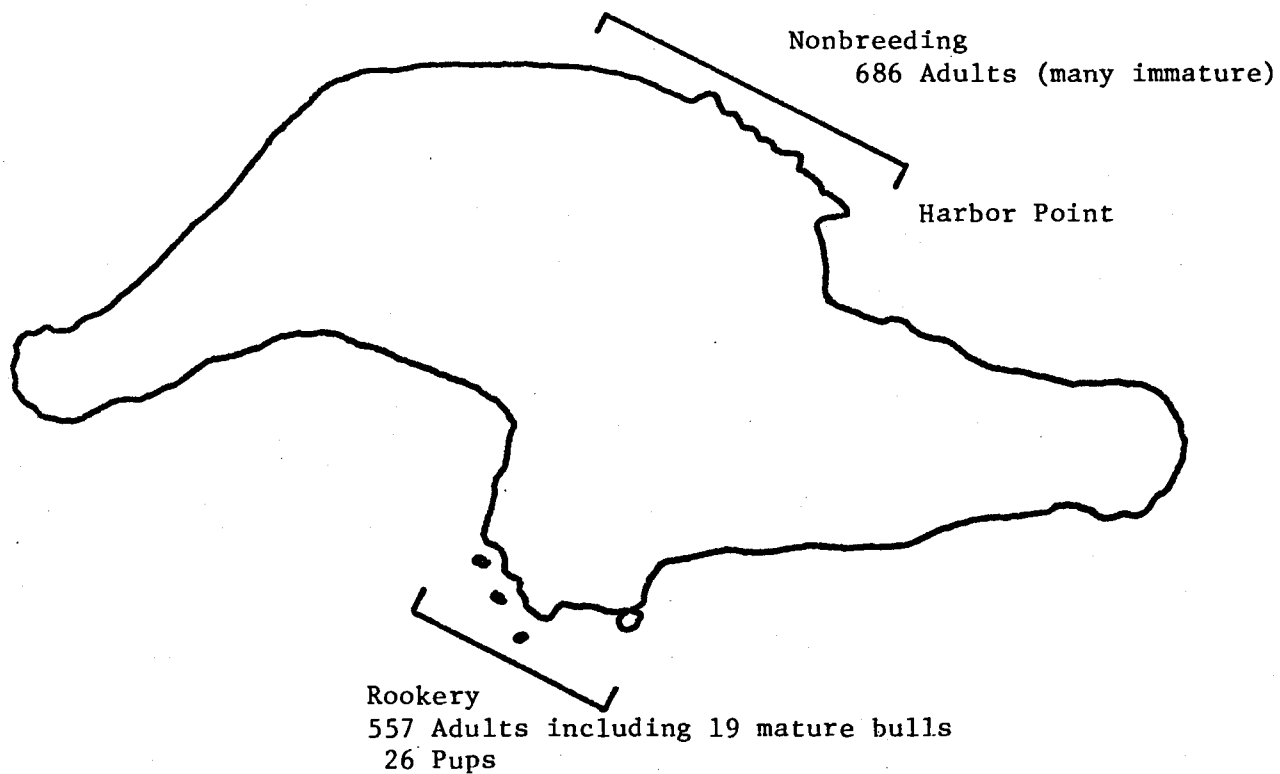
M23

Seal Rocks 1245 26 June 1973

Sea Lions - 1533 Adults counted from photos  
191 Pups estimated visually

\*Rookeries, All other areas contained many immature animals

Scale Approximately 1:2000

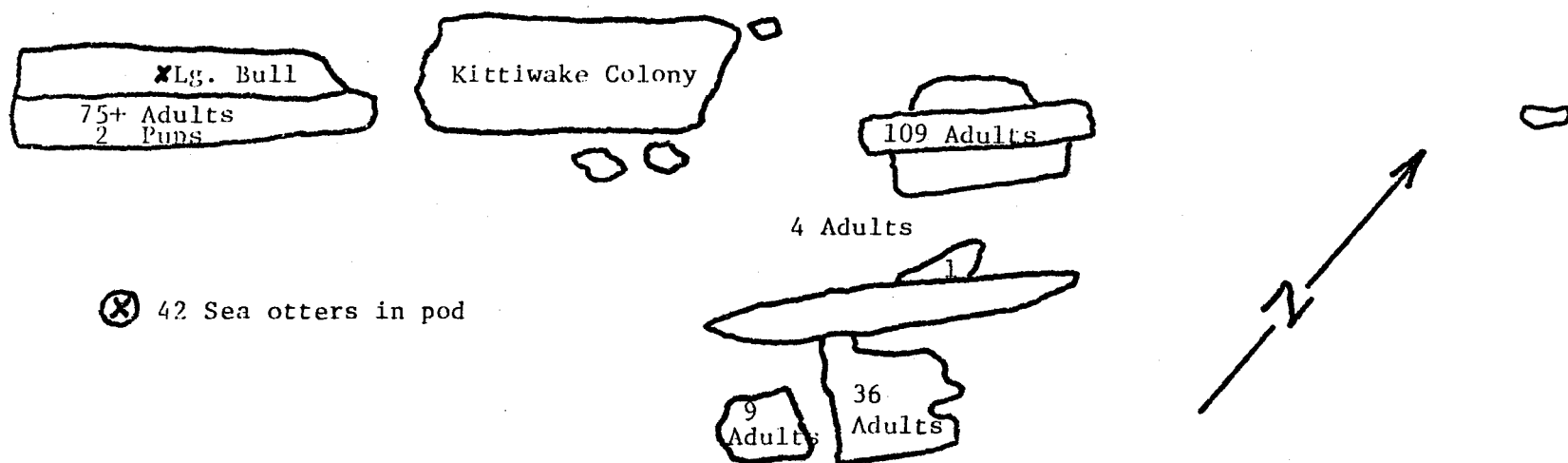


Lewis Island 1145 26 June 1973

Sea Lions 1243 Adults (counted from photos)  
26 Pups (counted visually)

Scale Approximately 1:3300





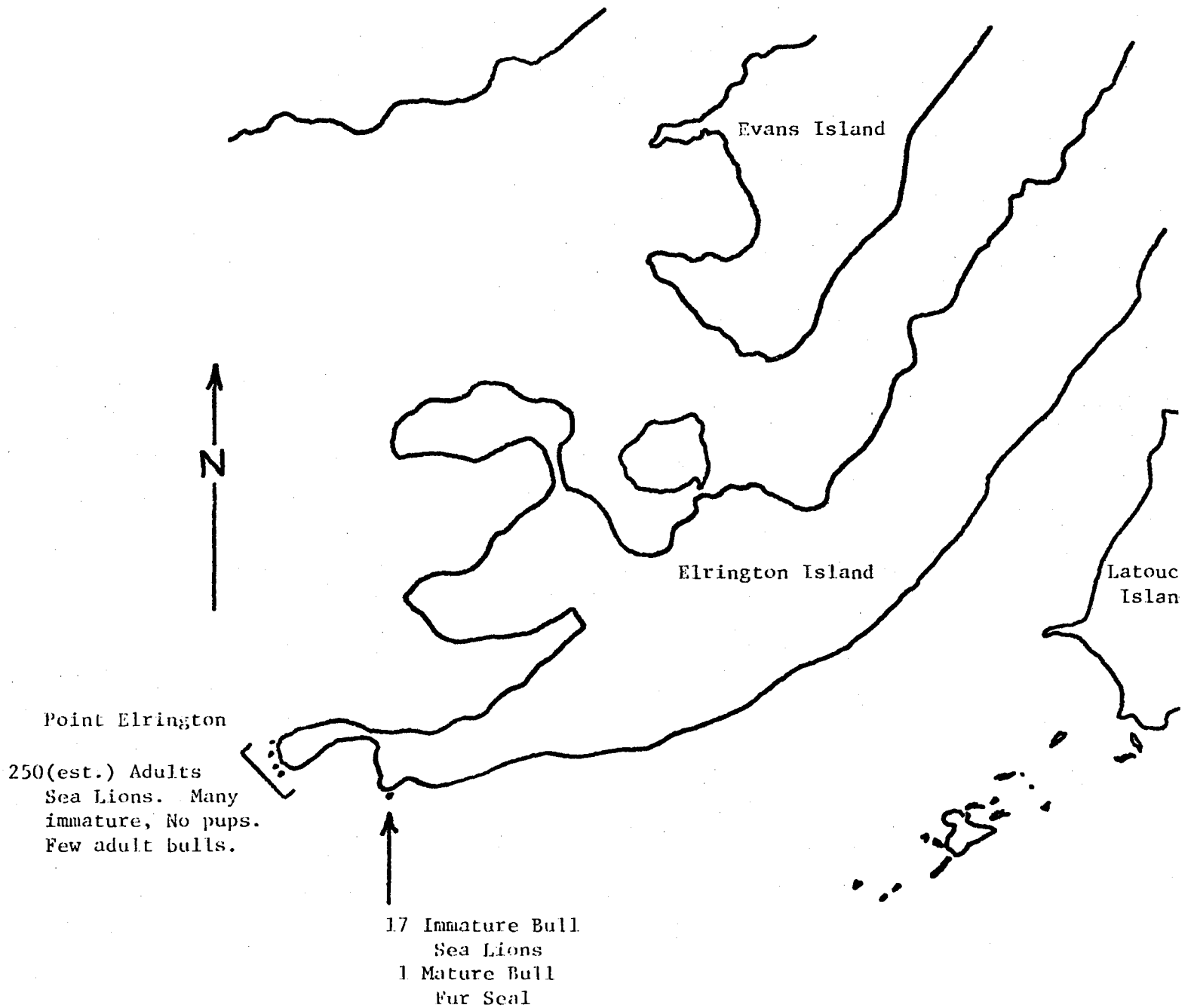
The Needle 1000 26 June 1973

Harbor Seals - 2

Sea Otters - 42

Sea Lions - 234+ Adults counted from photos (mostly nonbreeding, 1 large territorial bull)  
2 Pups

Scale Approximately - 1:3200



Point Elrington 1215 hrs. 27 June 1973

Sea Lions - 267 Adults (visually estimated)

Fur Seal - 1 Adult Bull

Scale Approximately - 1:81,436

## HARBOR SEAL

Detailed information on abundance and distribution of harbor seals in Prince William Sound is lacking. Alaska's Wildlife and Habitat (Alaska Department of Fish and Game, 1973) shows, in a general way, distribution and areas of concentration. Slightly more is known about the Copper River area because of an intensive control program from 1951 to 1958 during which 30,250 seals were reportedly killed (Alaska Department of Fish and Game, 1958). Herds of over 1,000 seals were reported as common on sand bars at the mouth of the river.

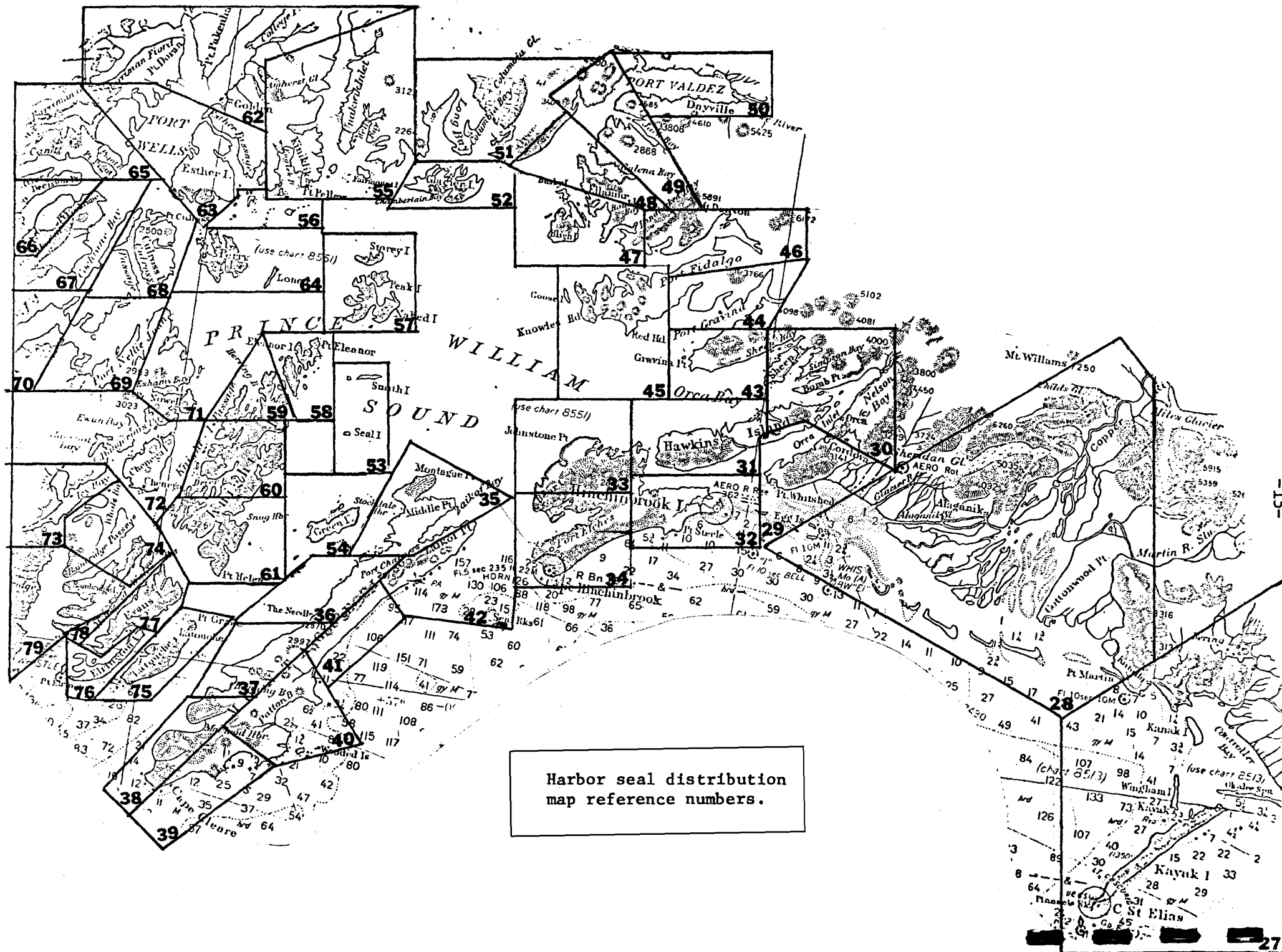
Survey techniques for harbor seals are not adequate for estimating population size, and may even be marginal for determining distribution. Seals in the water are difficult to see. When under water they can be seen only under the most favorable conditions i.e. clear, shallow, calm water with good lighting. Even on the surface, seals are difficult to see and many are missed. Seals are most easily seen and accurately counted when hauled out. Various environmental factors apparently affect haul out behavior with tide probably being most important. In tidal areas many more seals are usually seen hauled out on lower stages of the tide. It has been our experience that in some tidal haul out areas four to five times more seals can be counted at low tide than at high tide. In glacier fed bays, where seals haul on floating ice pans, the greatest numbers of animals are usually seen on higher stages of the tide when the floating ice is concentrated near the glaciers. Bishop (1967) felt more seals in total hauled out when the ice was concentrated at high tide than when the ice scattered on outgoing tides. Unfortunately even when large numbers of seals are hauled out and can be counted the relationship to total population size is unknown.

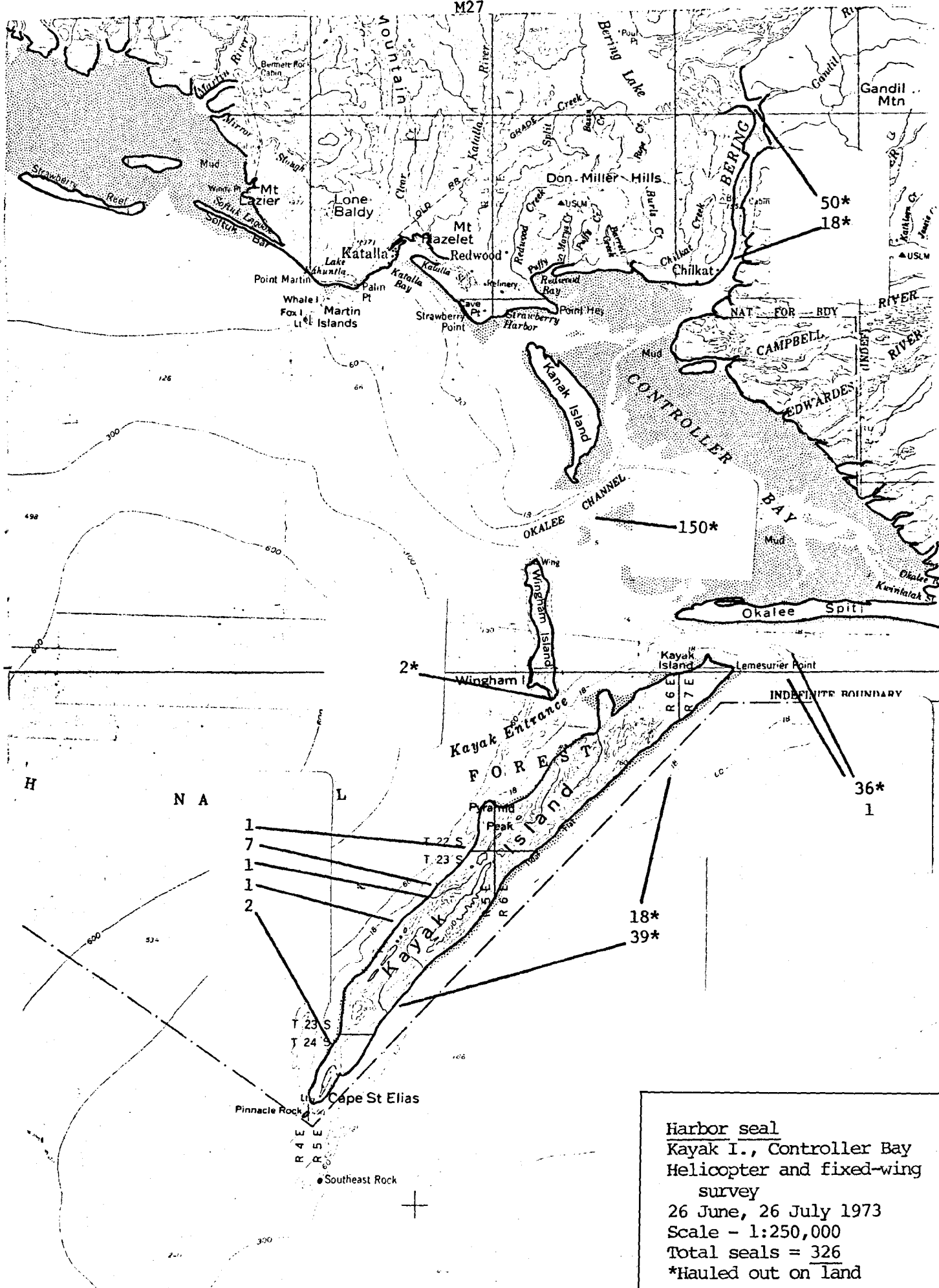
Ideally, a seal survey would only be conducted under optimum conditions when surface conditions were calm, lighting was good and stage of tide suitable for the type of haul out area. During this survey, financial and time limitations prevented restricting the survey to times of optimum conditions. Weather was considered to some degree but no regard was made to stage of tide and the results should be considered in this light. Population numbers are undoubtedly far in excess of the 5,640 recorded (map nos. 27 - 79). Some haul out and concentration areas may have been missed because of timing and conditions of the survey.

The largest concentration of seals was found on the Copper River Delta where 1,349 were counted hauled out on sand bars. Other areas found where seals used sand bars as hauling areas were Controller Bay and the Bering River. The Copper River, Miles Lake and Bering River were the only areas where seals were found in fresh water.

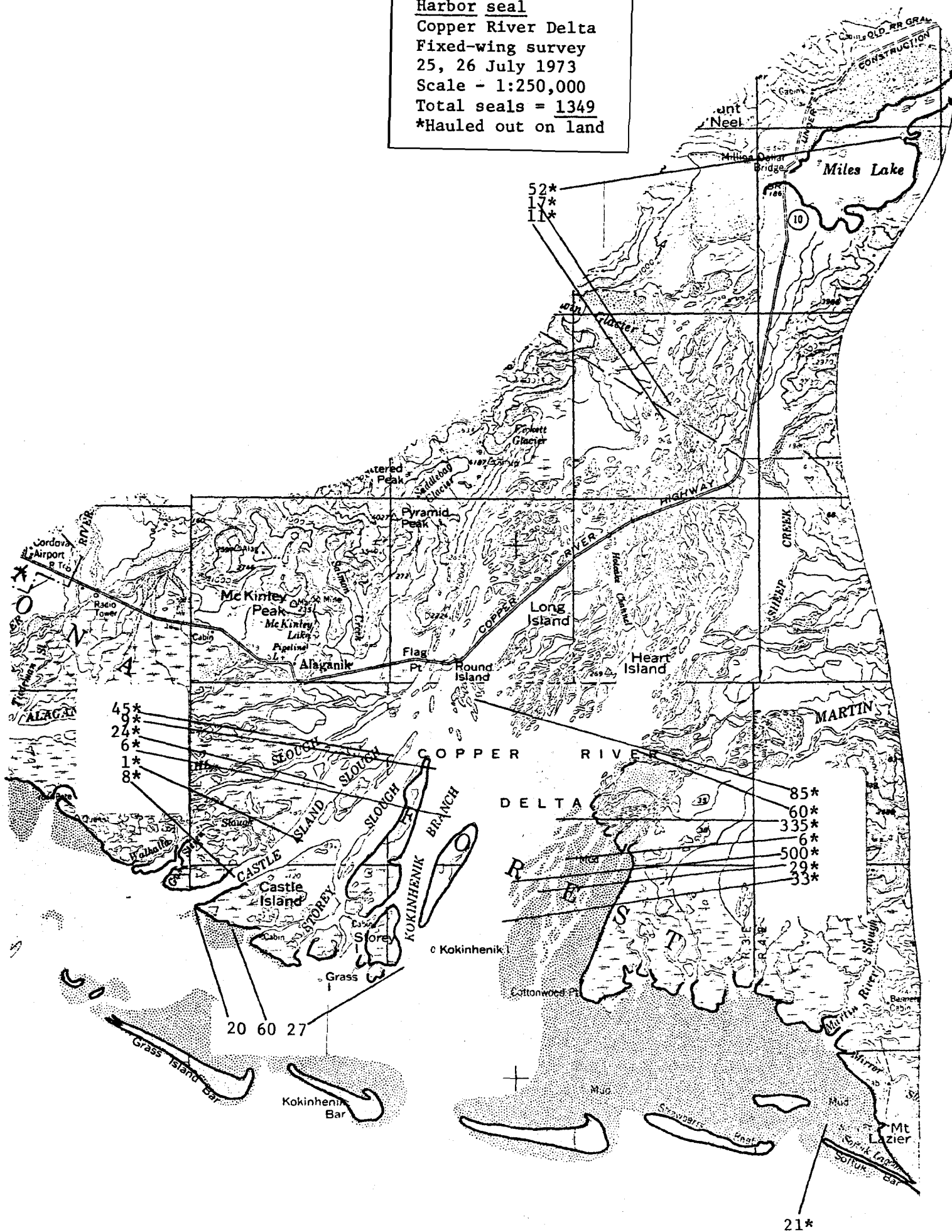
The following areas, where seals haul out on glacial ice pans, were identified during the survey; Columbia Bay, Unakwik Inlet, College Fiord, Harriman Fiord, Blackstone Bay, Derickson Bay and Nassau Fiord.

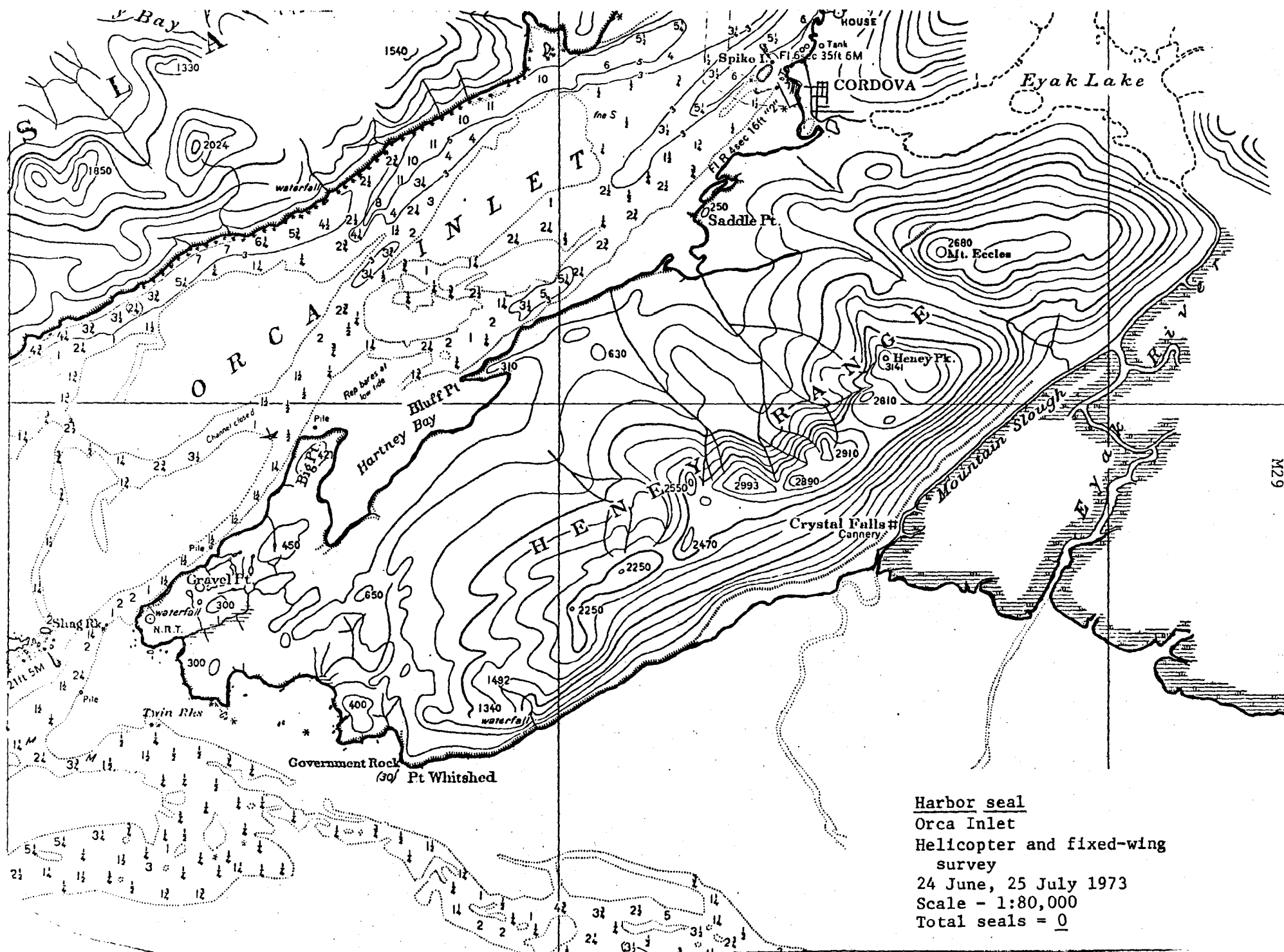
Offshore rocks and islets are used as haul out grounds throughout the area. Concentrations of harbor seals were found at; the Port Chalmers - Stockdale Harbor area, Seal I., Applegate Rocks, Channel I., Little Green I., Olsen - Fairmount I., Naked I., Knight I., Danger I., Evans I. and Port Bainbridge.





Harbor seal  
 Copper River Delta  
 Fixed-wing survey  
 25, 26 July 1973  
 Scale - 1:250,000  
 Total seals = 1349  
 \*Hauled out on land

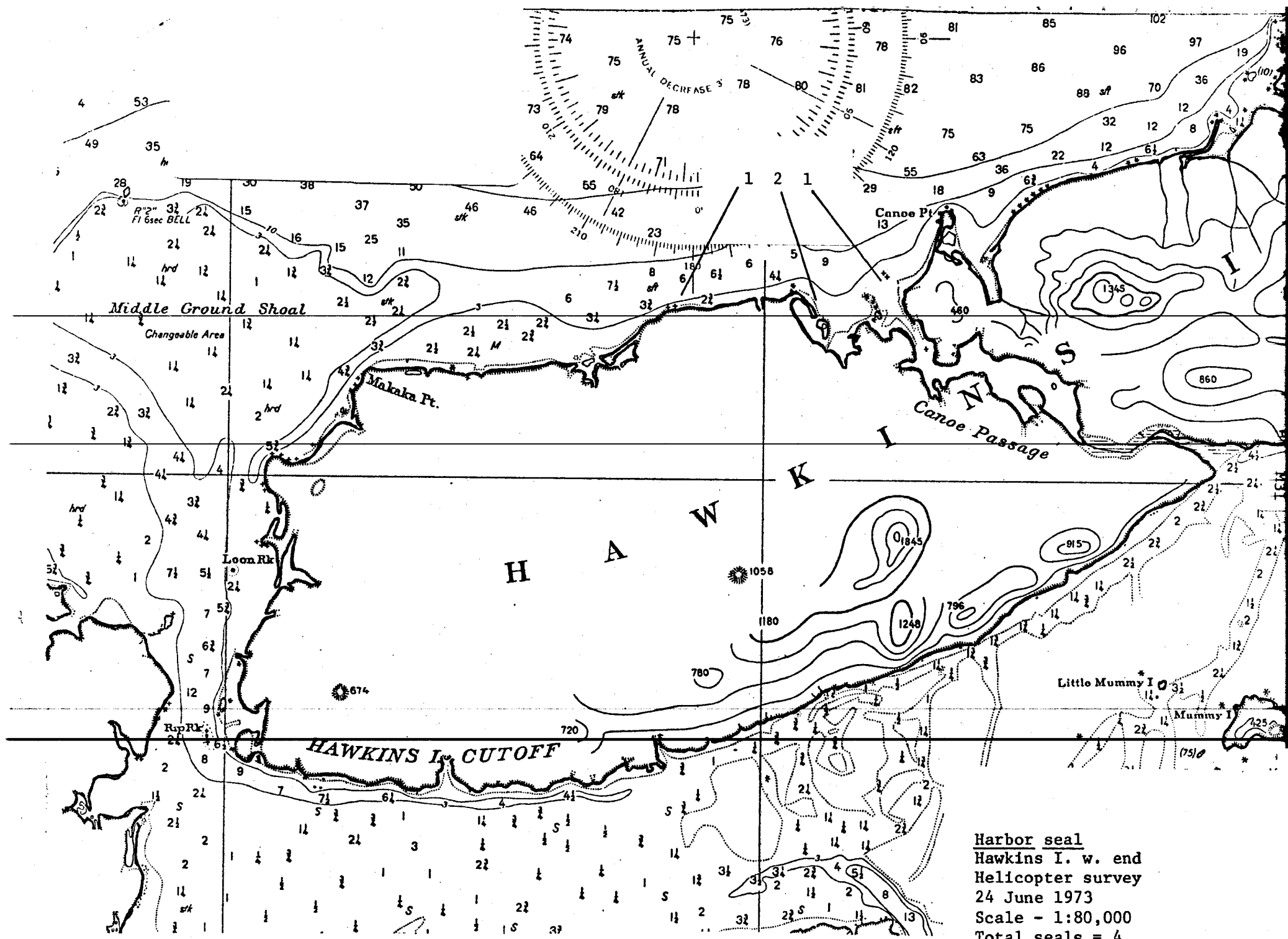




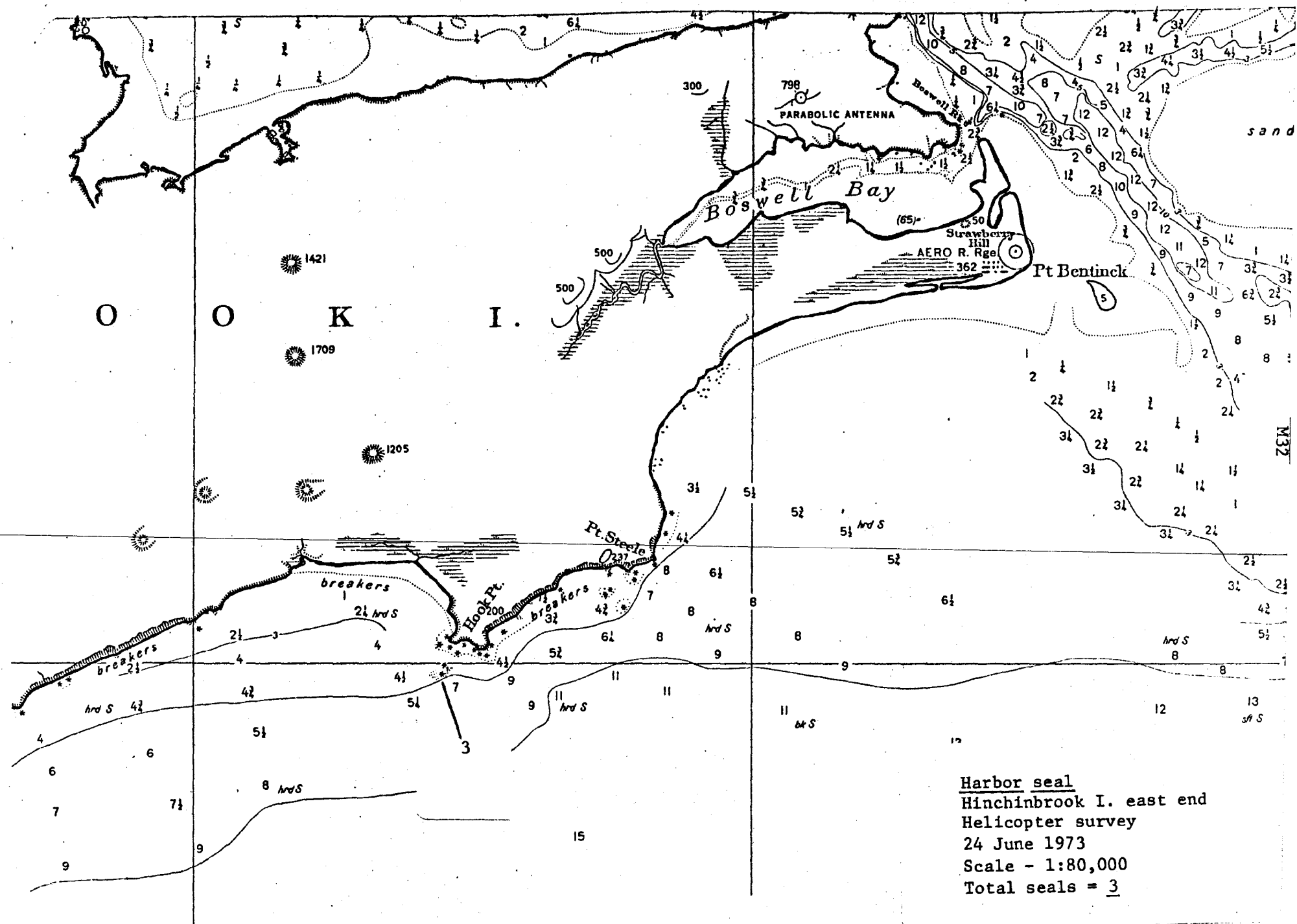
Harbor seal  
 Orca Inlet  
 Helicopter and fixed-wing  
 survey  
 24 June, 25 July 1973  
 Scale - 1:80,000  
 Total seals = 0

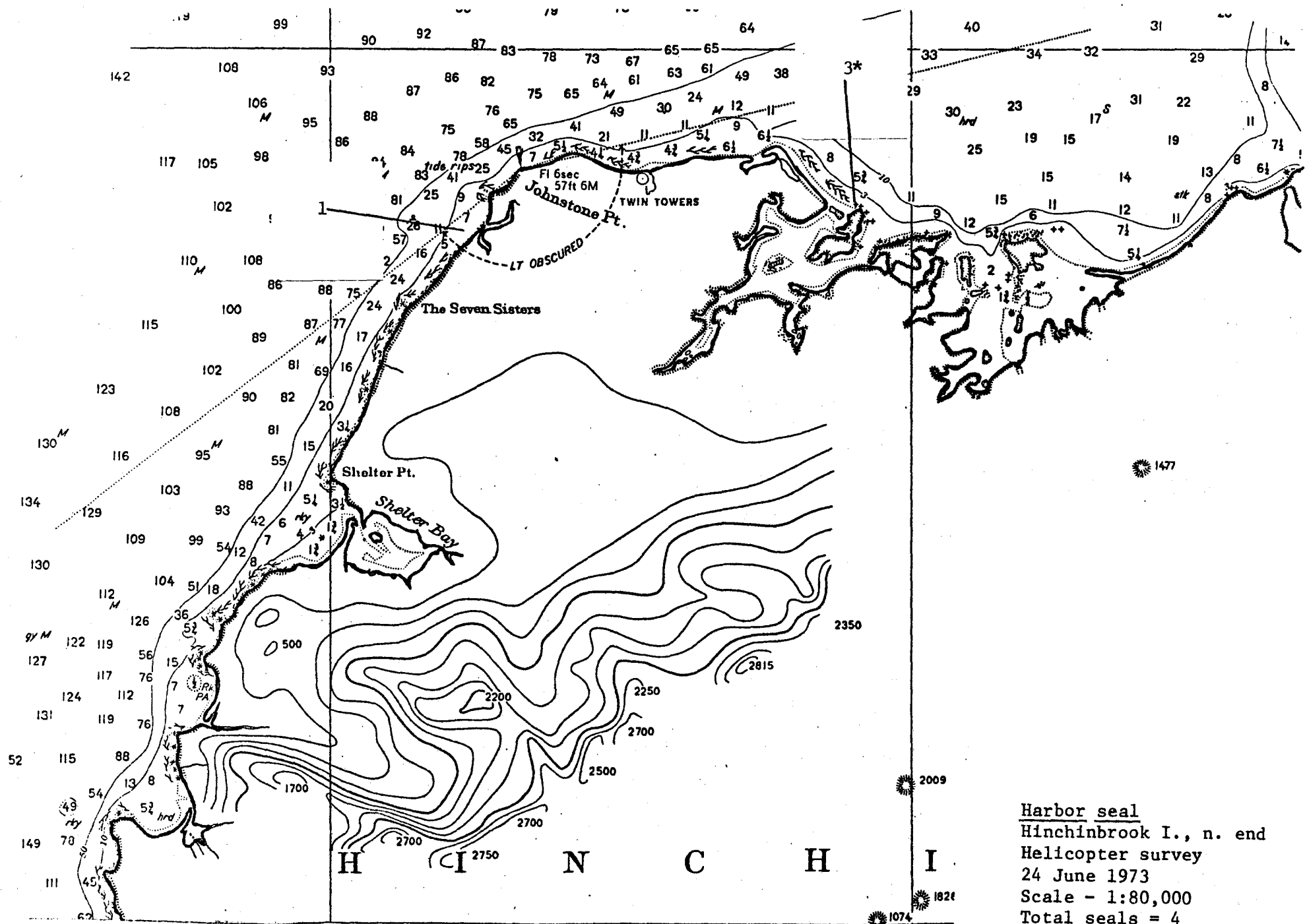




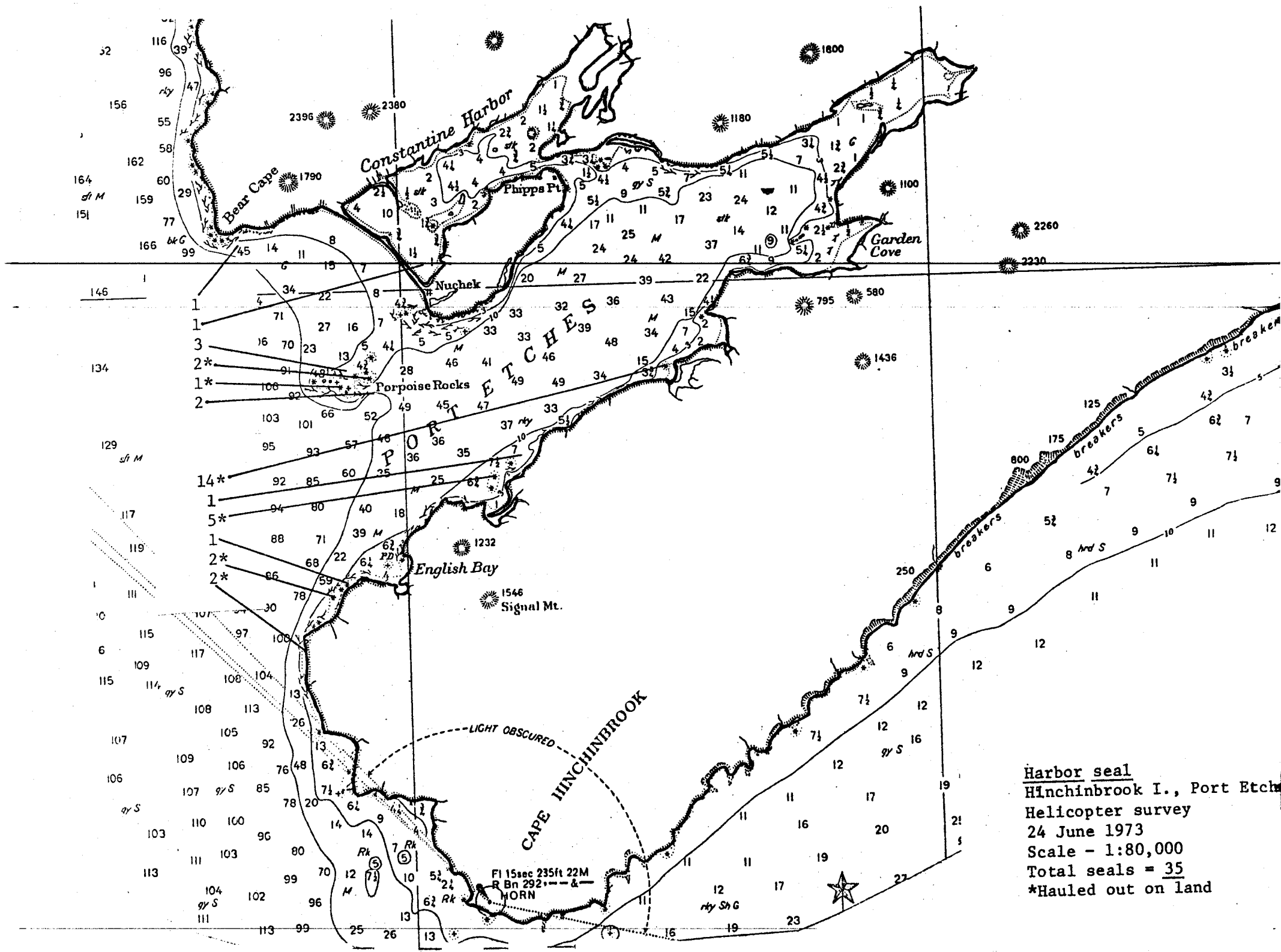


Harbor seal  
Hawkins I. w. end  
Helicopter survey  
24 June 1973  
Scale - 1:80,000  
Total seals = 4





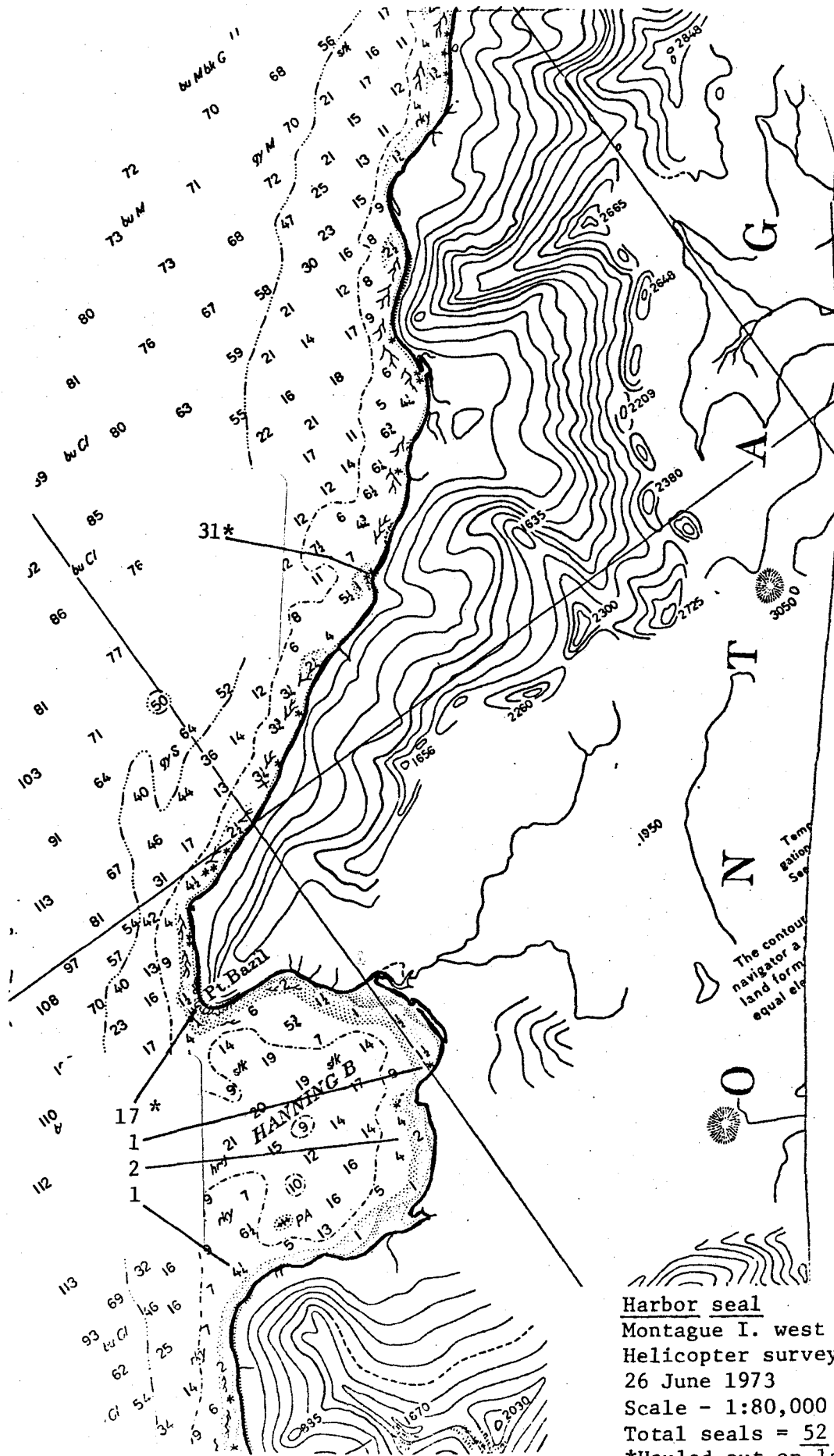
Harbor seal  
Hinchinbrook I., n. end  
Helicopter survey  
24 June 1973  
Scale - 1:80,000  
Total seals = 4  
\*Hauled out on land

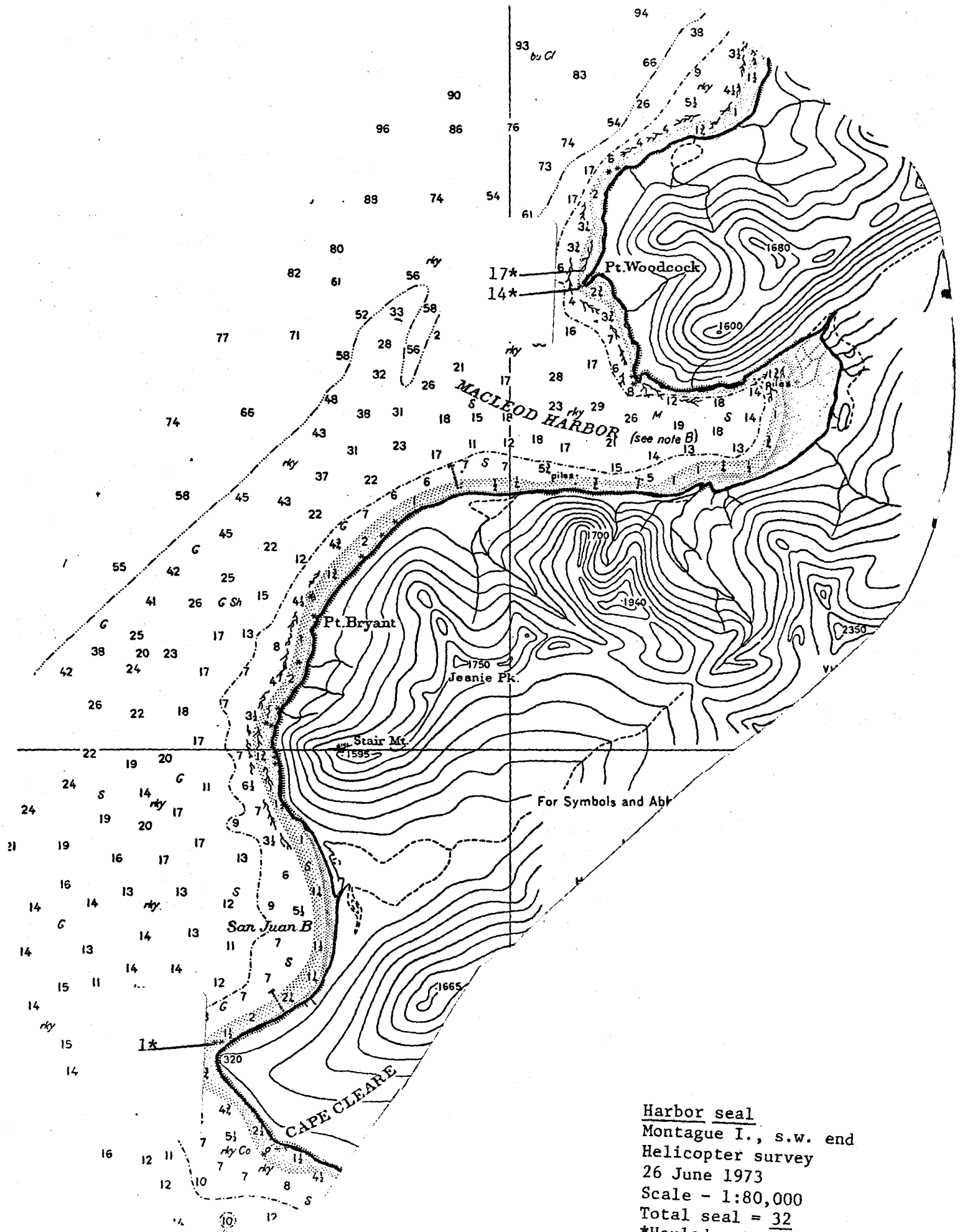


Harbor seal  
 Hinchinbrook I., Port Etches  
 Helicopter survey  
 24 June 1973  
 Scale - 1:80,000  
 Total seals = 35  
 \*Hauled out on land



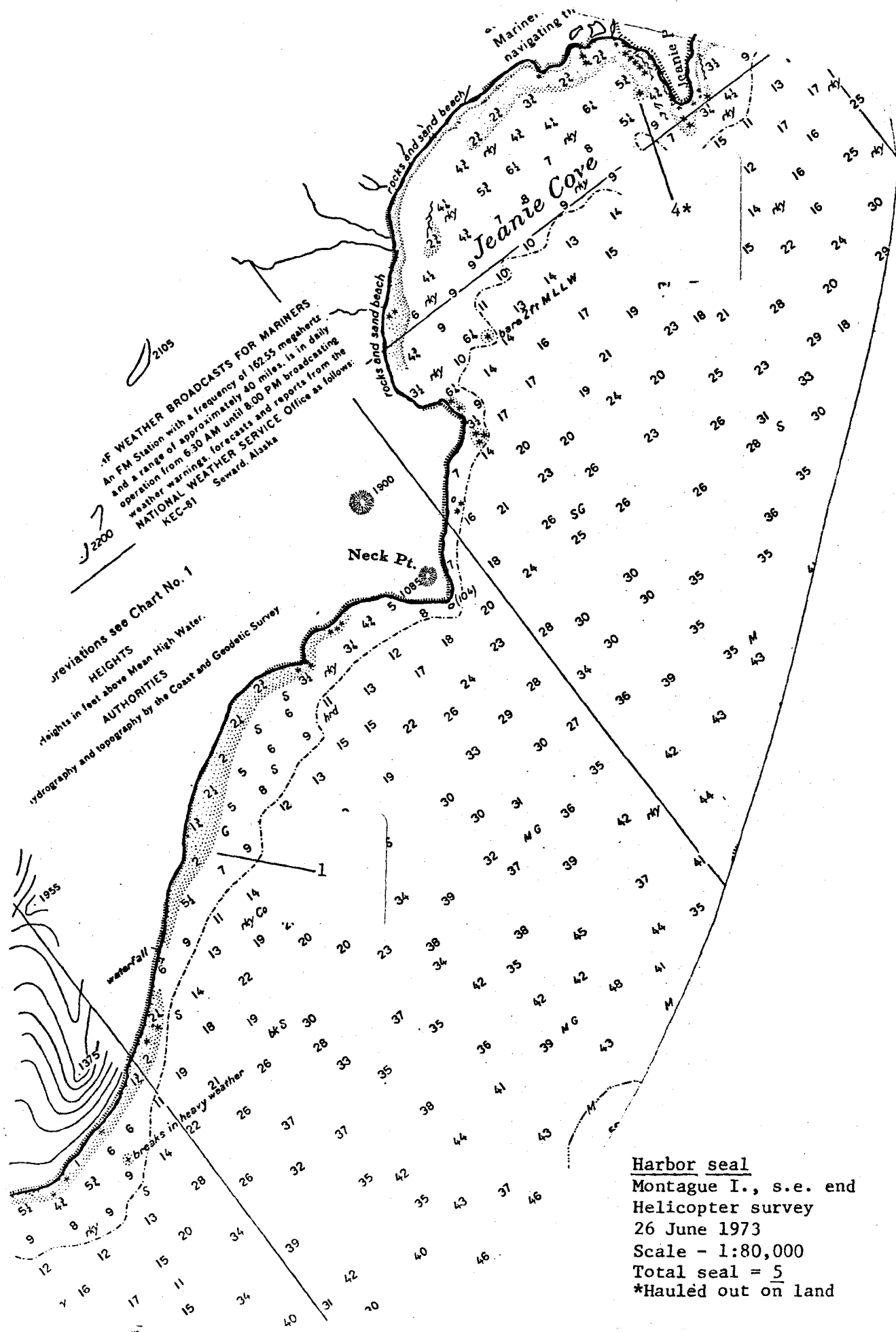
Harbor seal  
Montague I., w. side  
Helicopter survey  
26 June 1973  
Scale - 1:80,000  
Total seals = 23  
\*Hauled out on land

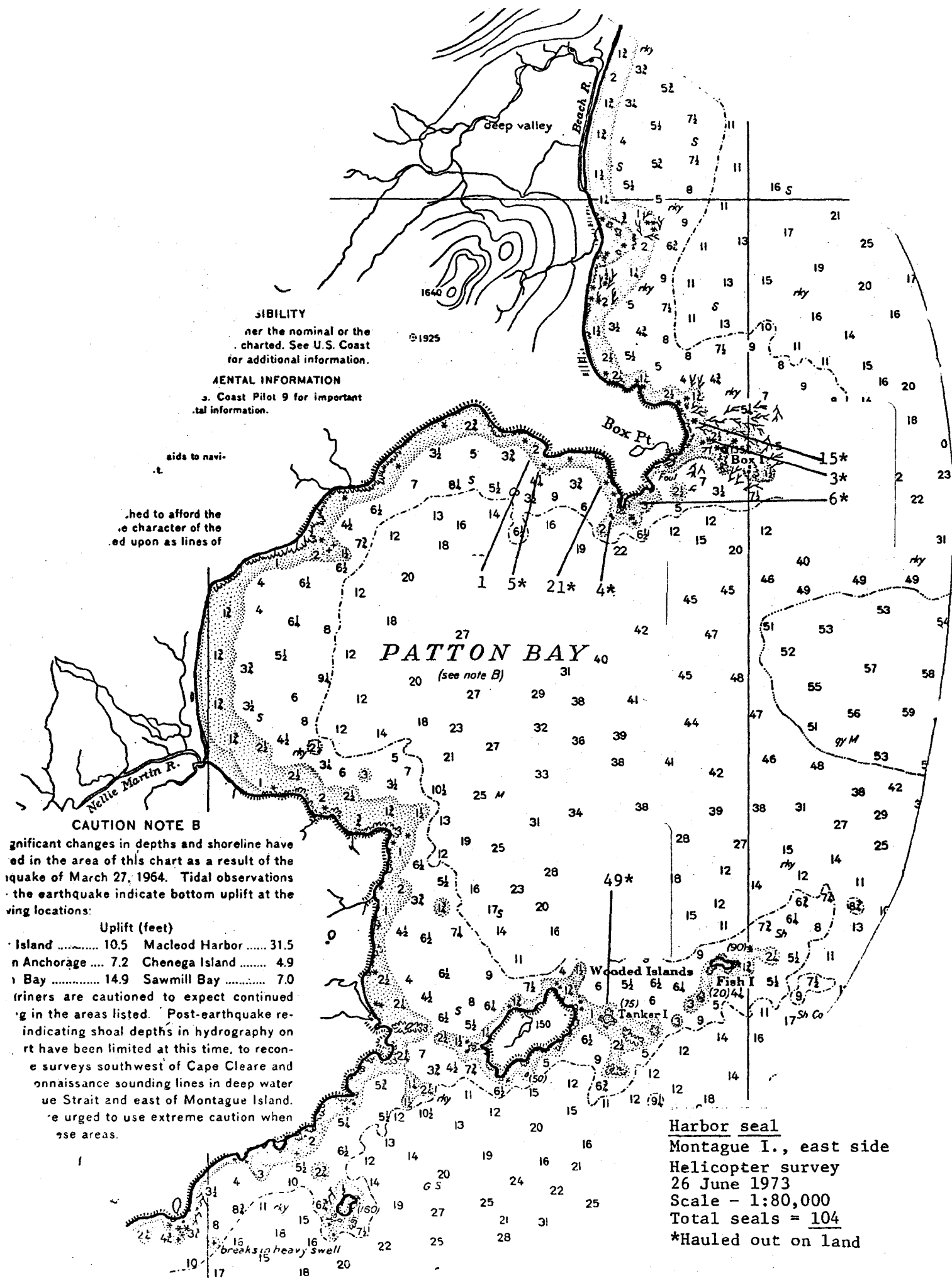


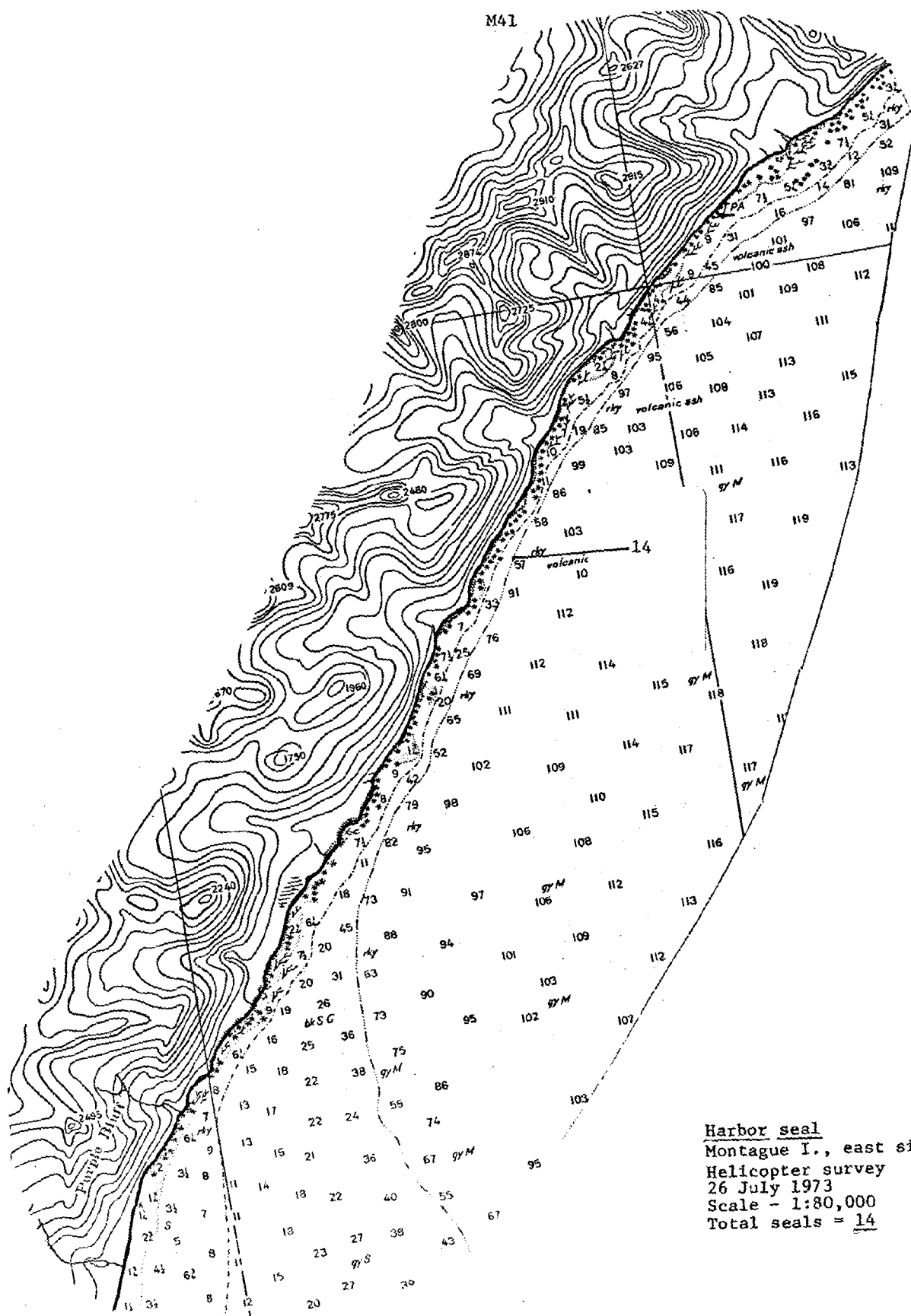


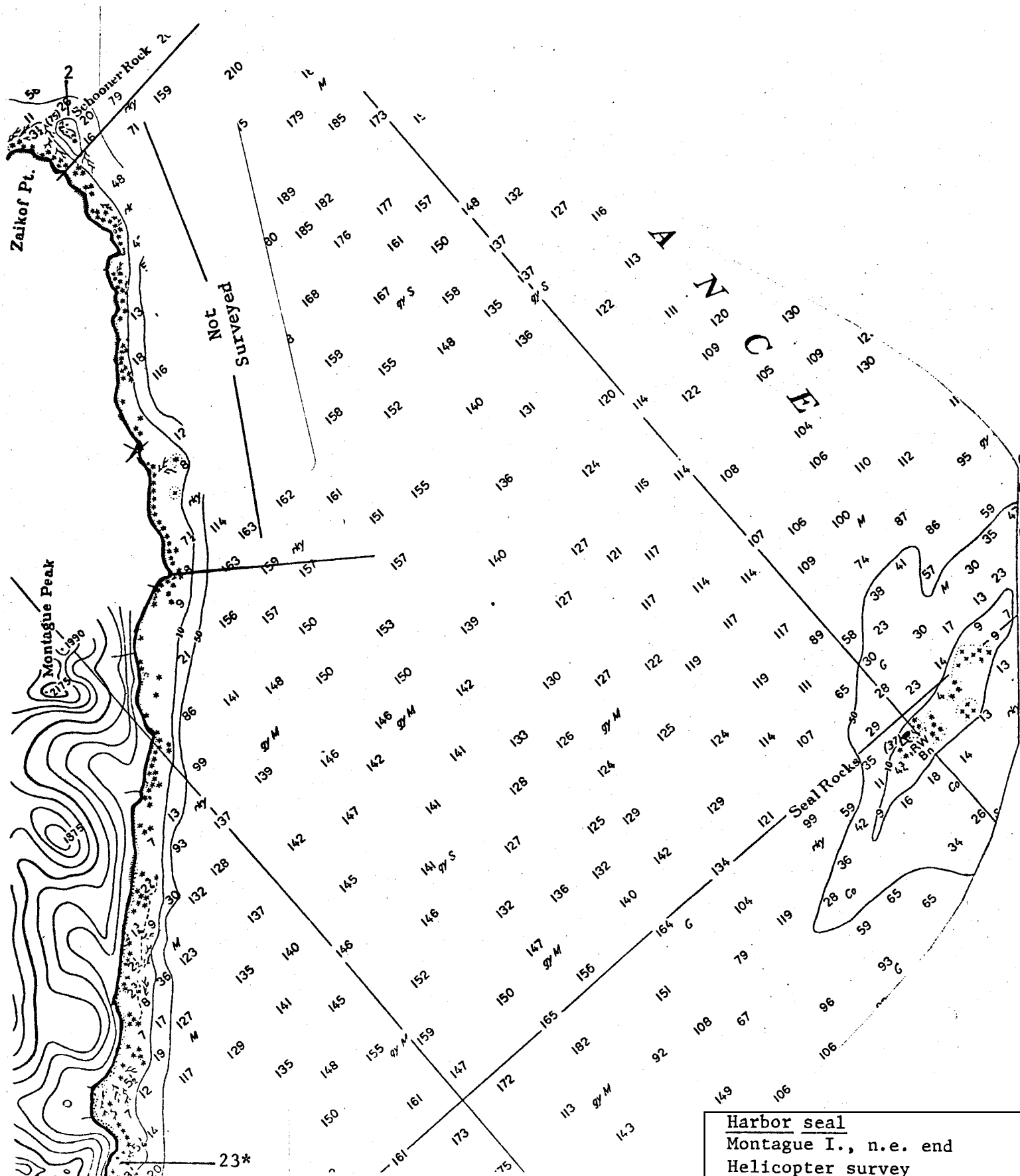
Harbor seal  
 Montague I., s.w. end  
 Helicopter survey  
 26 June 1973  
 Scale - 1:80,000  
 Total seal = 32  
 \*Hauled out on land

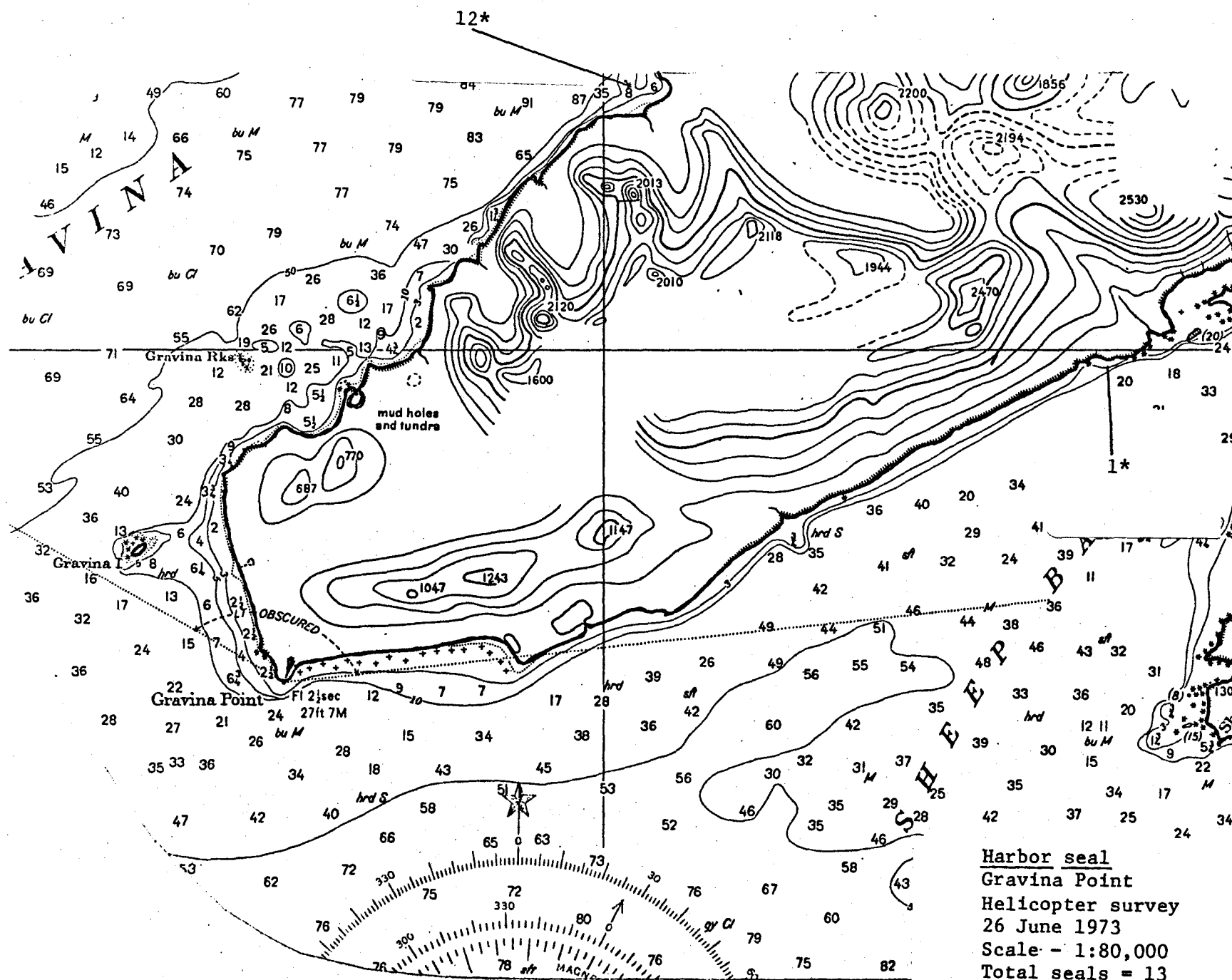




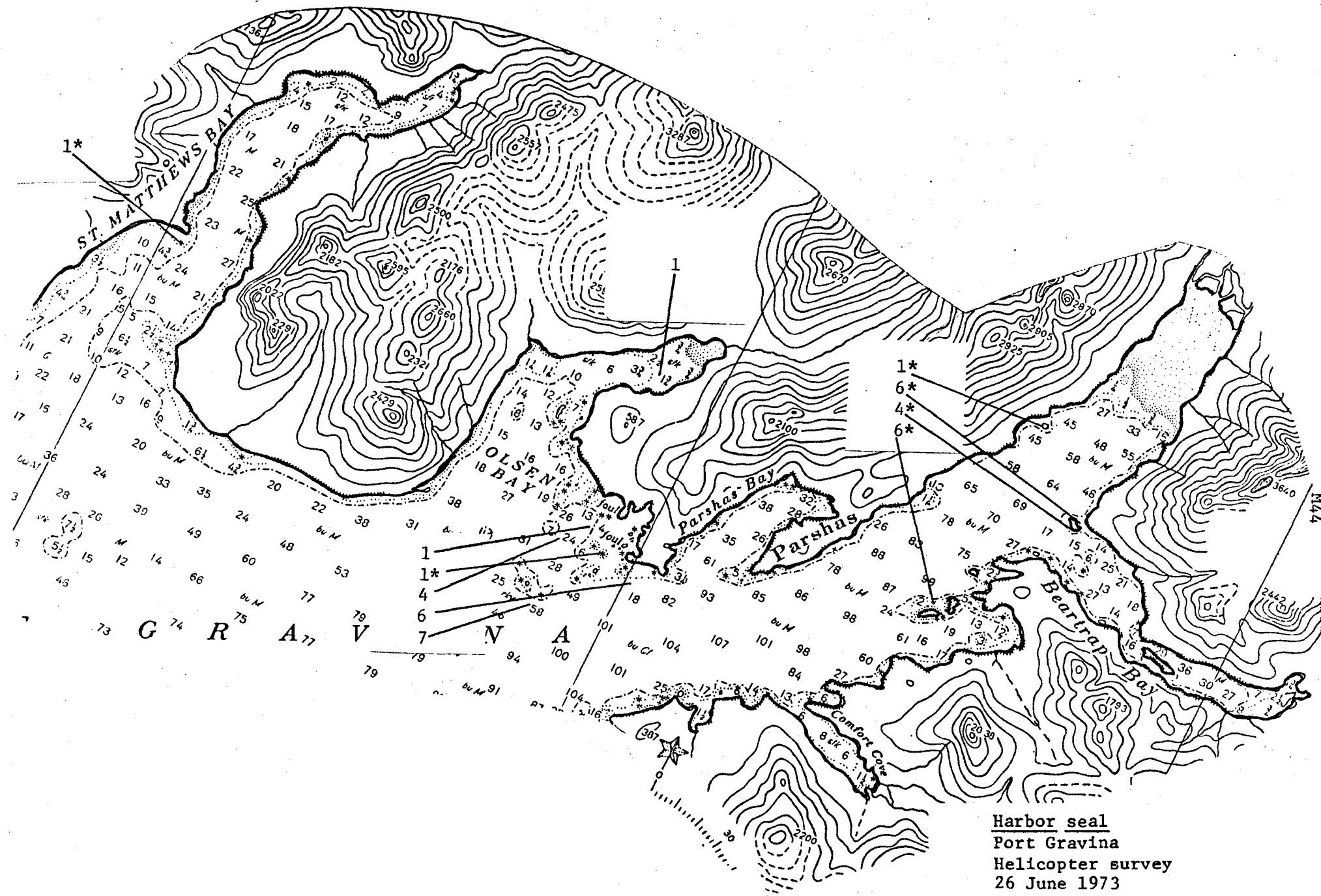






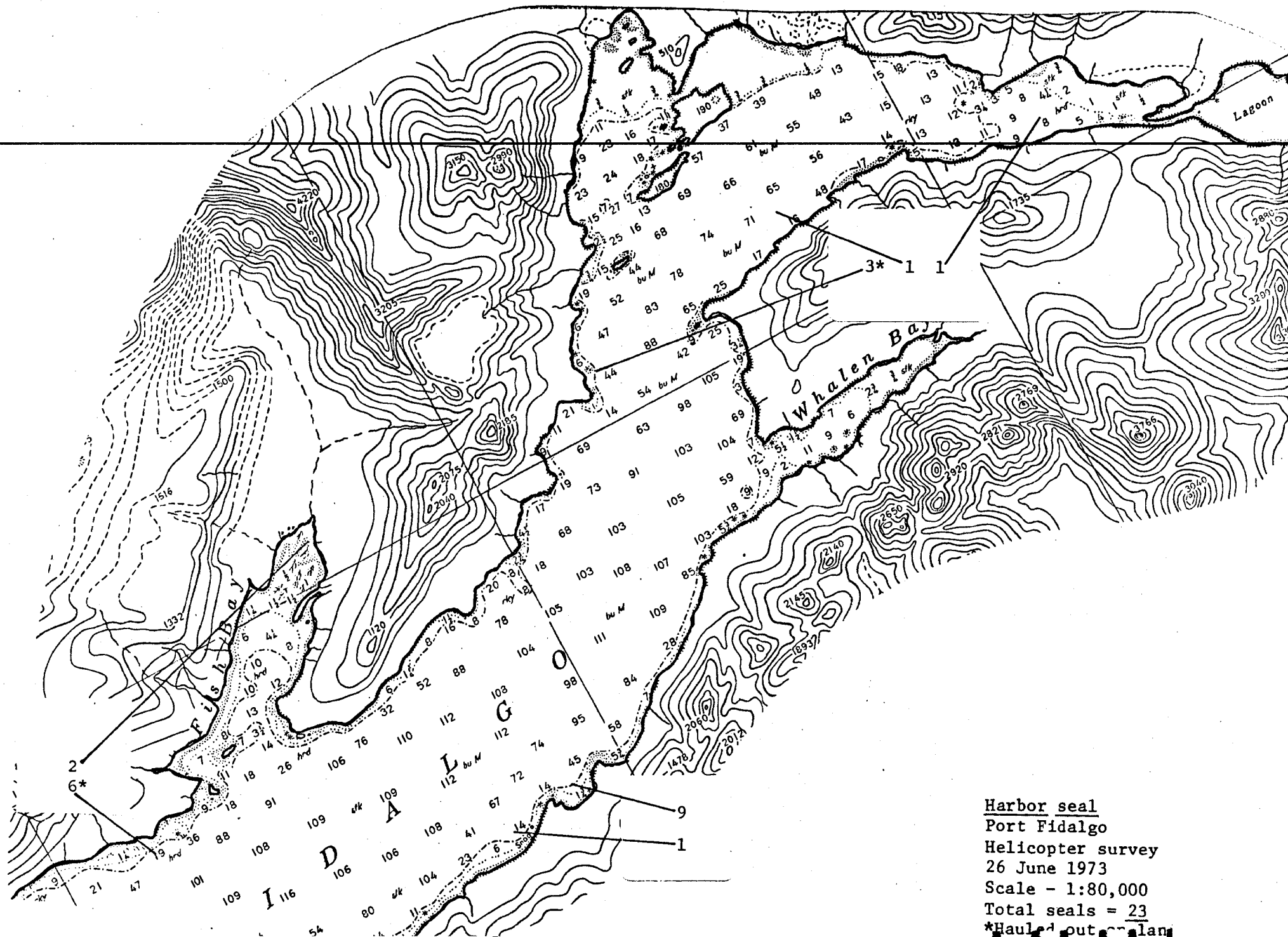


Harbor seal  
Gravina Point  
Helicopter survey  
26 June 1973  
Scale - 1:80,000  
Total seals = 13  
\*Hauled out on land



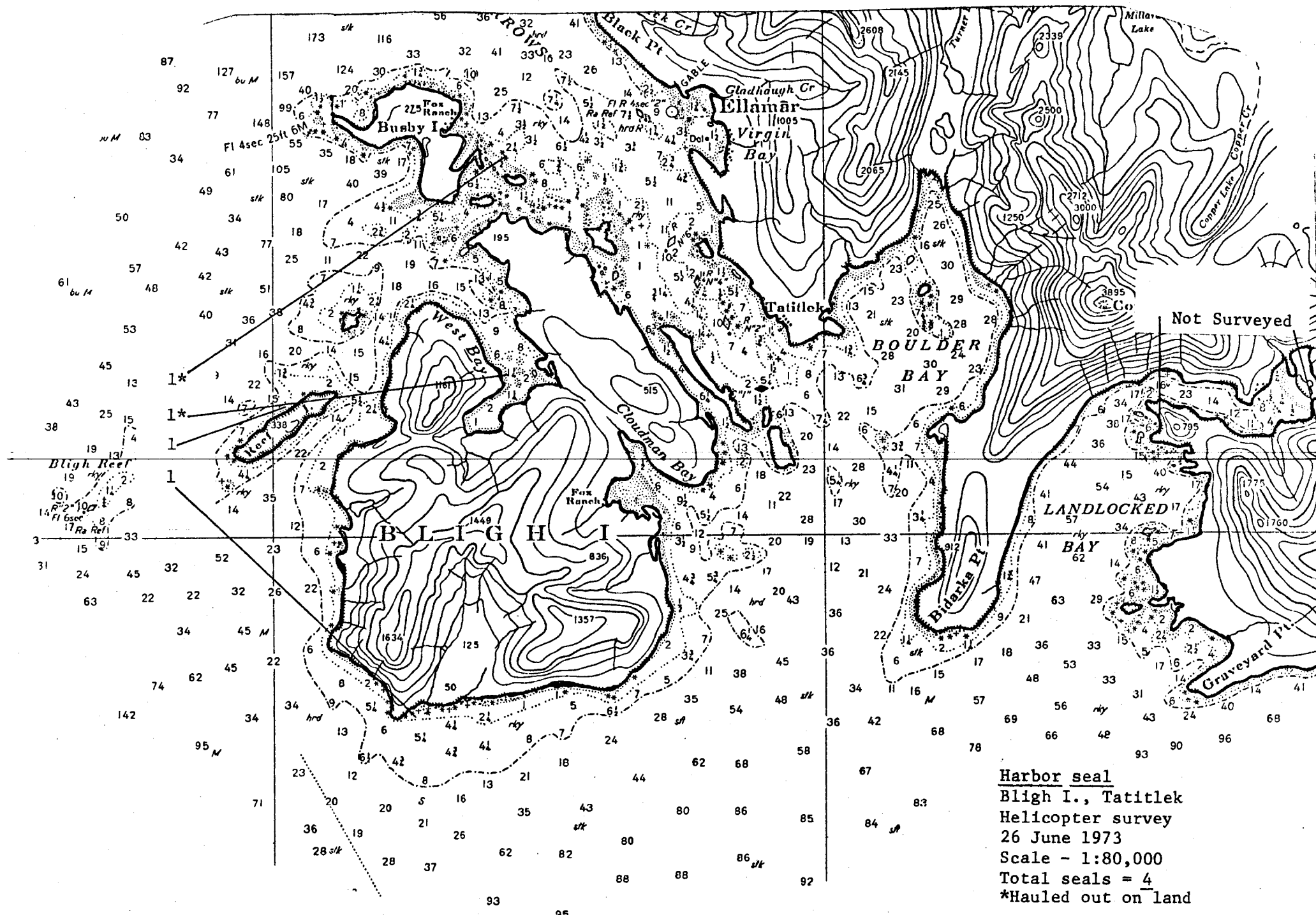
Harbor seal  
 Port Gravina  
 Helicopter survey  
 26 June 1973  
 Scale - 1:80,000  
 Total seals = 38  
 \*Hauled out on land

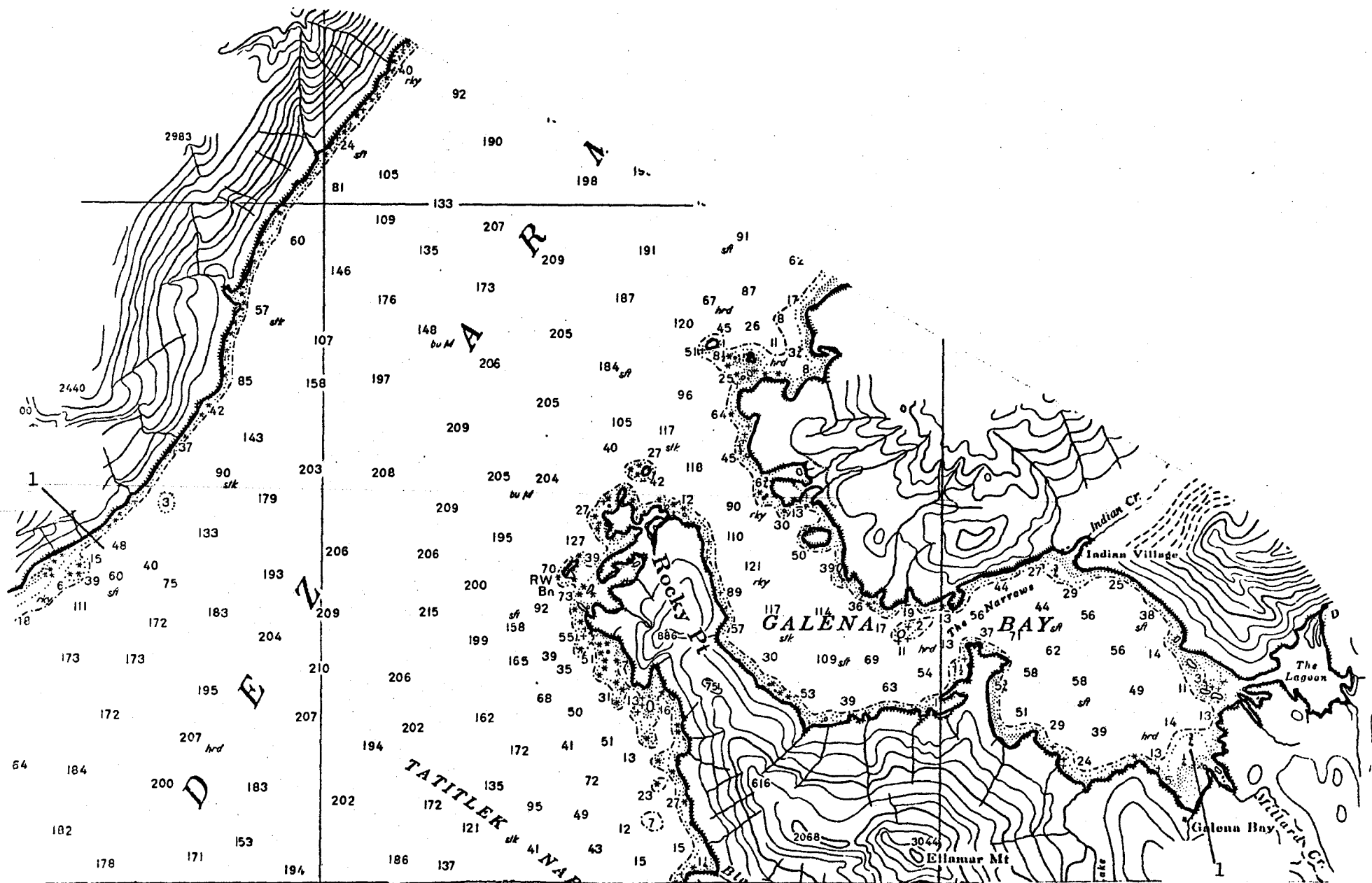




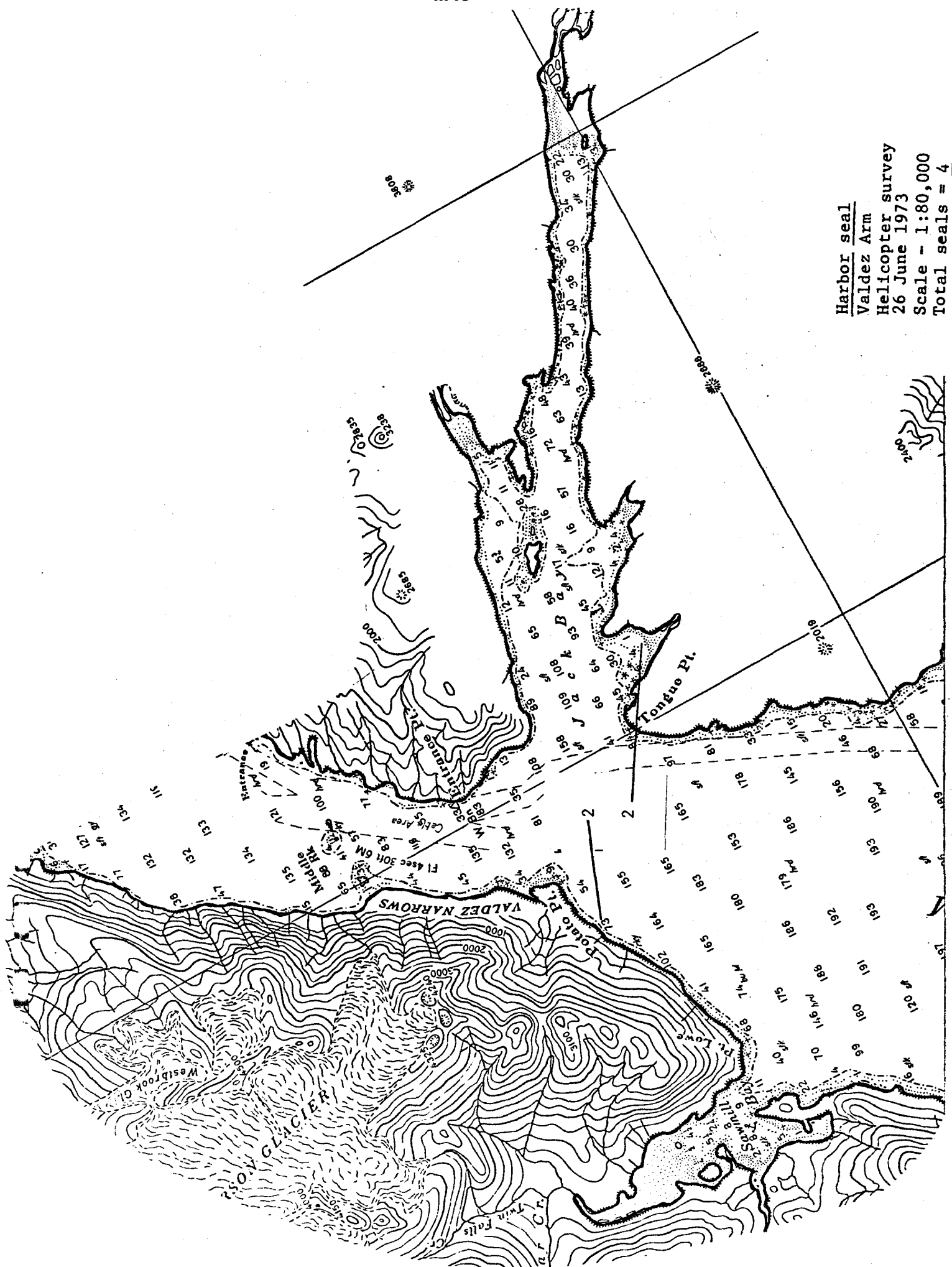
Harbor seal  
 Port Fidalgo  
 Helicopter survey  
 26 June 1973  
 Scale - 1:80,000  
 Total seals = 23  
 \*Hauled out on island

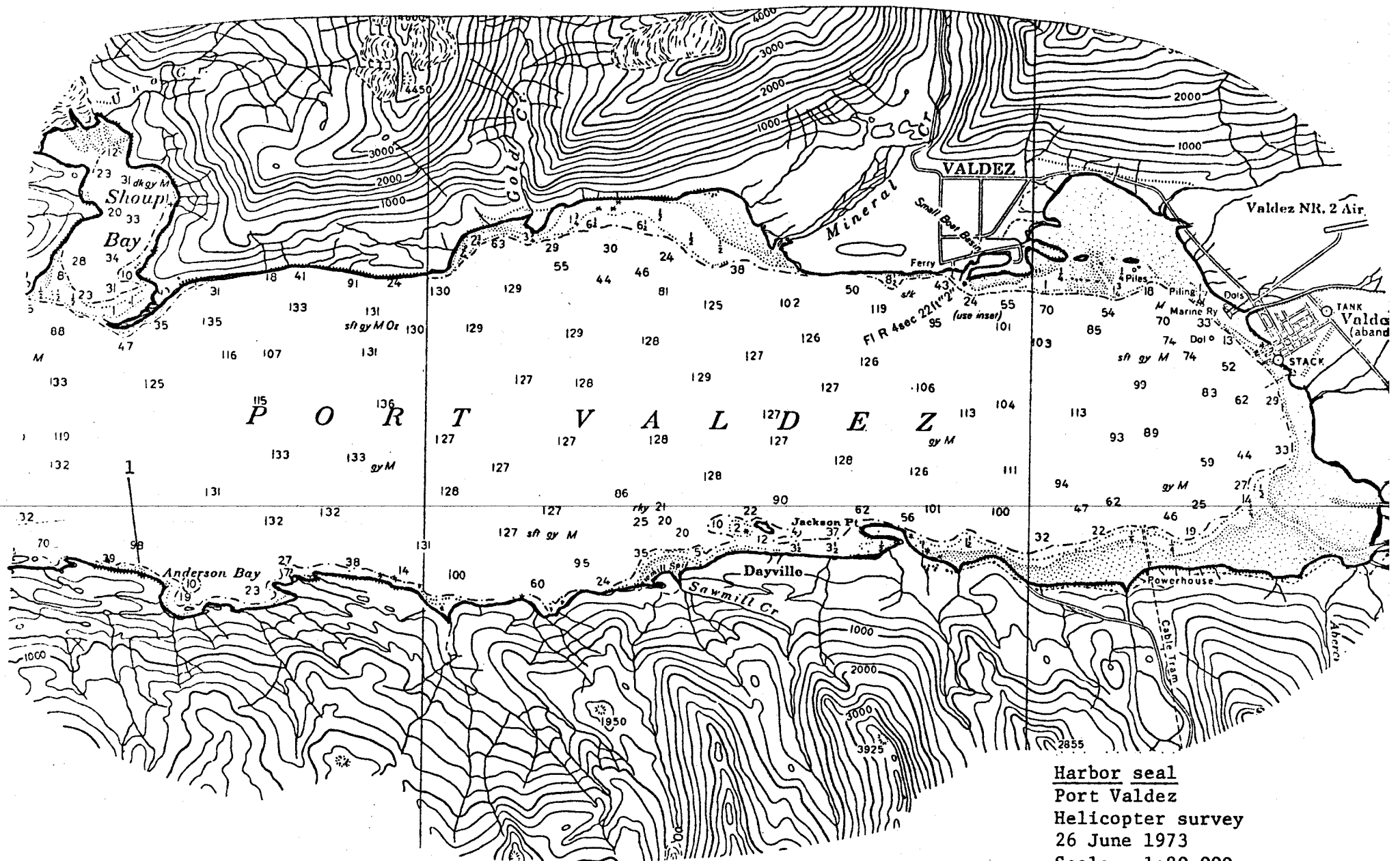






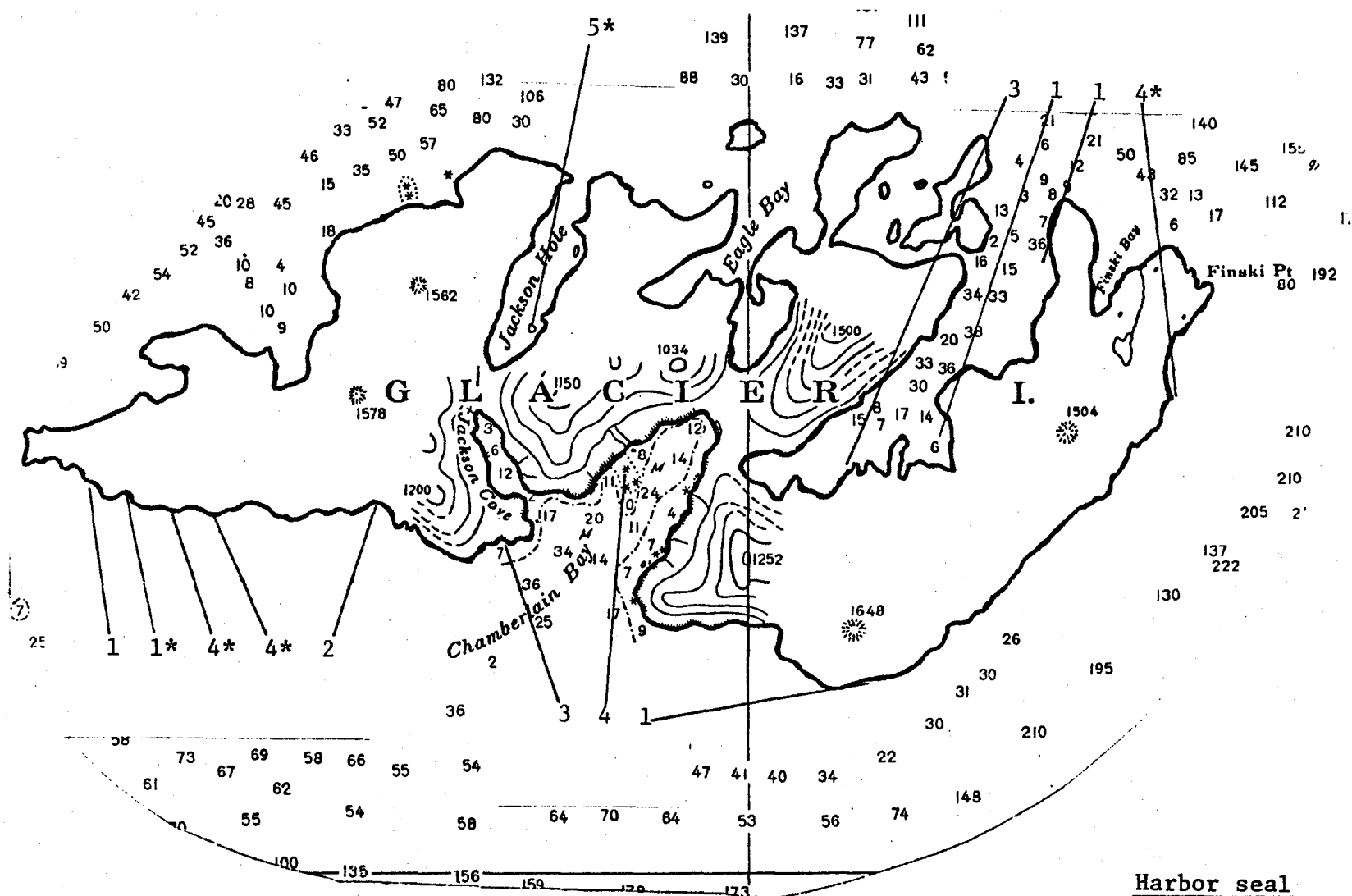
Harbor seal  
 Outer Valdez Arm  
 Helicopter survey  
 26 June 1973  
 Scale - 1:80,000  
 Total seals = 2



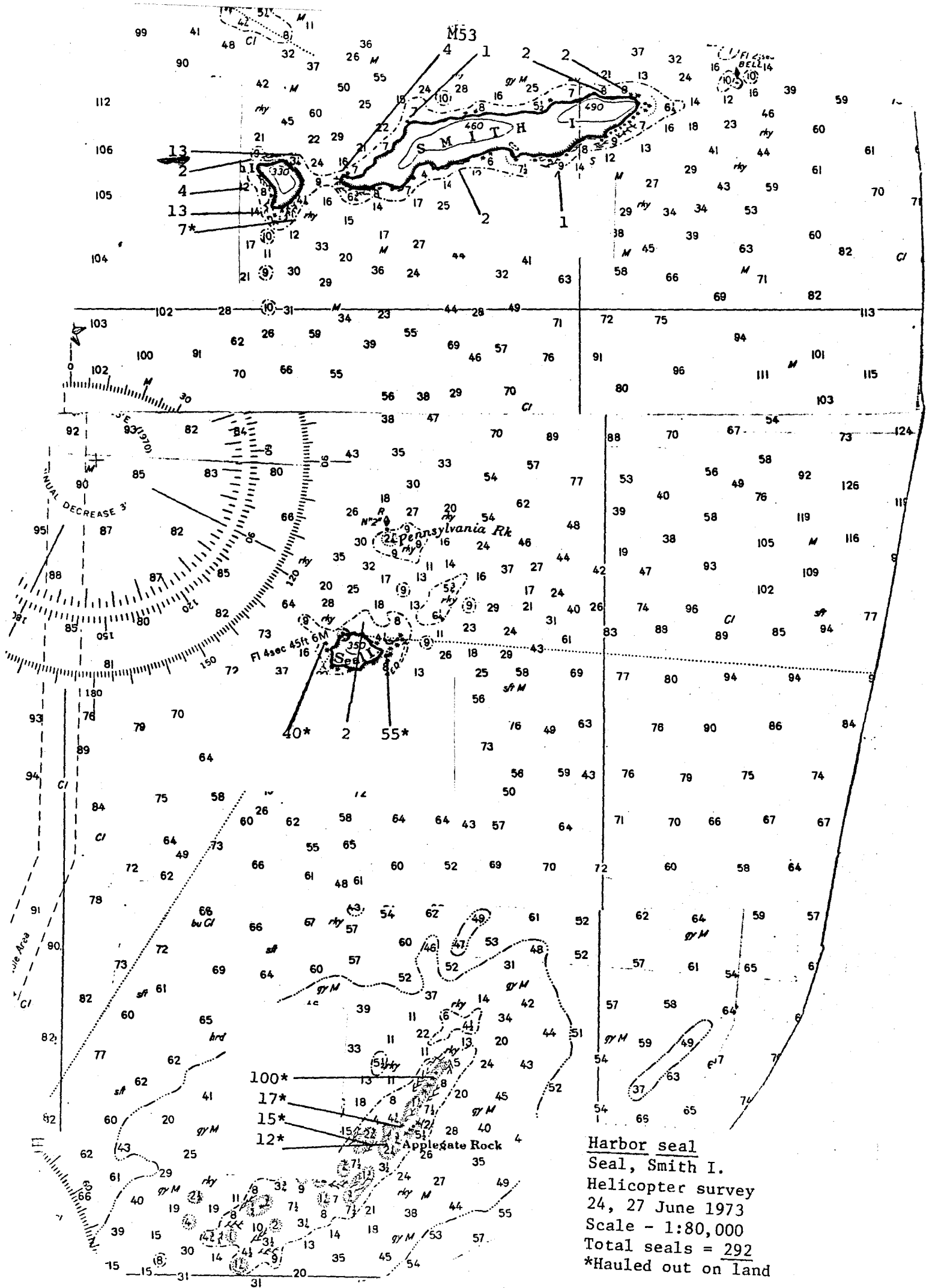


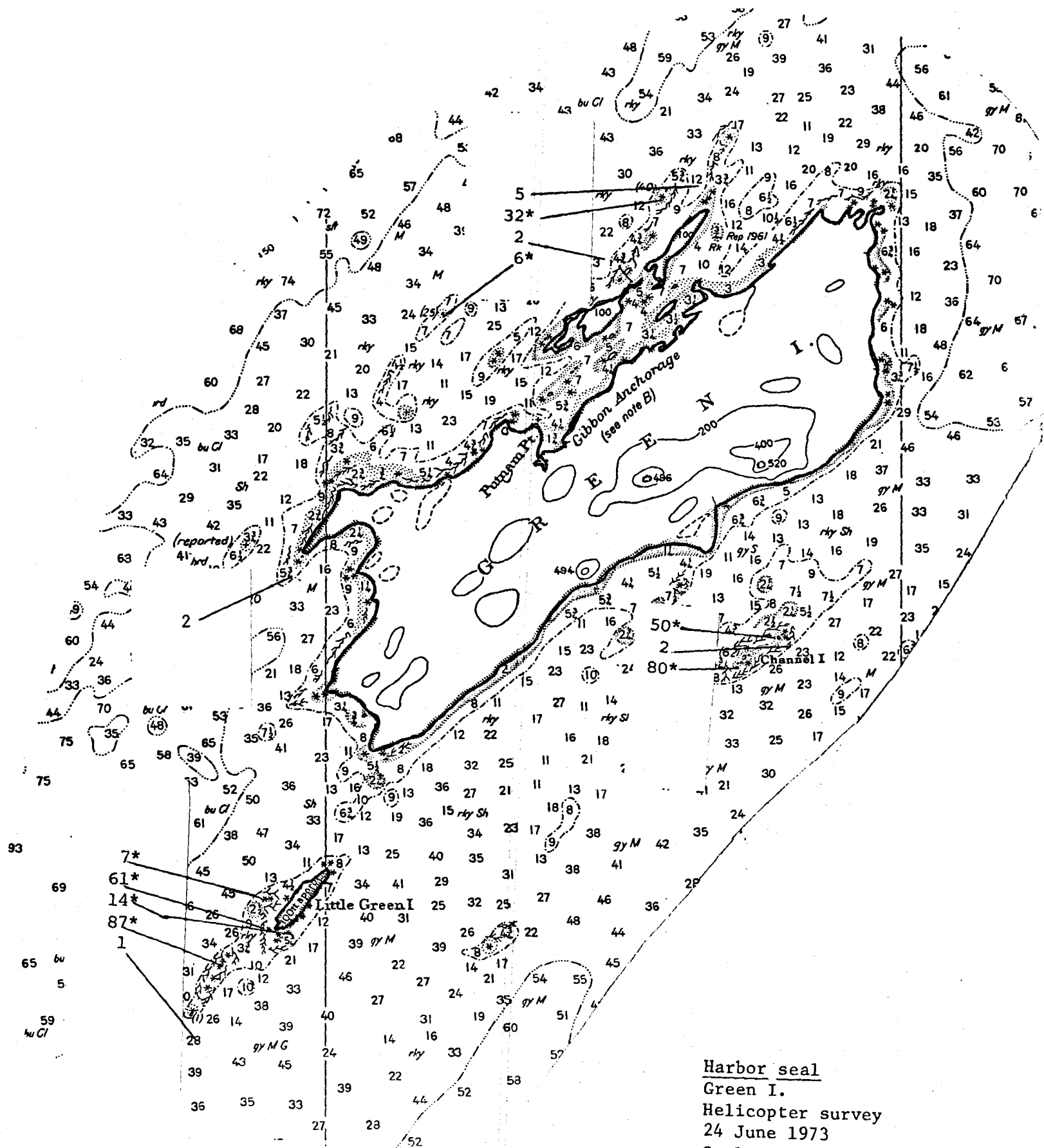
Harbor seal  
 Port Valdez  
 Helicopter survey  
 26 June 1973  
 Scale - 1:80,000  
 Total seals = 1





Harbor seal  
 Glacier I.  
 Helicopter survey  
 28 June 1973  
 Scale - 1:80,000  
 Total seals = 34  
 \*Hauled out on land





### Harbor seal

Green I.

Helicopter survey  
24 June 1973

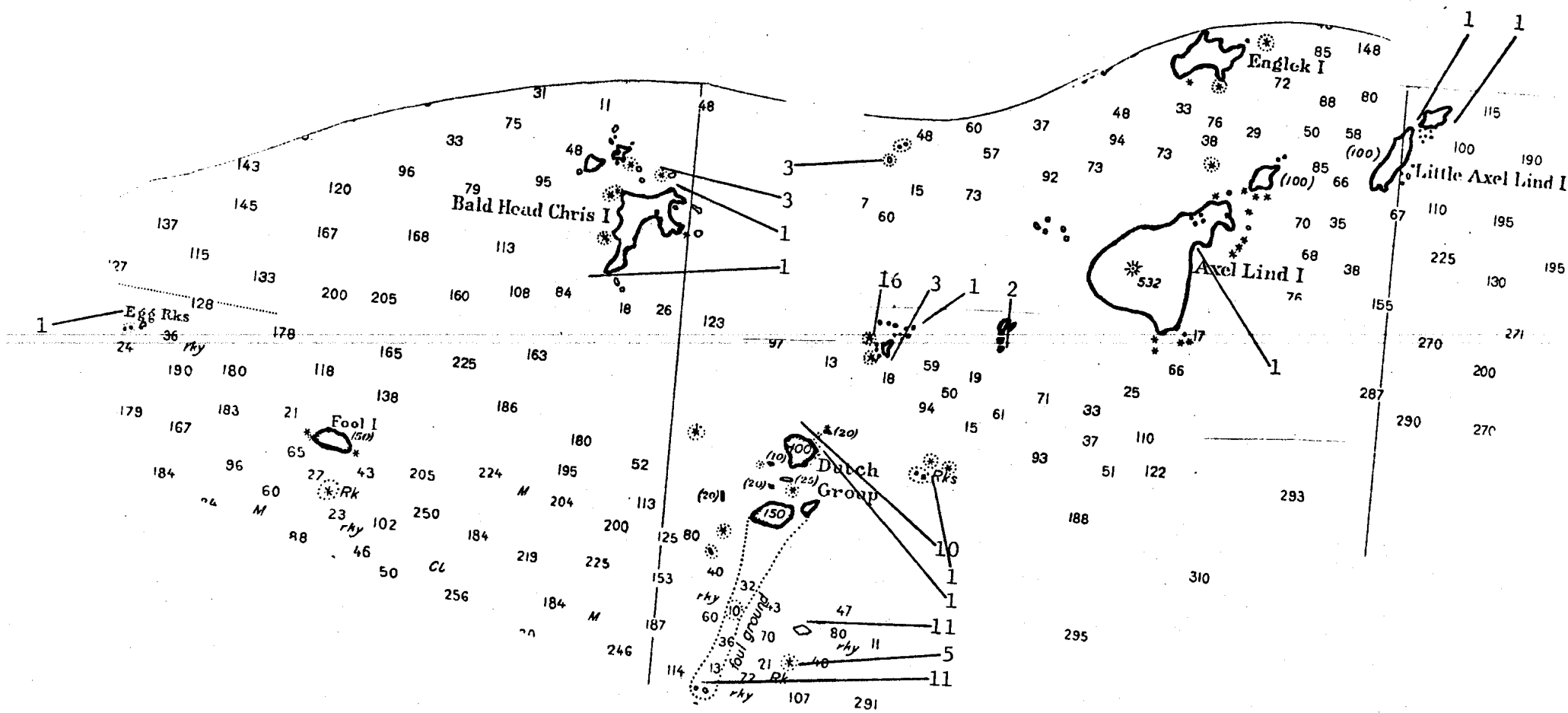
Scale - 1:80,000

Total seals = 349

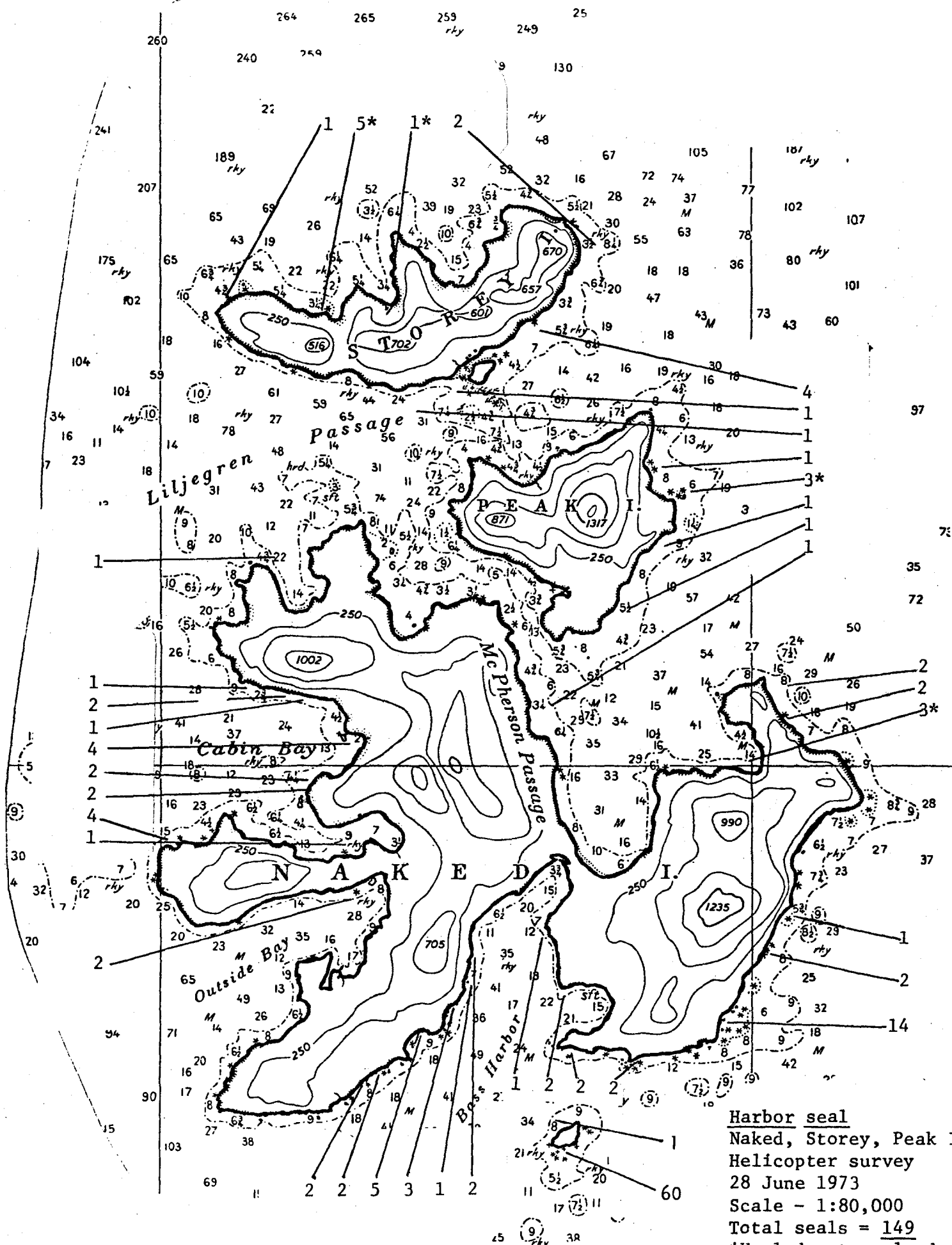
\*Hauled out on land

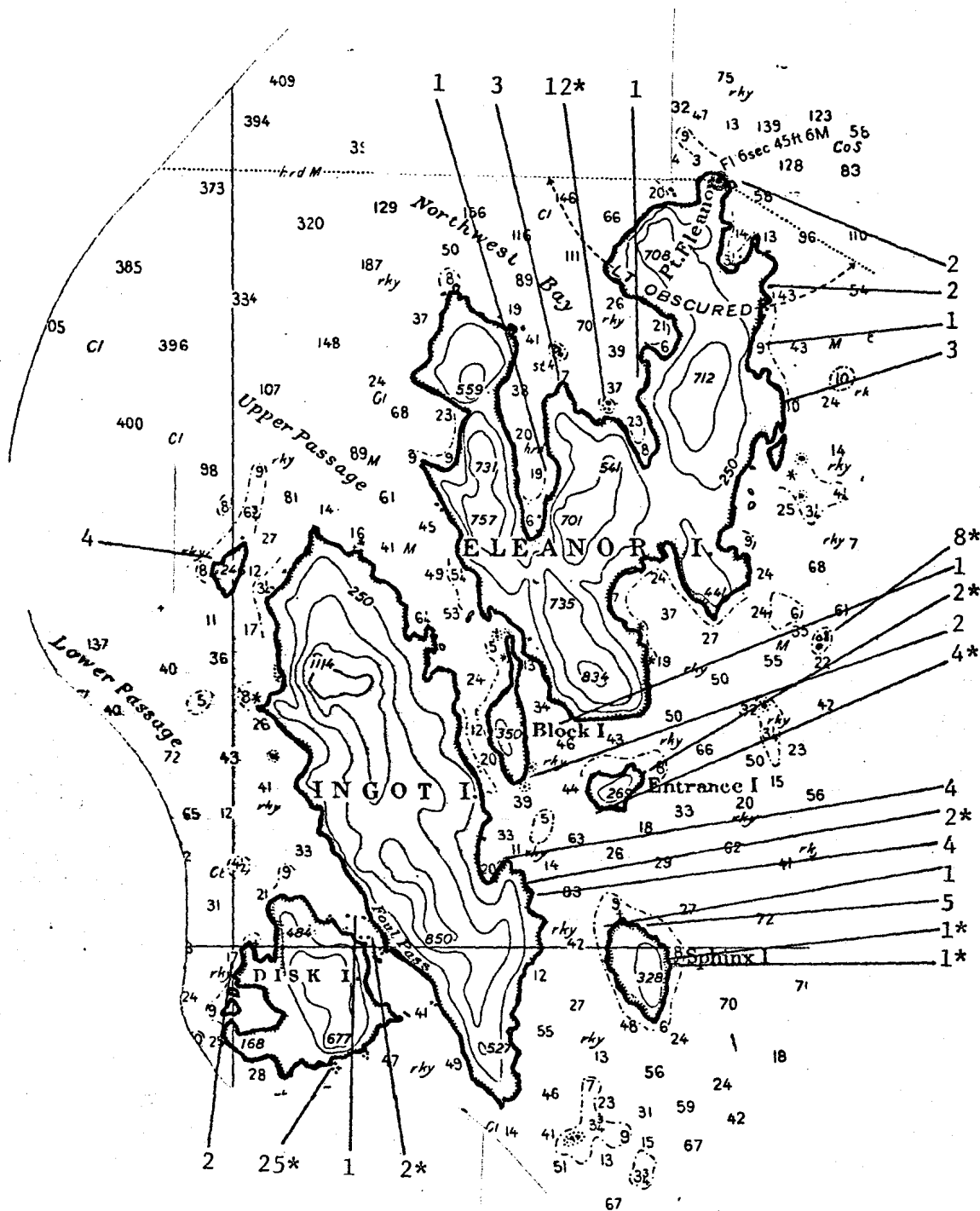


Harbor seal  
Unakwik Inlet  
Helicopter survey  
28, 29 June 1973  
Scale - 1:200,000  
Total seals = 288  
\*Hauled out on land  
\*\*Hauled out on ice

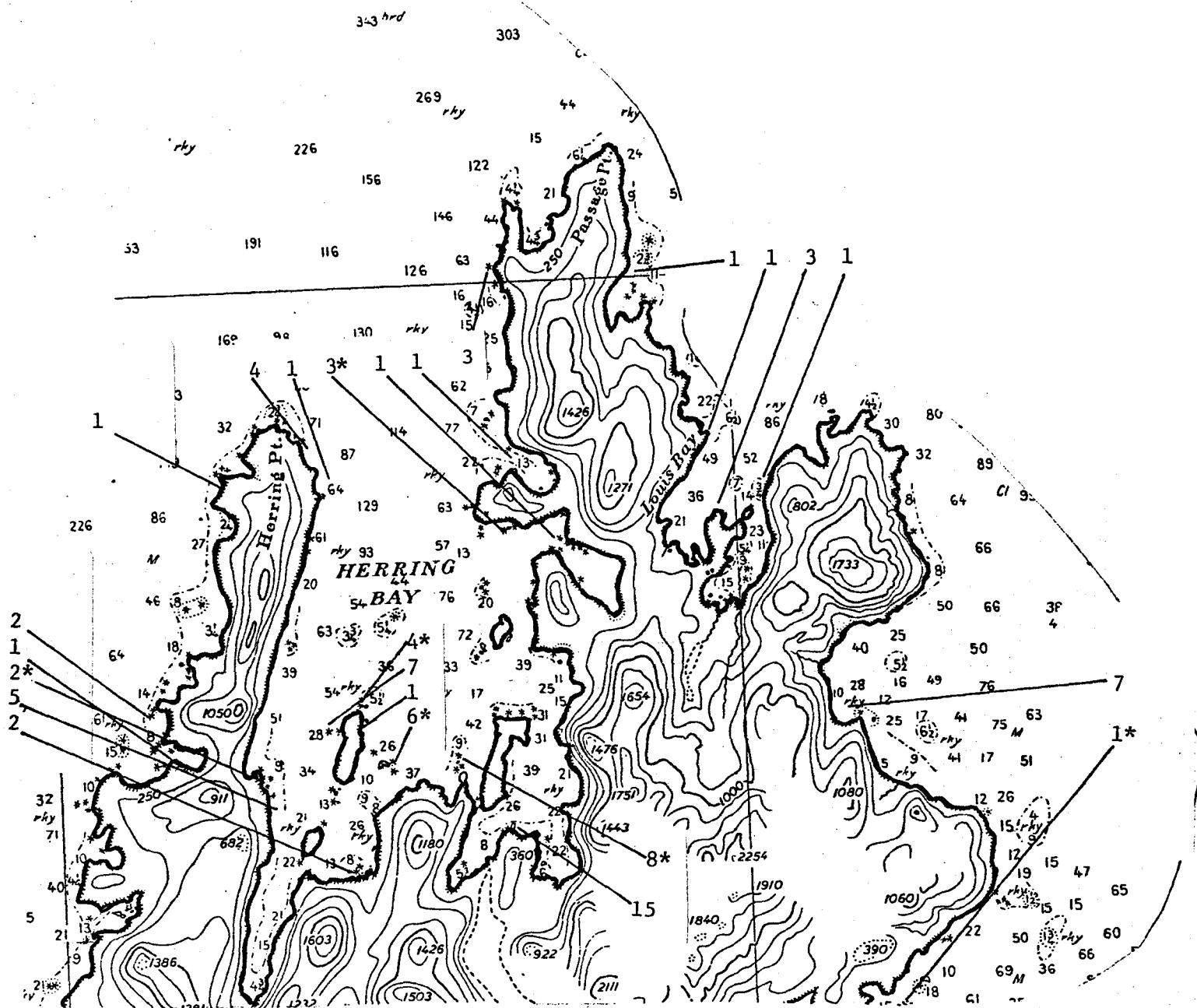


Harbor seal  
 Axel Lind, Dutch Group  
 Helicopter survey  
 28, 29 June 1973  
 Scale - 1:80,000  
 Total seals = 73  
 \*Hauled out on land

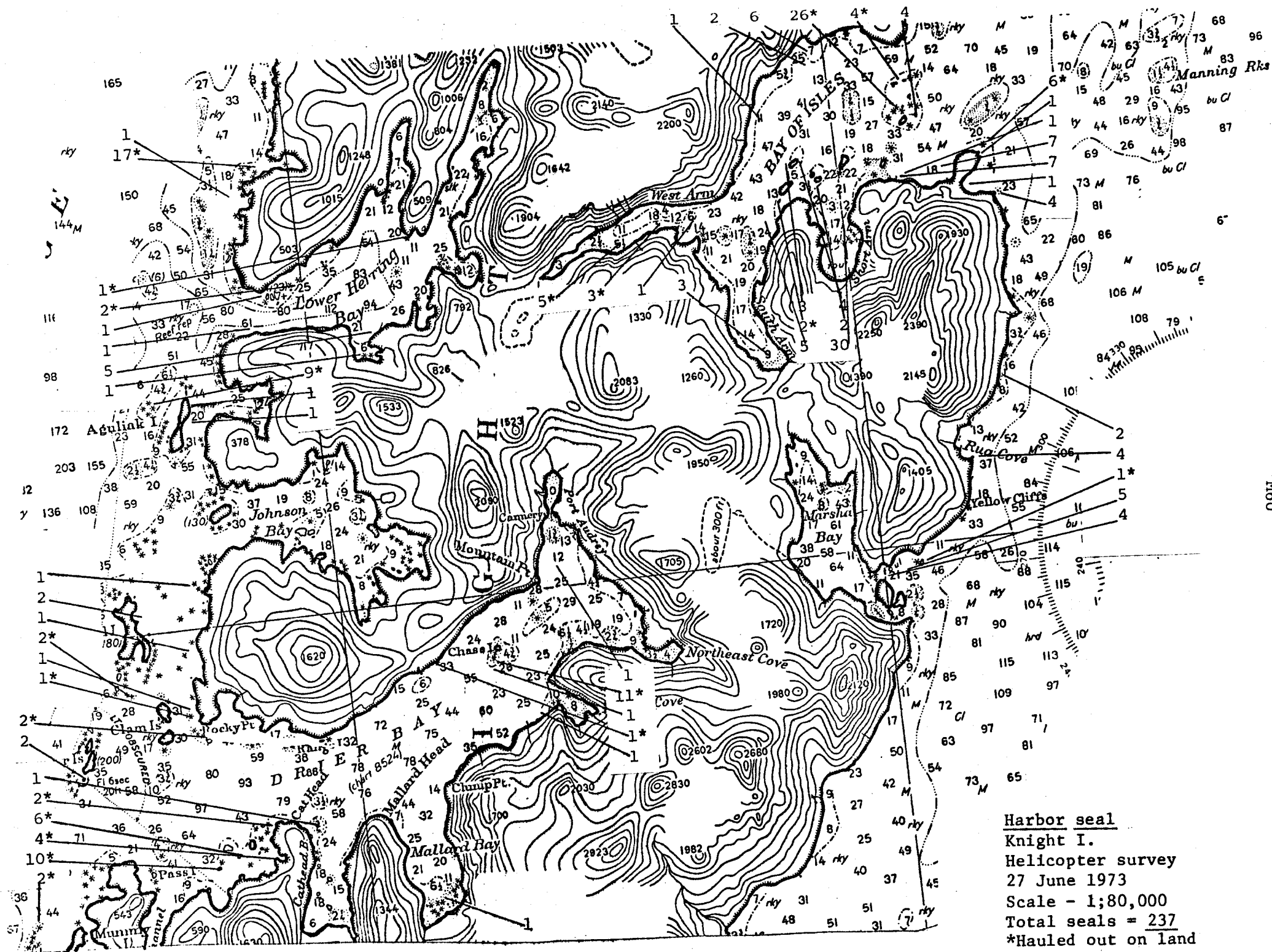




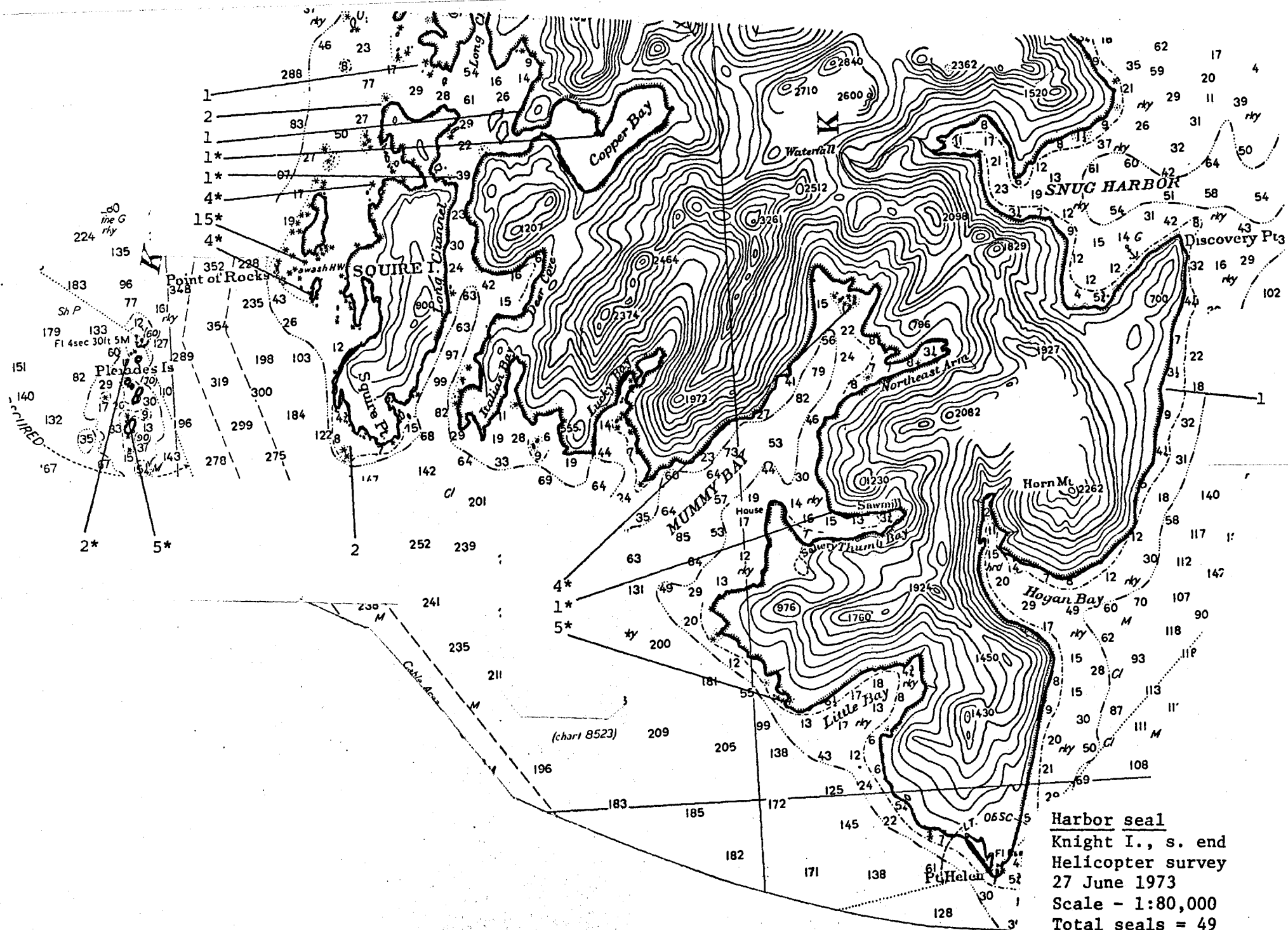
Harbor seal  
 Eleanor, Ingot, Disk I.  
 Helicopter survey  
 27 June 1973  
 Scale - 1:80,000  
 Total seals = 94  
 \*Hauled out on land



Harbor seal  
 Knight I., n. end  
 Helicopter survey  
 27 June 1973  
 Scale - 1:80,000  
 Total seals = 81  
 \*Hauled out on land



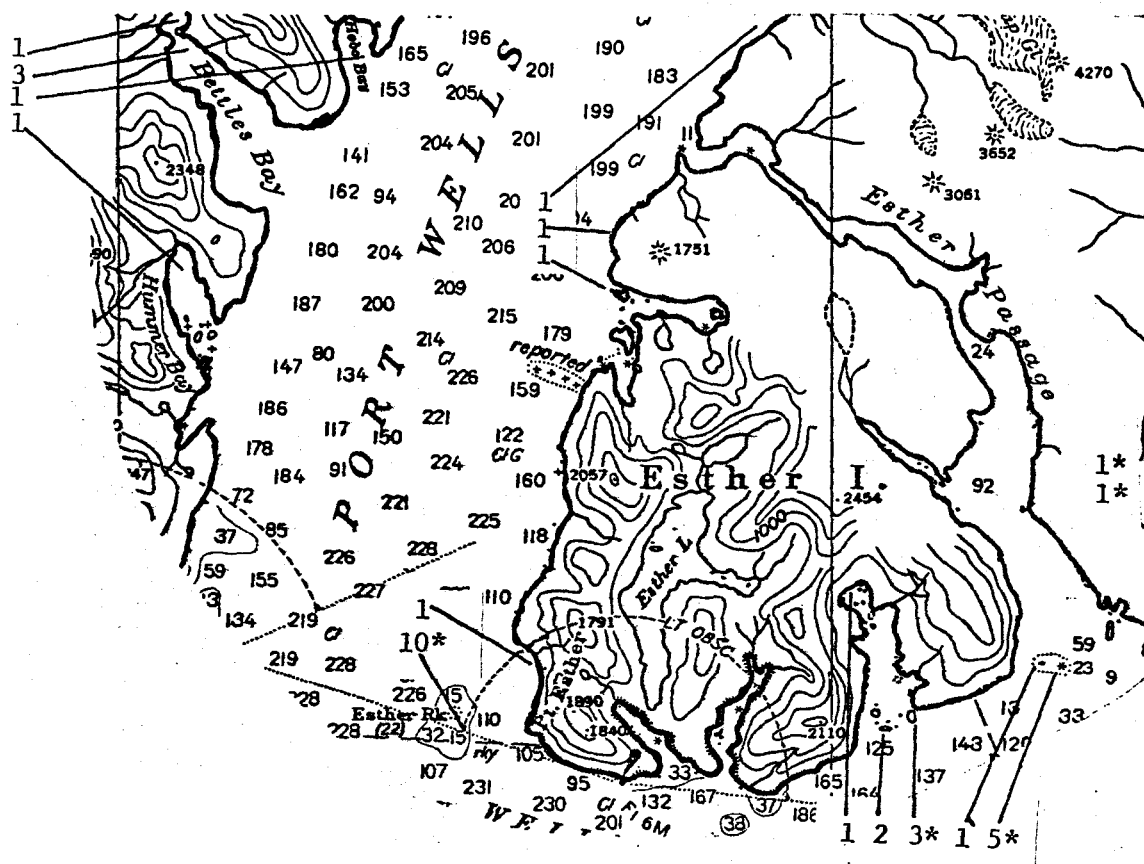
Harbor seal  
 Knight I.  
 Helicopter survey  
 27 June 1973  
 Scale - 1:80,000  
 Total seals = 237  
 \*Hauled out on land



Harbor seal  
 Knight I., s. end  
 Helicopter survey  
 27 June 1973  
 Scale - 1:80,000  
 Total seals = 49  
 \*Hauled out on land







# Harbor seal

Esther I.

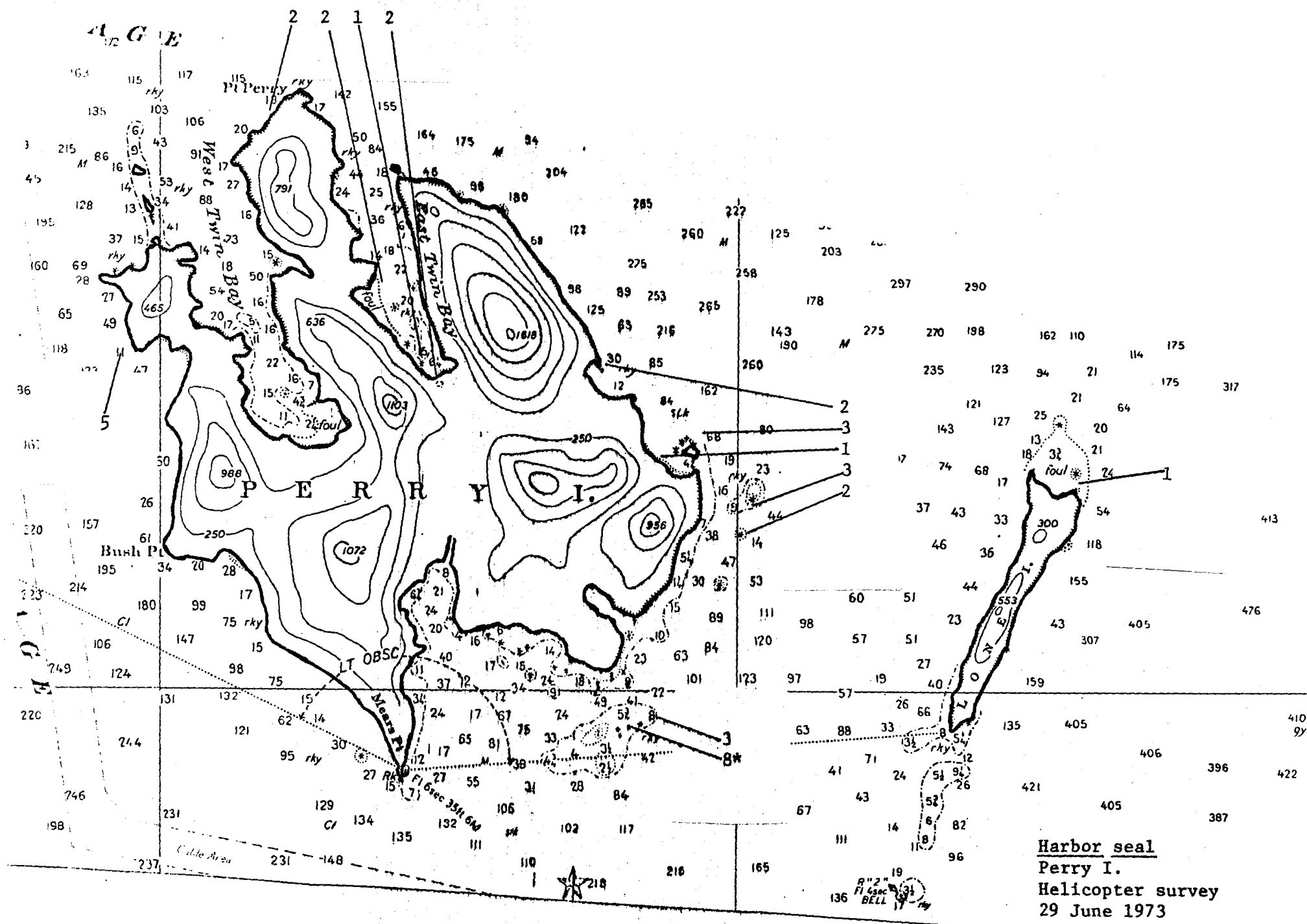
Skiff, helicopter survey

7, 29 June 1973

Scale - 1:200,000

Total seals = 34

\*Hauled out on land



# Harbor seal

Perry I.

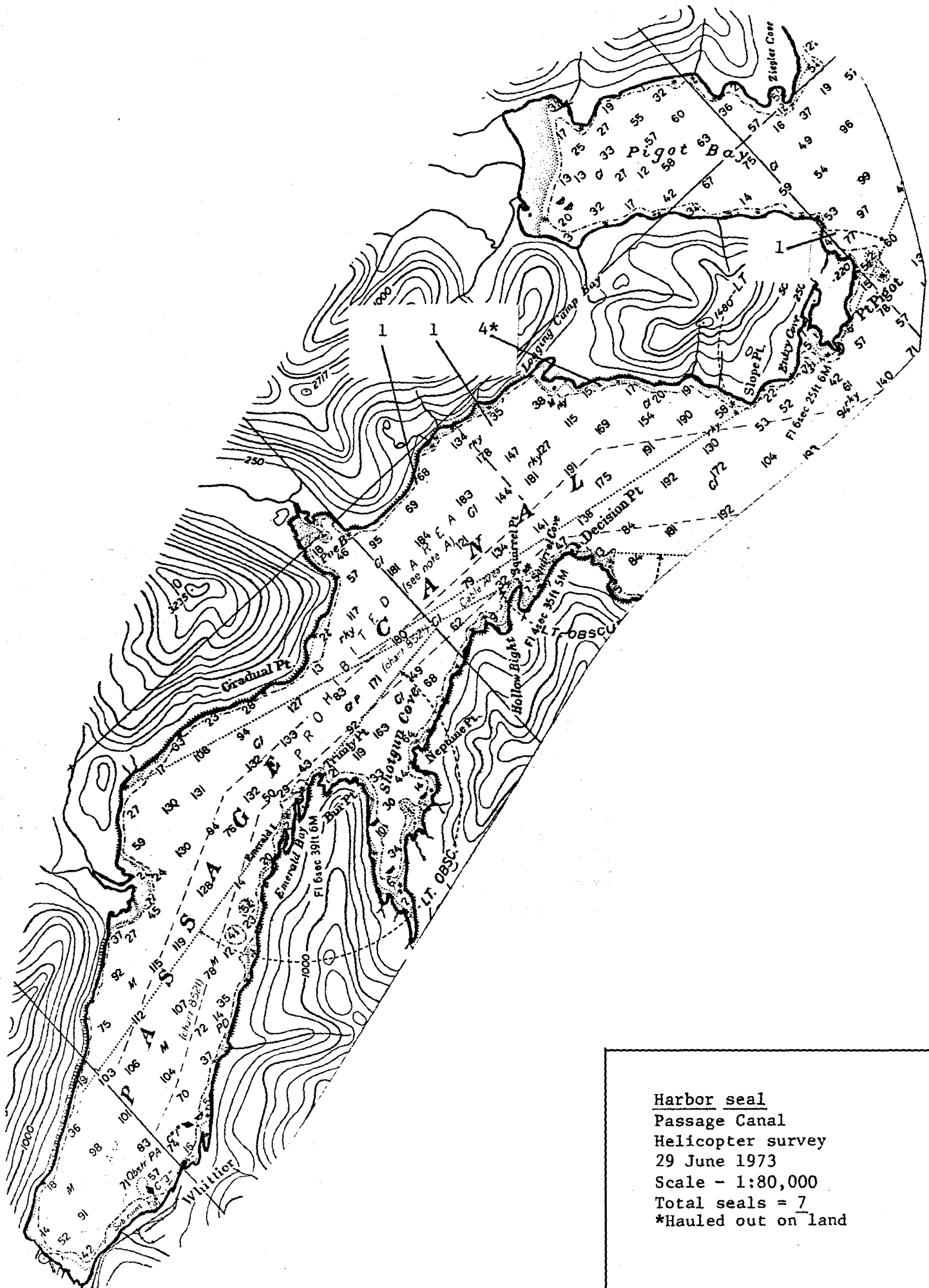
Helicopter survey

29 June 1973

Scale - 1:80,000

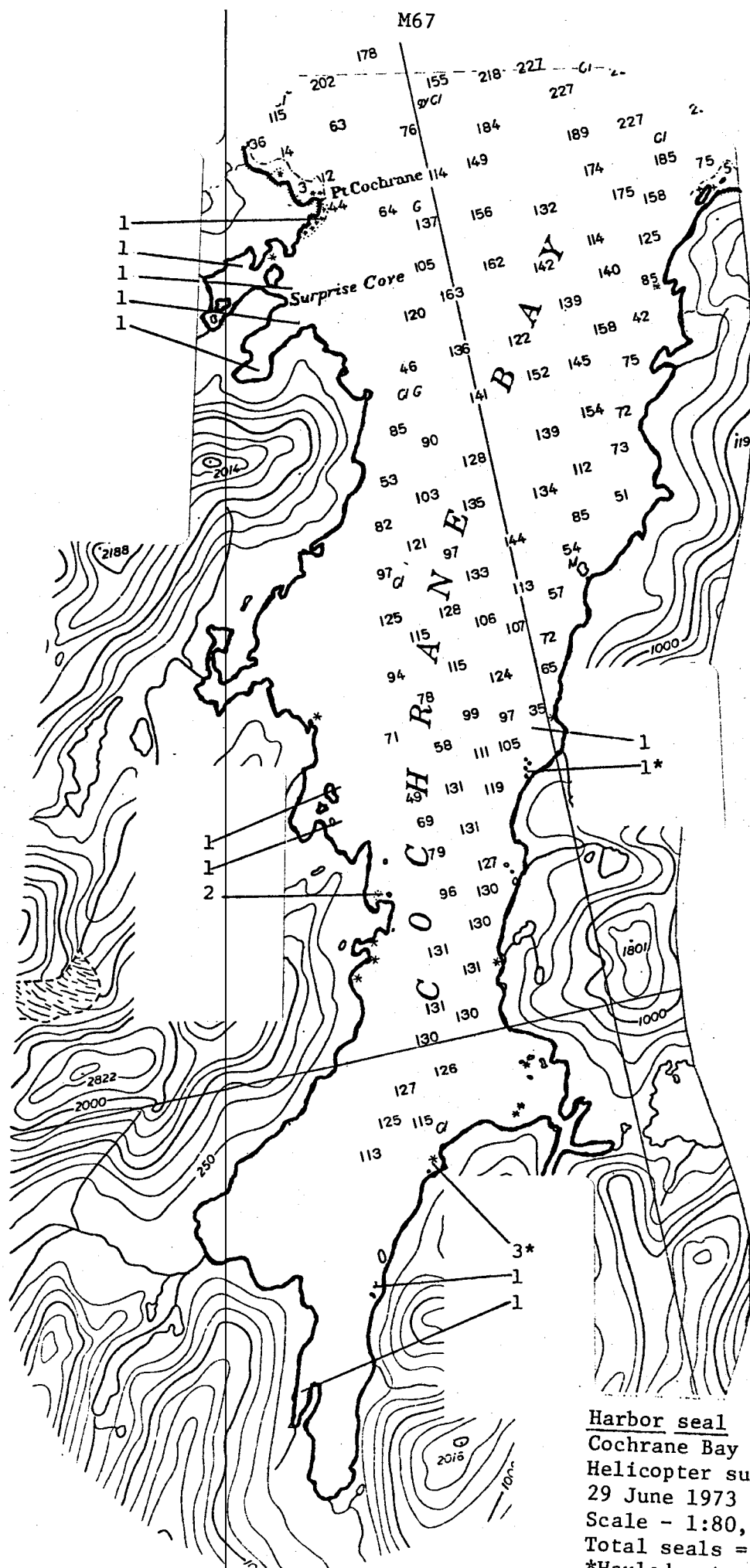
Total seals = 35

\*Hauled out on land



Harbor seal  
 Passage Canal  
 Helicopter survey  
 29 June 1973  
 Scale - 1:80,000  
 Total seals = 7  
 \*Hauled out on land

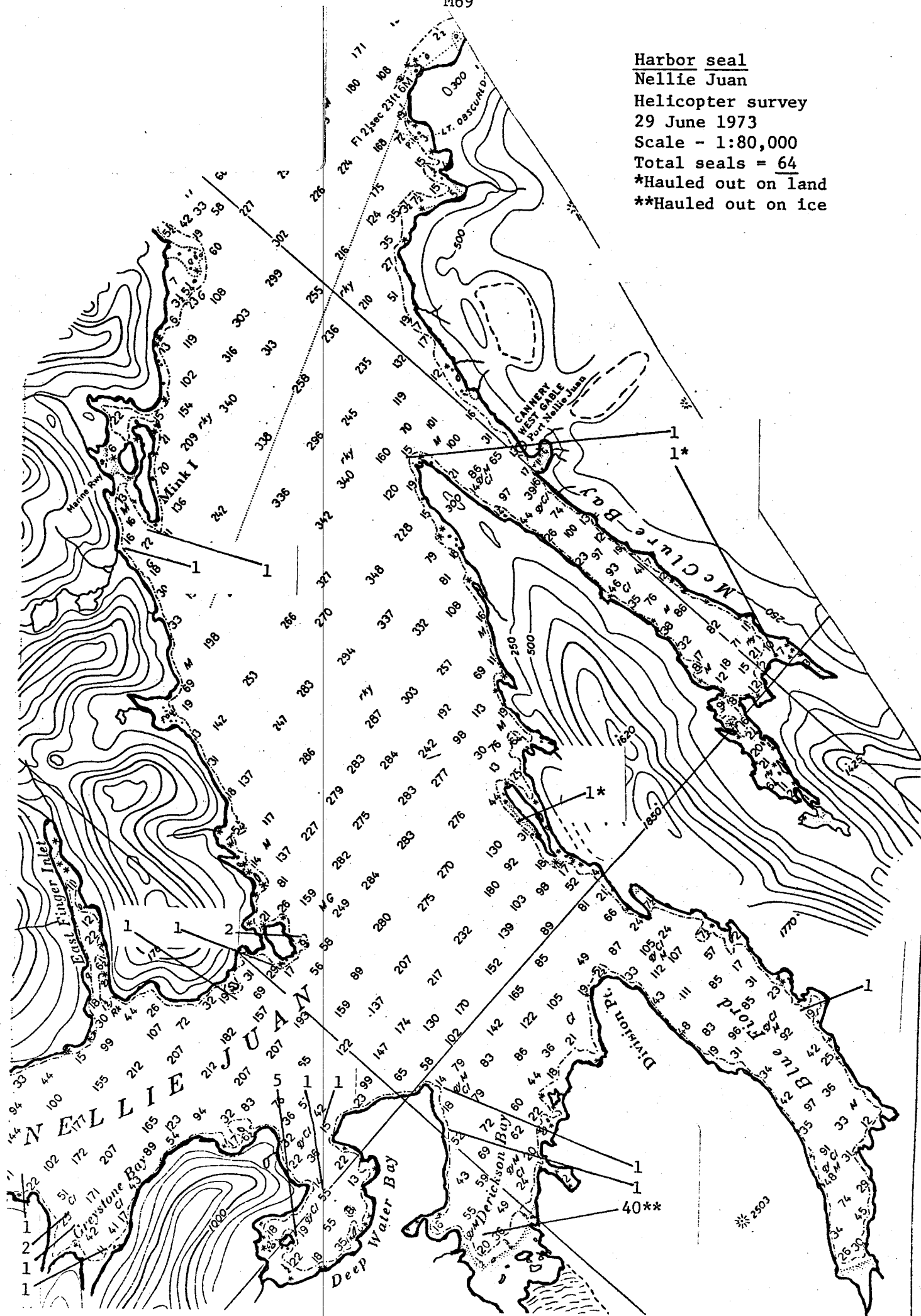


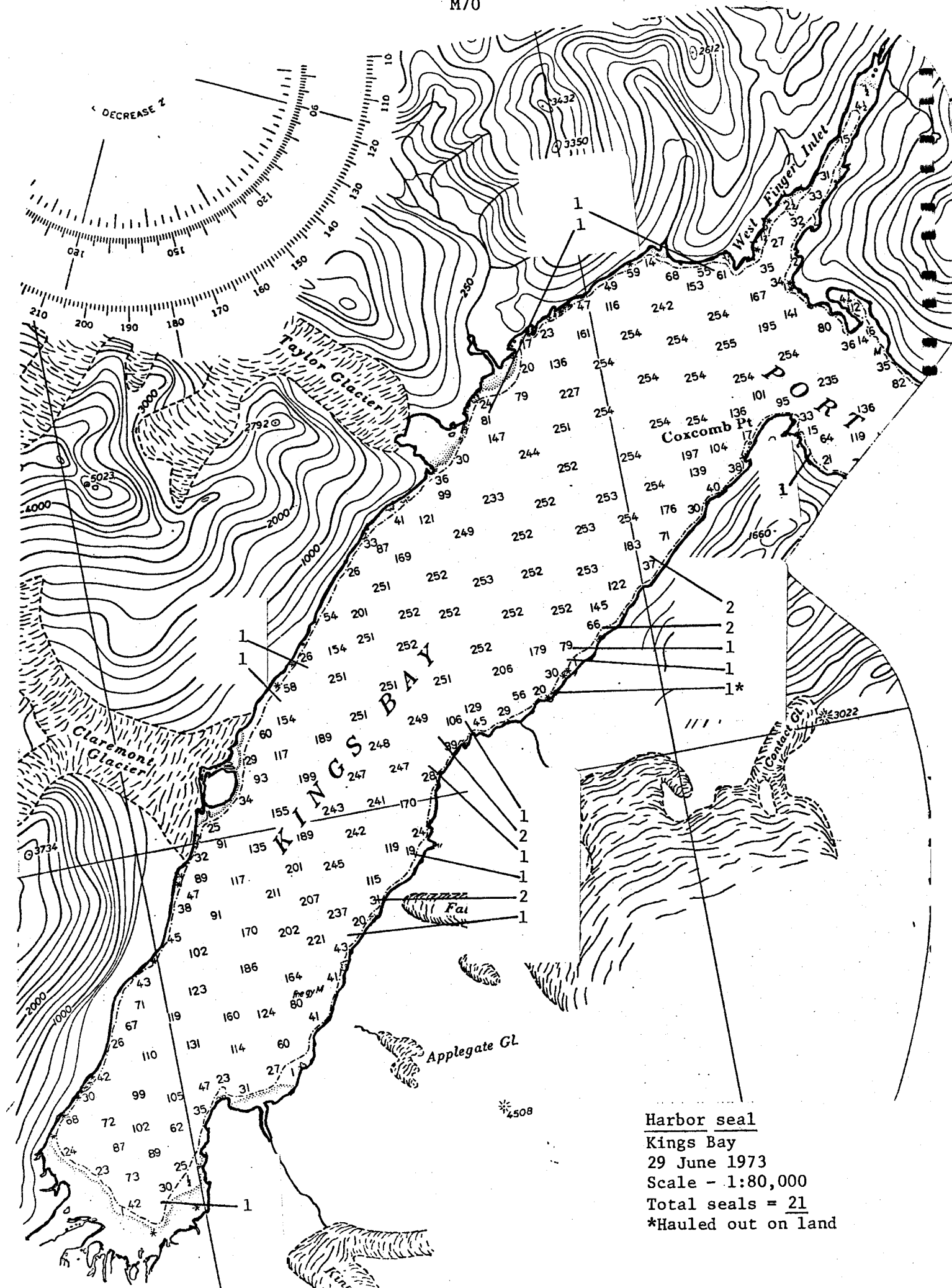


Harbor seal  
 Cochrane Bay  
 Helicopter survey  
 29 June 1973  
 Scale - 1:80,000  
 Total seals = 16  
 \*Hauled out on land

Harbor seal  
Culross I.  
Helicopter survey  
29 June 1973  
Scale - 1:80,000  
Total seals = 13  
\*Hauled out on land

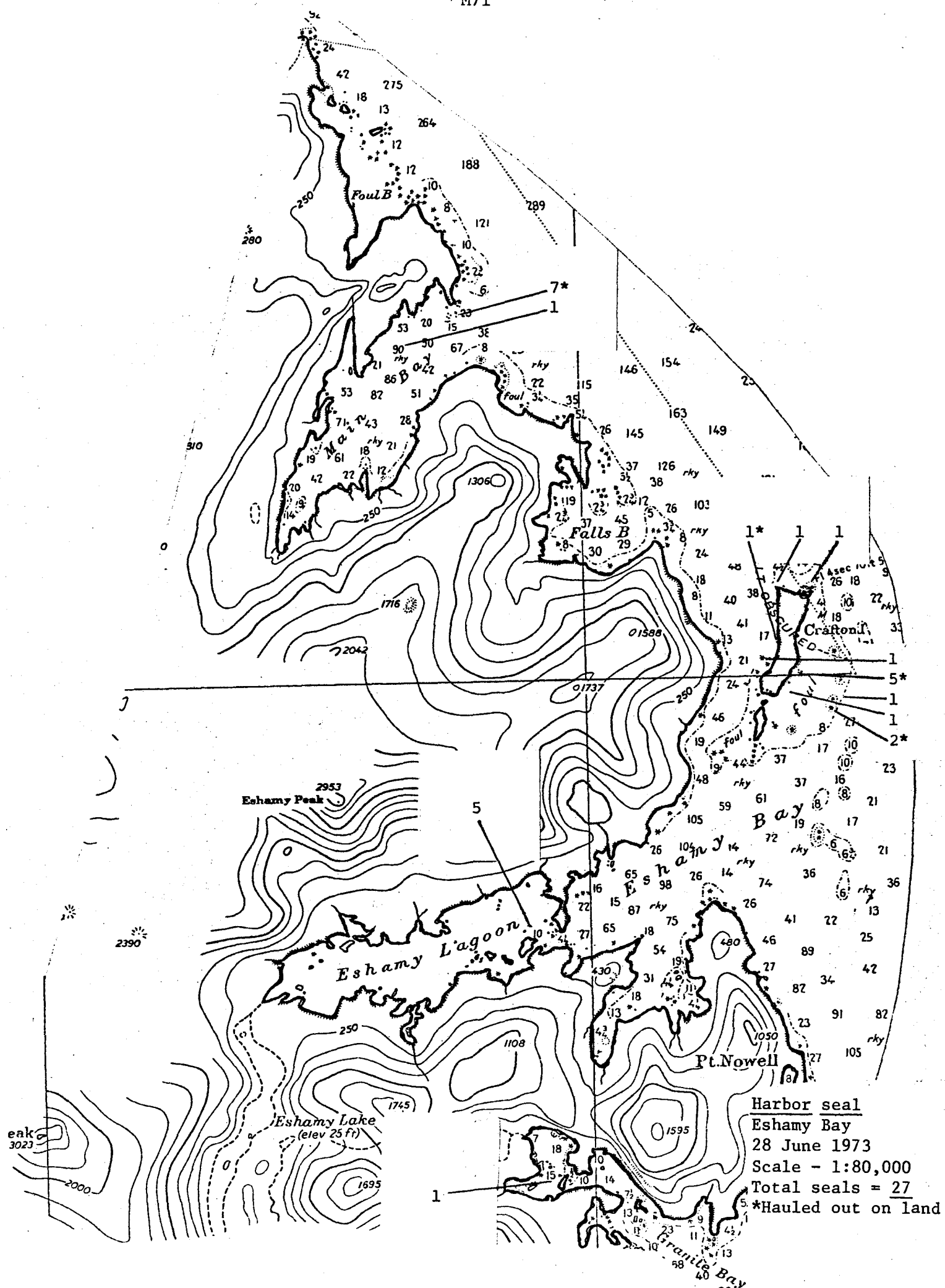
Harbor seal  
 Nellie Juan  
 Helicopter survey  
 29 June 1973  
 Scale - 1:80,000  
 Total seals = 64  
 \*Hauled out on land  
 \*\*Hauled out on ice

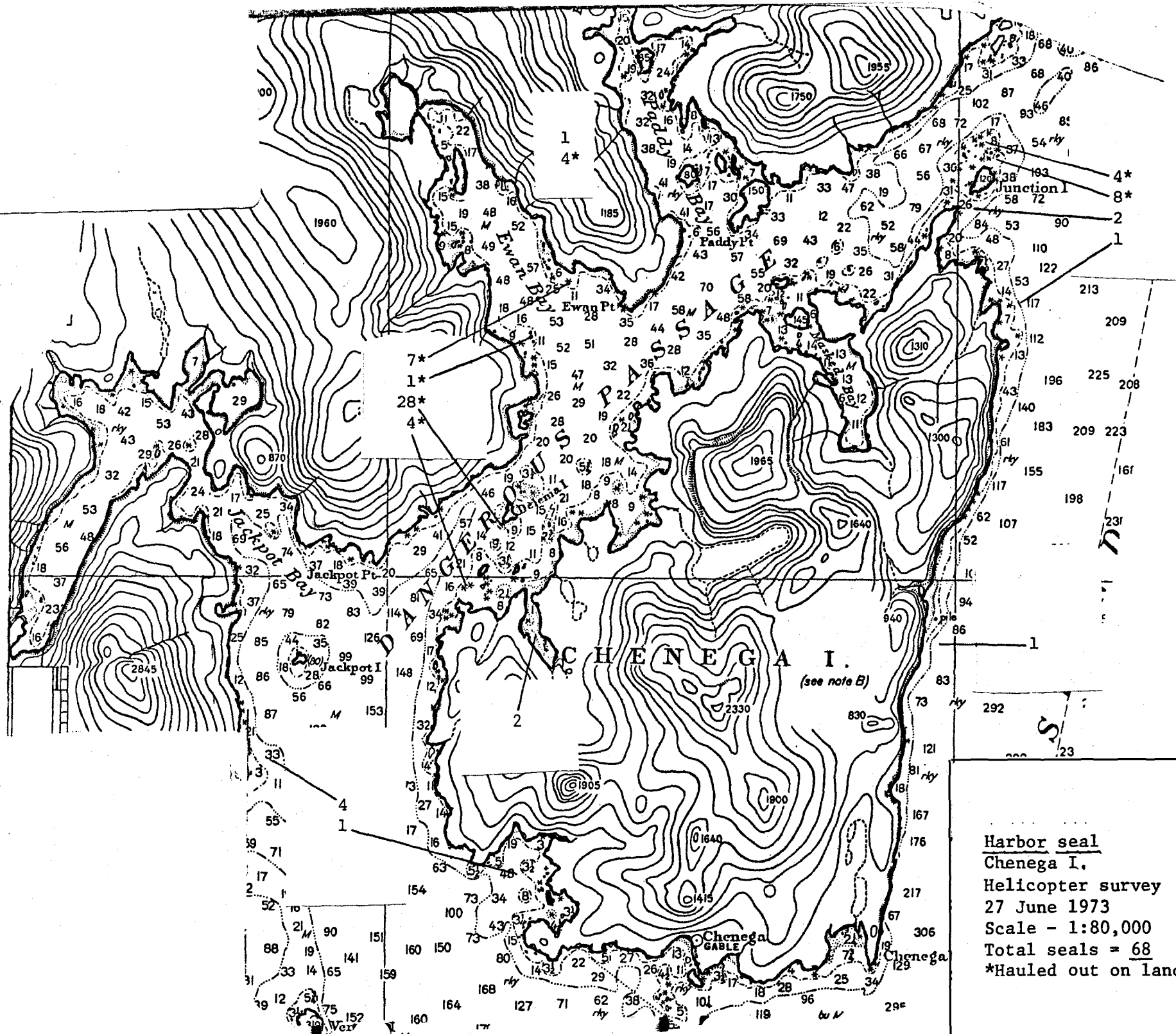




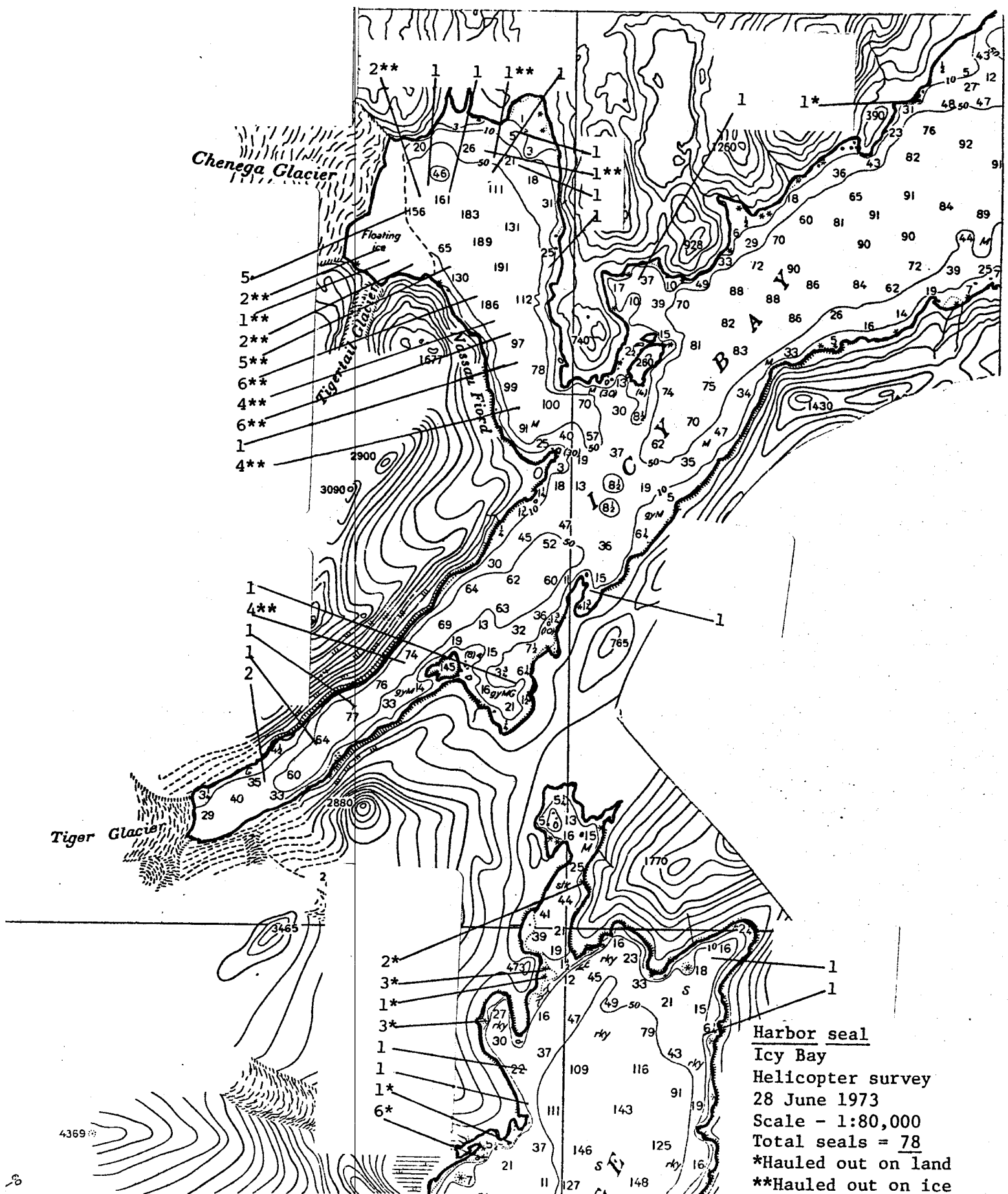
Harbor seal  
 Kings Bay  
 29 June 1973  
 Scale - 1:80,000  
 Total seals = 21  
 \*Hauled out on land

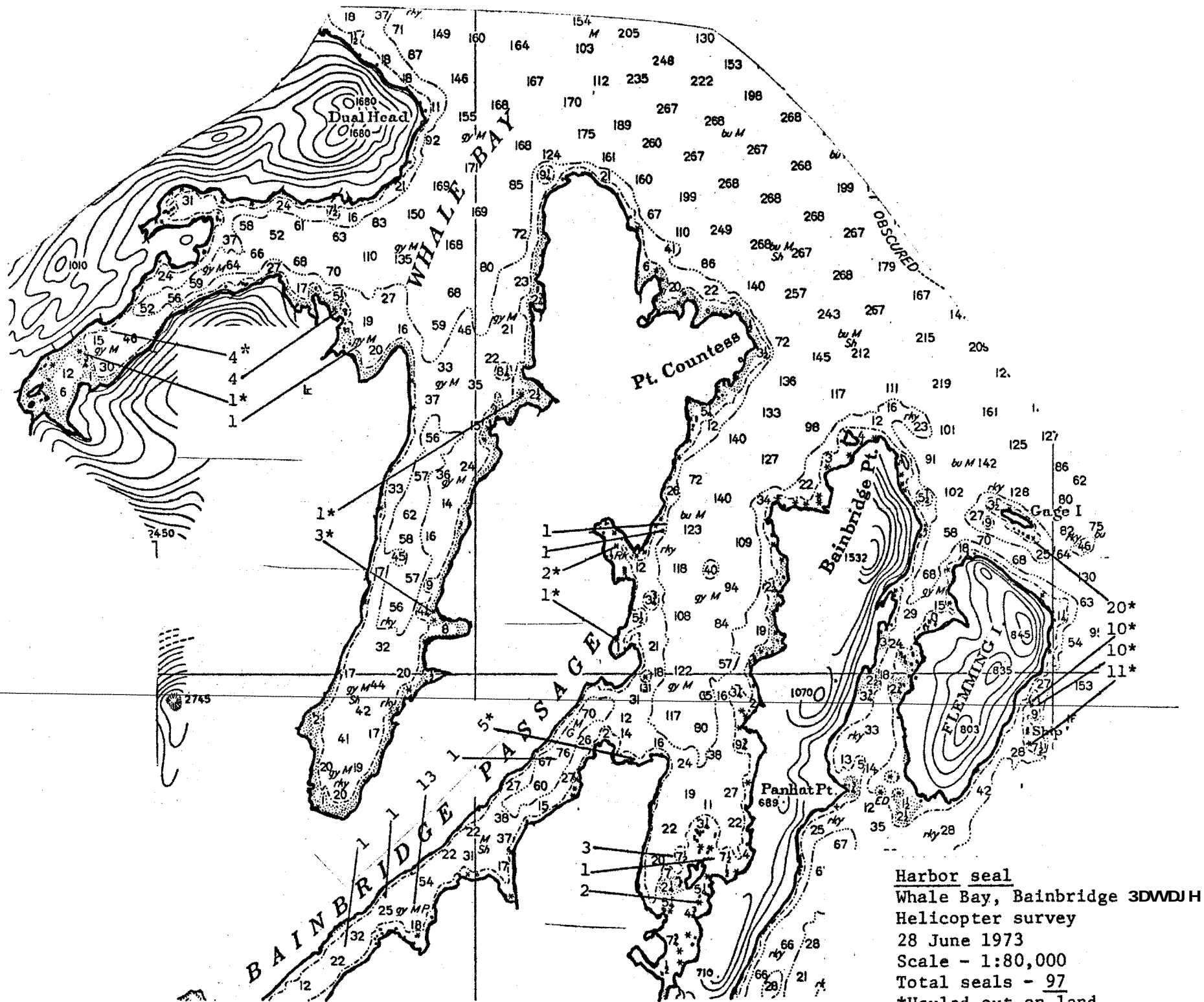






Harbor seal  
 Chenega I.  
 Helicopter survey  
 27 June 1973  
 Scale - 1:80,000  
 Total seals = 68  
 \*Hauled out on land





Harbor seal

Whale Bay, Bainbridge 3DWDJH

### Helicopter survey

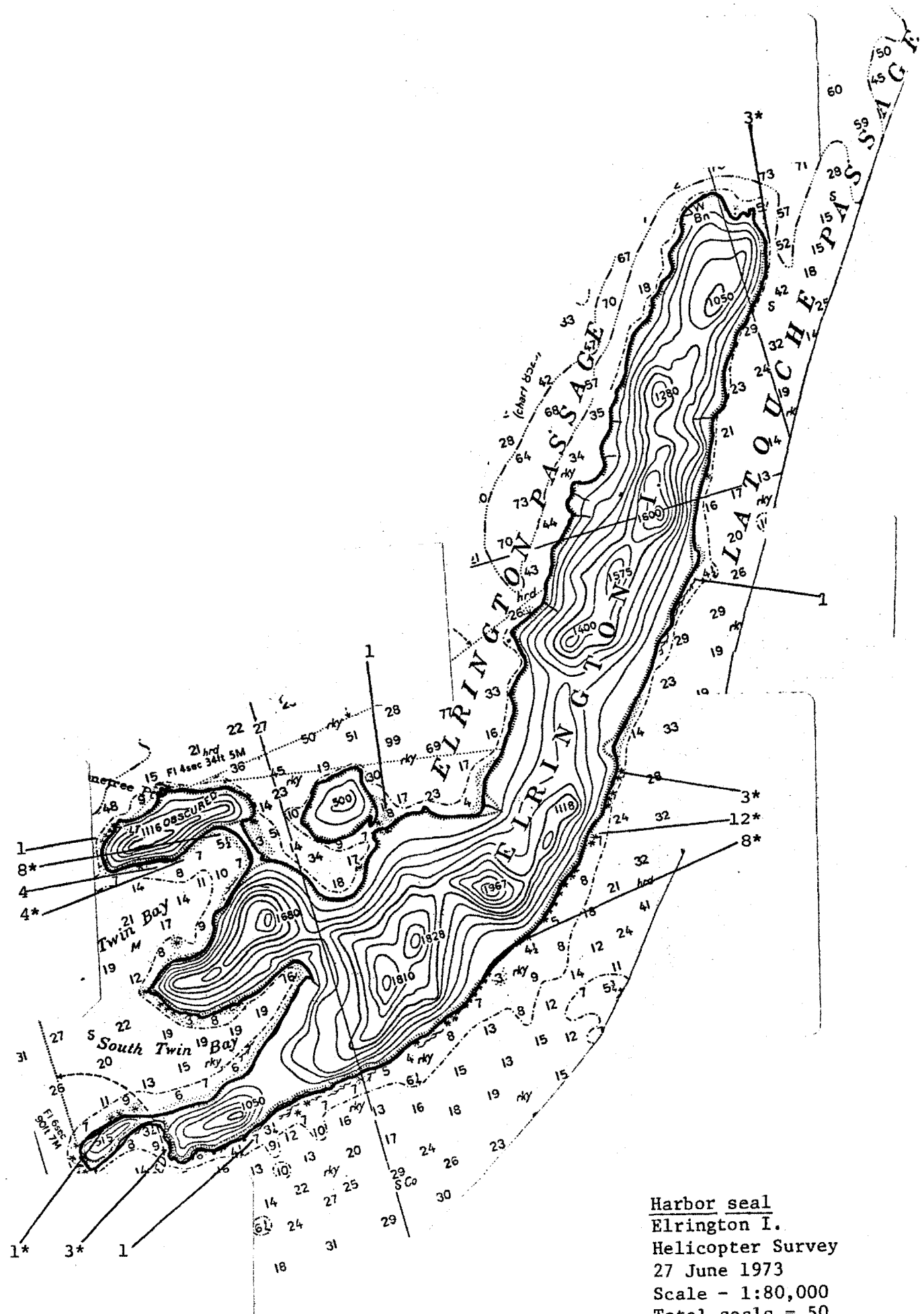
28 June 1973

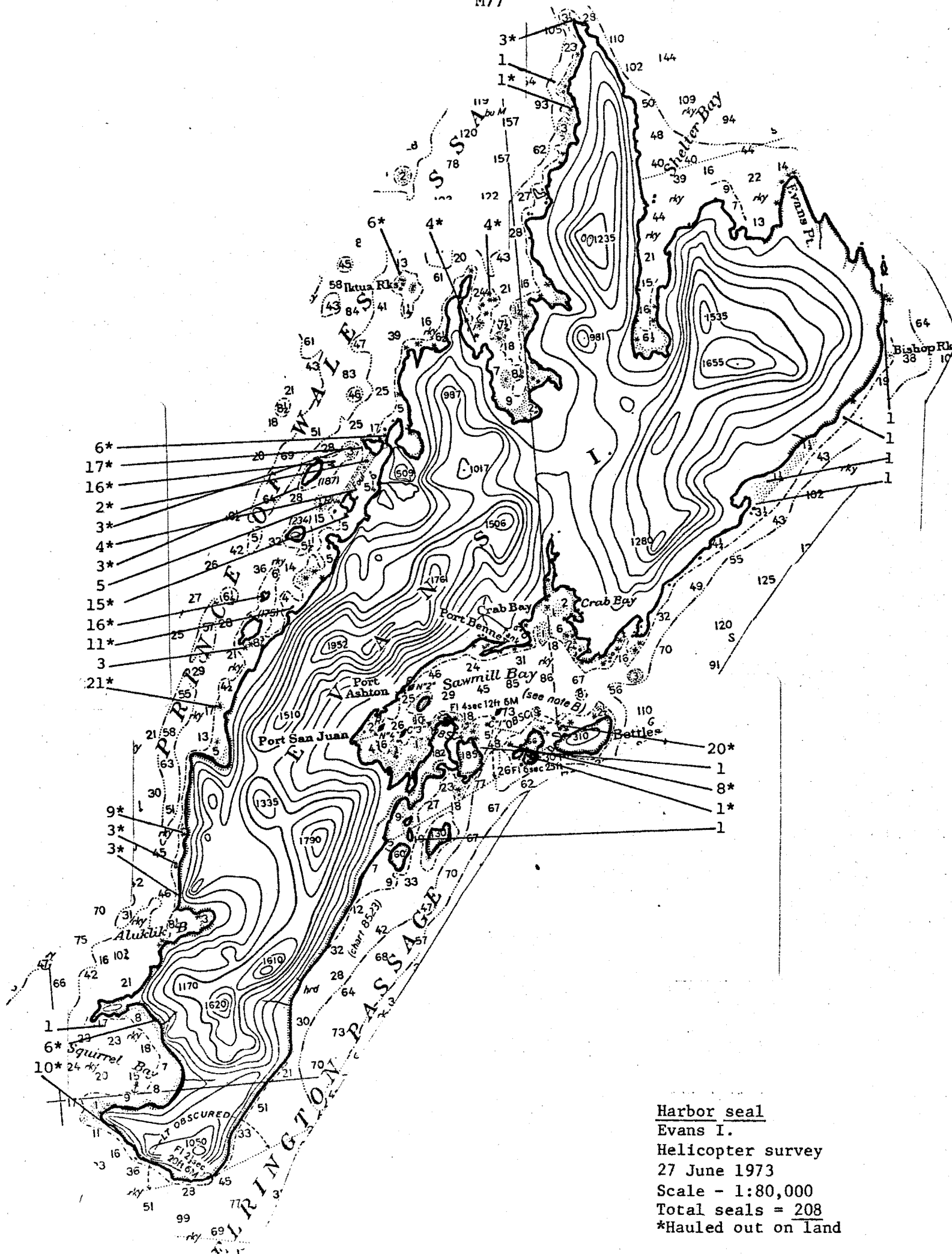
Scale - 1:80,000

Total seals - 97

\*Hauled out on land

Harbor seal  
Latouche I.  
Helicopter survey  
27 June 1973  
Scale - 1:80,000  
Total seals = 382  
\*Hauled out on land





Harbor seal

Evans I.

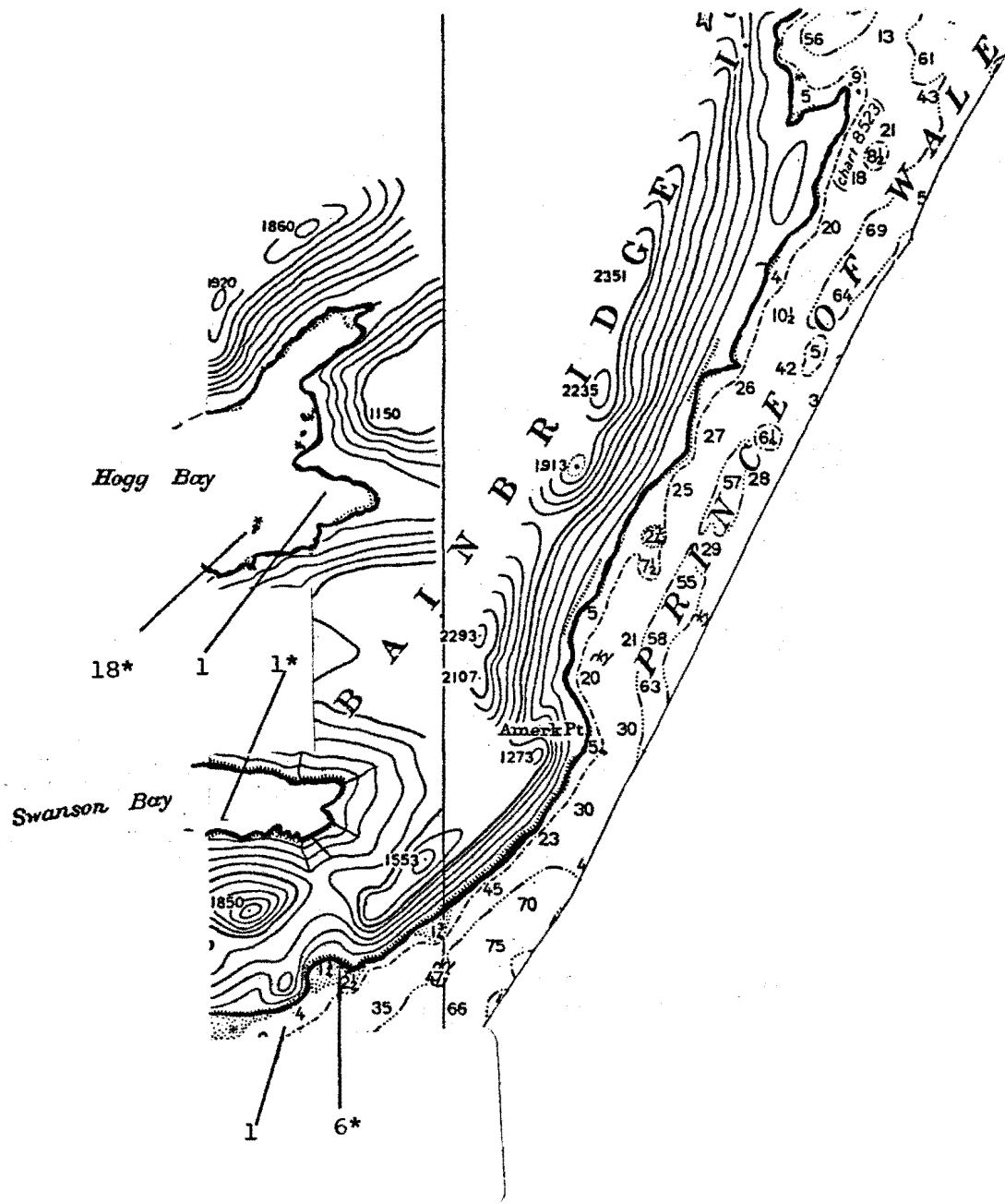
Helicopter survey

27 June 1973

Scale - 1:80,000

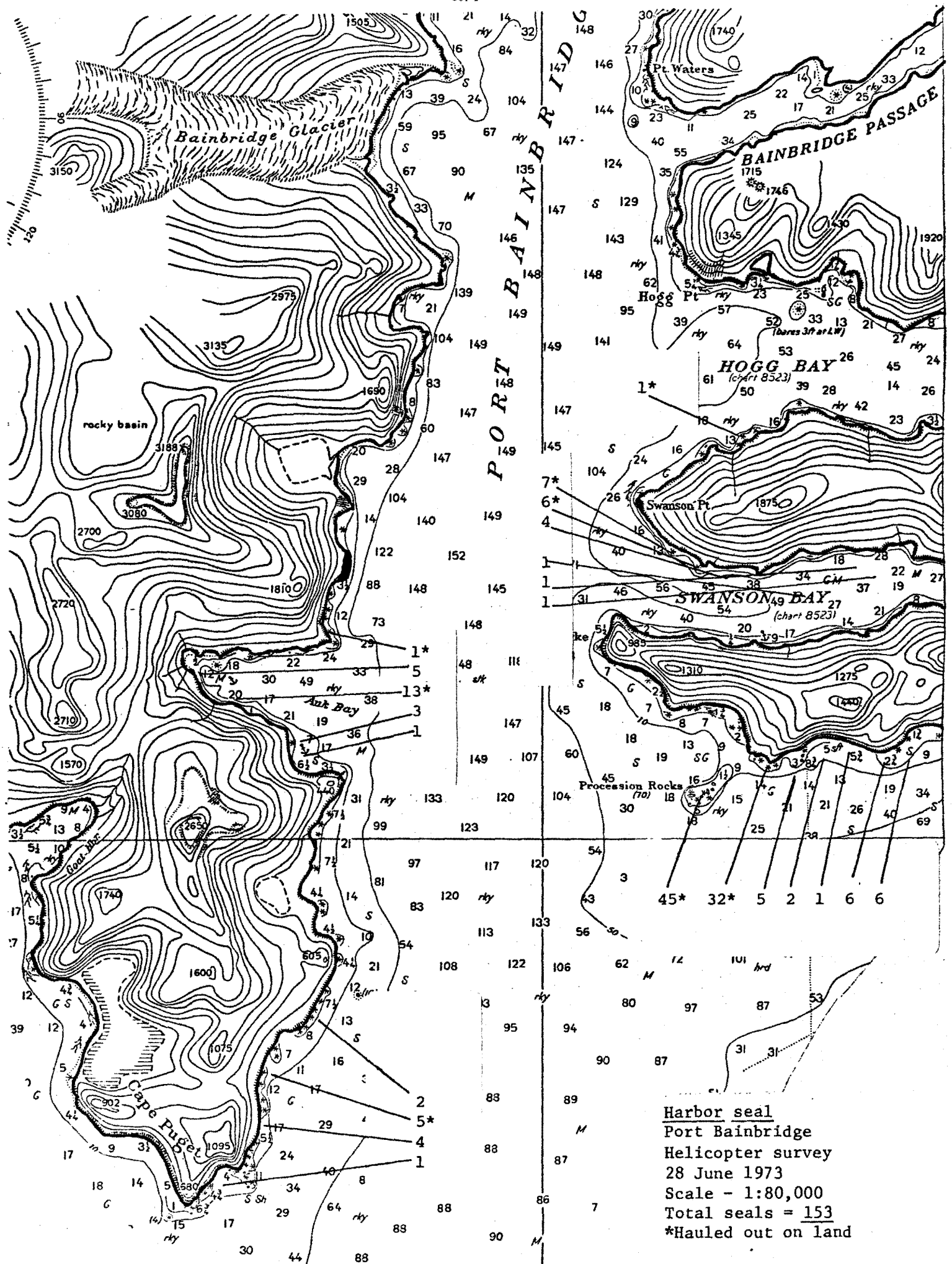
Total seals = 208

\*Hauled out on land



Harbor seal  
 Bainbridge I.  
 Helicopter survey  
 28 June 1973  
 Scale - 1:80,000  
 Total seals = 27  
 \*Hauled out on land





#### MISCELLANEOUS OBSERVATIONS

Six minke whales were seen during this survey; two near Green I., one at Bainbridge I. and three just east of Seal I. Department biologists have reported this whale as common around northwestern Montague I. and Passage Canal during the summer.

Humpback whales were seen eight times, all in the southwestern portion of the Sound. Three were seen in Shelter Bay on Evans I. and five were found around Bainbridge I. Several other sightings of whales were made which were not identified as to species.

Dall and harbor porpoises are both common year around residents of Prince William Sound. Numerous observations were made on the survey, many of which were not identified as to species because they were offshore from the flight line. No distinct pattern of distribution was apparent.

A group of at least 40 and possibly as many as 100 killer whales was seen between Evans and Knight I. Three were seen in Bass Harbor on Naked I., three were seen off the east side of Perry I. and one was recorded at Busby I.

One adult, male fur seal was observed among 17 immature, male sea lions on a rock off the southwest end of Elrington Island.

#### SUMMARY AND CONCLUSIONS

Summer distribution patterns were established for sea otter. Montague, Green, Hinchinbrook, Latouche and Elrington I. all retain sizable numbers of otters. Knight I., Naked I. and the Knowles Head - Port Gravina area have become well populated in recent years. Total population size is estimated at 5,000 based on observations of 2,015 otters. Further investigations are needed to determine if sexual segregation of sea otters occurs in this area. If segregation does occur, the pattern needs to be determined and specific use areas identified.

Summer distribution of sea lions was found to be almost exclusively limited to five rookeries and hauling ground and to outside waters. Counts of sea lions totaled 5,134 animals. The population is estimated at 6,500-7,500. Total numbers appear to be about the same as during 1956-57, but an increase was detected at Seal Rocks and a decrease at Lewis I. Pup production was low, only 246 were recorded. Large numbers of immature animals were seen on the hauling grounds. More detailed studies are needed to verify the low pup production. This could be done by ground counts of each rookery in late June. A marking program on rookeries in Prince William Sound, the Kenai Peninsula and Kodiak area would provide needed information on degree of interchange and population discreteness.

Useful information on harbor seal distribution, concentrations and hauling areas was obtained but cannot be considered complete due to shortcomings of the survey technique. Major concentration and haul out areas include; Controller Bay, Copper River Delta, Columbia Bay, Seal I., Applegate Rocks,

Channel I., Little Green I., Knight I., College Fiord, Blackstone Bay, Danger I. and Evans I. No population estimate can be made but it undoubtedly far exceeds the 5,640 seen on the survey. More detailed information could be obtained by using skiff surveys under optimum conditions of tide and weather. This technique is probably too time consuming for the entire area but may be worthwhile in selected portions.

Seasonal changes in distribution occur for some species of marine mammals. Casual observations indicate that winter distribution of sea lions is considerably different than summer distribution and that many animals move into inside waters. Location of winter hauling grounds and feeding areas are not well documented. There are some indications that seasonal changes in harbor seal distribution occur but a pattern has not been demonstrated. No major seasonal shifts in sea otter distribution appear to occur but little winter field work has been done to substantiate this. A winter survey similar to the summer survey would provide information needed to help complete our knowledge of abundance and year around distribution.

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