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SEA OTTER REPORT

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska  
Cooperators: Karl B. Schneider  
Project Nos.: W-17-5 & W-17-6 Project Title: Marine Mammal Investigations  
Job No.: 8.9R Job Title: Sex and Age Segregation of Sea Otters  
Period Covered: January 1, 1973 - June 30, 1974

SUMMARY

Ages of approximately 900 sea otters, collected in the Aleutian Islands in 1970, were estimated from cementum layers. These ages will be used for analysis of the distribution of sea otters by age class.

Information pertinent to the sex and age segregation of sea otters in Prince William Sound, collected during a 1970 transplant, on two helicopter surveys and a boat survey, is presented. This information supported previous conclusions that the sex and age composition of otters in certain high density areas is similar to that found in Aleutian "female areas", but that no classical "male areas" exist in Prince William Sound. A concentration of otters in the Port Gravina-Sheep Bay area was found to have few females with pups, but appeared to be typical of areas recently populated by immigration of large numbers of animals and is not a classical "male area."

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## BACKGROUND

Geographical segregation of sex and age classes of sea otters (*Enhydra lutris*) in the Aleutian and Commander Islands has been demonstrated and discussed by a number of authors (Lensink 1962, Marakov 1965, Kenyon 1969, Schneider 1972 and 1973a). The existence of discrete male and female areas has not been demonstrated in other areas of the sea otter's range, however. Calkins (1972) suggested that such areas did not exist in Prince William Sound. Schneider (1973a) presented some information which indicated that some form of segregation does exist in Prince William Sound, but that it is manifested differently than in the Aleutian Islands.

Knowledge of the degree of sexual segregation and the location of male and female areas is important to the management of sea otter populations. Harvests must be regulated to avoid putting too much pressure on one segment of the population. When capturing animals for transplants, it often is necessary to set nets in specific areas to obtain the desired sex ratio. In case of a localized kill of otters, such as might occur in the area of an oil spill, it is important to know the distribution of sexes to evaluate the impact of the kill on the population.

## OBJECTIVE

To determine the degree of geographical segregation of sex and age classes of sea otters.

## PROCEDURES

The ages of approximately 900 sea otters collected in 1970 were estimated from tooth cementum layers, using the technique described by Schneider (1973b). These ages will be used in the analysis of the distribution of otters of different sexes and ages.

The weights and sexes of 47 sea otters, captured near Montague and Green Islands in Prince William Sound during the 1970 transplant to British Columbia, were obtained from I. Smith of the British Columbia Fish and Wildlife Branch. These animals were grouped into age classes on the basis of body weight, and the resulting sex and age composition was compared with similar data collected from the same area in other years (Schneider 1973a).

Two helicopter surveys of marine mammals were made in Prince William Sound. The first in June 1973 and the second in March 1974. Whenever possible the presence of female sea otters with pups was recorded to assist in the future identification of "male areas" and "female areas." Methods used during the surveys were described by Pitcher and Vania (1973).

Portions of Elrington, Evans and Latouche Islands and all of Knight, Little Green, and Green Islands and the surrounding shallow waters were surveyed from the 65 foot "M/V Aleutian Tern" in cooperation with Ancel Johnson of the U.S. Fish and Wildlife Service in March 1974. The vessel followed the shoreline at an average speed of 7 knots while two observers counted sea otters from the foredeck with the aid of 10X binoculars and a 15-60X spotting scope. Areas not accessible by the vessel were surveyed from a skiff. Pups were recorded wherever possible.

#### FINDINGS

Between July 18 and 21, 1970, 47 sea otters were caught in the Green Island-Port Chalmers area of Prince William Sound for transplant to British Columbia. Although I previously used the sex and age composition of otters caught for transplant to get some insight into the composition of otters using specific areas (Schneider 1972 and 1973a), the 1970 data from Prince William Sound were not available until recently. Age classes were estimated on the basis of weight. Otters of either sex which weighed less than 30 pounds or were known to still be attended by a female were considered pups. Females between 30 and 39 pounds and males between 30 and 55 pounds were considered subadults (as long as they were not attended by a female), and larger animals were considered adults. These criteria are very crude. Some otters weighing between 25 and 30 pounds have already been weaned, and many sexually immature females weigh between 40 and 45 pounds. Therefore, there may be a tendency to underestimate the number of subadults.

Based on the above criteria the composition of otters captured was:

	Adults		Subadults		Pups			All Ages		
	M	F	M	F	M	F	?	M	F	?
#	12	20	2	3	2	6	2	16	29	2
%	38	63	40	60	20	60	20	34	62	4

Three of the females listed as adults weighed 40 to 41 pounds and three females listed as pups weighed between 27 and 29 pounds, and were not known to still be with their mothers. All of these animals may have actually been subadults. One male weighed 28 pounds, but when it died it was found to have a total length of 91 cm indicating that it probably was a pup. If we consider the above females subadults, the composition would be:

	Adults		Subadults		Pups			All Ages		
	M	F	M	F	M	F	?	M	F	?
#	12	17	2	9	2	3	2	16	29	2
%	41	59	18	82	29	43	29	34	62	4

Allowing for the small sample size and subjectivity of age classification, this composition agrees with similar data collected in the same area at the same time of year in 1966 and 1972 (Schneider 1973a). Specific areas of capture were not recorded but all came from Gibbon Anchorage on Green Island, Channel Island and the rocky areas to either side of Port Chalmers on Montague Island. These correspond to areas C,D,E and G shown in Schneider's (1973a) Fig. 5.

The composition of otters caught in the entire Green Island-Port Chalmers area for all 3 years was:

Year	Adults		Subadults		Pups			Total		
	M	F	M	F	M	F	?	M	F	?
1966	14	19	0	3	2	3	1	16	25	1
1970	12	17	2	9	2	3	2	16	29	2
1972	13	29	1	3	6	6	2	20	38	2
Total	39	65	3	15	10	12	5	52	92	5
Percent	38	63	17	83	37	44	19	35	62	3

These data support my previous conclusion (Schneider 1973a) that there is a higher percentage of adult males in that area than is found in Aleutian female areas at that time of year. There was a relatively low percentage of subadult males, indicating that this segment of the population tends to segregate itself from areas where there are large numbers of breeding animals.

With the exception of the somewhat higher percentage of adult males, the composition found in the Green Island-Port Chalmers area and the Port Etches area of Hinchinbrook Island (Schneider 1973a) was typical of that found in female areas in the Aleutians.

In the Aleutian Island populations studied, the non-breeding males, including most of the subadult males, concentrate in discrete male areas which are characterized by dense groupings of animals which contain no pups (Schneider 1972). An attempt was made to identify similar areas in Prince William Sound during the helicopter and boat surveys.

Pup counts made during helicopter surveys are not always reliable. The majority of pups are missed because of viewing conditions, or because the observer is concentrating on locating separate individuals. As a result, the data are not precise enough to warrant detailed analysis. Nevertheless, some pups were recorded in virtually every area where otters were concentrated, and they were rarely recorded where otter densities were low. No area resembling a classical "male area" was found anywhere in Prince William Sound. This supports the hypothesis, presented by Schneider (1973a), that adult females concentrate in areas containing the best habitat. Breeding males tend to exclude non-breeding males, except pups under maternal care, from these areas. Non-breeding males are probably scattered throughout areas of less desirable habitat, or, where habitat is uniformly good (as around many Aleutian Islands) they concentrate near exposed points forming male areas.

The boat survey of portions of Prince William Sound proved to be a practical technique. Numbers of sea otters counted equalled or slightly exceeded those seen on helicopter surveys. Numbers of pups counted were much higher, making the boat counts more useful for determining the distribution of females with pups.

Results of the boat survey are presented in Table 1 and Figs. 1-7. Pup/adult ratios are presented in Table 2. These data show a fairly uniform distribution of females with pups throughout all the areas surveyed except Sheep and Gravina Bays. Knight Island had two areas, Herring Bay and the area outside Johnson Bay, where pup/adult ratios were relatively low, even though the number of adults was relatively high. However, pups were present, and the low ratios may have been due to random variation in distribution. Females with pups were common even in shallow offshore areas, such as those southwest of Little Green Island and around Applegate Rock.

Comparison of pup/adult ratios from different counts can be misleading. The percentage of pups identified will vary with viewing conditions, average size of the pups in the population, method of survey and the type of area surveyed. Pup/adult ratios in the female areas of shore count area A on Amchitka Island ranged from 12 to 27 pups/100 adults in a series of four shore counts made in late May and early June 1972 (Schneider 1973a). There was a positive correlation between the ratio and viewing conditions. In a count of the same area made in November 1972 the ratio dropped to 5 pups/100 adults, probably because most of the pups were large enough and independent enough to be counted as adults when viewed at a distance. Kenyon (1969) found an increase in pup percentages throughout the summer and fall, however. His study area permitted examination of otters at shorter distances, making identification of large pups easier. Therefore pup counts, such as those presented in Table 2, should be used only as rough indicators of the abundance of females with pups.

Few March pup counts exist from other areas. Kenyon (1969) found a mean pup percentage of 15 percent or 19 pups/100 adults in seven shore counts made at Amchitka in March and April. Ratios obtained in eight shore counts of female areas at Amchitka in May, June and August 1972 were 11, 12, 15, 16, 27, 14, 18, and 11 pups/100 adults. The pup/adult ratios presented in Table 2 for all areas except Sheep and Gravina Bays are comparable.

The composition and distribution of otters in Sheep and Gravina Bays did not fit any previously described pattern. Otters were numerous, but very few females with pups were present. Most of the females with pups were inside the bays at the fringes of the main concentrations. The large groups that were offshore, in more exposed waters outside the bays, contained only single animals. These characteristics might indicate the existence of a male area. The area occupied by single animals was much greater than that found in Aleutian male areas, but it is possible that such areas can be extensive, especially in broad, shallow areas

Table 1

Sea Otter Survey from Deck of M/V Aleutian Tern -  
Prince William Sound, March 15-21, 1974

Elrington Island (Northwest side, see Fig. 1) March 15, 1974.

Area	Adults	Pups	Total	Time	Visibility
E1 - 1	1	0	1	0800	Good-Very Good
E1 - 2	2	2	4		Good-Very Good
E1 - 3	4	0	4	0915	Good-Very Good
E1 - 7	<u>5</u>	<u>0</u>	<u>5</u>	1422-1520	Excellent
Total	12	2	14		

Evans Island (Excluding Shelter Bay to Sawmill Bay, See Fig. 2) March 15, 1974

Area	Adults	Pups	Total	Time	Visibility
Ev - 2	2	0	2	0800	Good
Ev - 3	2	0	2		Good
Ev - 4	6	2	8	0945	Good
Ev - 1	3	0	3	1525	Excellent
Ev - 11	6	0	6		Excellent
Ev - 10	8	1	9		Good
Ev - 9	4	1	5		Good
Ev - 8	2	1	3		Good
Ev - 7	3	1	4		Good
Ev - 6(partial)	<u>7</u>	<u>0</u>	<u>7</u>	1805	Good
Total	43	6	49		

Table 1

(cont.) Sea Otter Survey from Deck of M/V Aleutian Tern -  
Prince William Sound, March 15-21, 1974

## Latouche Island (Latouche - Danger Island, See Fig. 3) March 15, 1974

Area	Adults	Pups	Total	Time	Visibility
L - 1 (Partial)	9	1	10	1000	Fair
L - 2	13	3	16		Fair
L - 3	7	0	7		Fair
L - 4	5	1	6		Fair
L - 5	5	1	6	<u>1145</u>	Poor
L - 6 (Partial)	<u>0</u>	<u>0</u>	<u>0</u>	1215	Poor
Total	39	6	45	1305	

## Knight Island (Whole Island, See Fig. 4) March 16-18, 1974

Area	Adults	Pups	Total	Time	Visibility
K - 1	9	2	11	0905	Fair
K - 2	6	0	6	3/16/74	Fair-Poor
K - 3	1	0	1		Poor
K - 4	8	1	9	<u>1225</u>	Fair
K - 5	4	1	5	1320	Fair-Good
K - 6	5	1	6		Very Good-Excellent
K - 7	30	2	32	<u>1740</u>	Very Good-Excellent
K - 8	15	1	16	0815	Poor-Very Good
K - 9	38	3	41	3/17/74	Excellent-Poor
K - 10	6	0	6	<u>1200</u>	Fair-Good
K - 11	22	5	27	1315	Fair-Good
K - 12 (Partial)	3	0	3	<u>1905</u>	Fair
K - 1 (Offshore over 110-150 fathoms of water)	1	0	1	0810	Fair
				3/18/74	
Total	148	16	164	0930	



Table 1

(cont.) Sea Otter Survey from Deck of M/V Aleutian Tern -  
Prince William Sound, March 15-21, 1974

Little Green Island, Green Island, Applegate Rock and Channel Island (See Fig. 5) March 18, 1974

Area	Adults	Pups	Total	Time	Visibility
LG - 2(offshore)	4	1	5	0950	Good
LG - 1	9	1	10		Fair
G - 1	16	2	18		Good
G - 2	26	2	28		Fair-Good
A - 2	2	0	2		Good
A - 1	32	7	39	<u>1240</u>	Fair
G - 3	10	0	10	1320	Fair
G - 4	32	3	35		Good
G - 5	17	1	18		Good
CI - 1	12	2	14		Fair
CI - 2	<u>9</u>	<u>0</u>	<u>9</u>	1650	Very Poor
<b>Total</b>	169	19	188		

Simpson Bay, Sheep Bay, Gravina Bay (See Fig. 6) March 20-21, 1974.

Area	Adults	Pups	Total	Time	Visibility
Simpson Bay	0	0	0	0955	Excellent
S - 1(Sheep Bay)	15	0	15	<u>3/20/74</u>	Very Good
S - 2	16	0	16	<u>1230</u>	Very Good
S - 3	194	7	201	1335	Excellent
G - 1	120	0	120		Very Good
G - 2	4	0	4		Good-Excellent
G - 3(Partial)	0	0	0		Good
G - 4	60	2	62	<u>1745</u>	Fair-Very Good
G - 5	43	1	44	0805	
G - 6	<u>8</u>	<u>0</u>	<u>8</u>	<u>3/21/74</u>	Very Good
<b>Total</b>	460	10	470	0940	Very Good

Table 1

(cont.) Sea Otter Survey from Deck of M/V Aleutian Tern -  
Prince William Sound, March 15-21, 1974

Hinchinbrook Island (North Side of Port Etches, See Fig. 7) March 21, 1974.

<u>Area</u>	<u>Adults</u>	<u>Pups</u>	<u>Total</u>	<u>Time</u>	<u>Visibility</u>
H - 5(offshore over 150 fathoms)	2	0	2	1115	Very Good
H - 4	5	0	5	<u>1150</u>	Poor
				1220	
H - 2(Partial)	3	1	4		Poor
H - 3	<u>25</u>	<u>0</u>	<u>25</u>	1420	Fair
Total	35	1	36		

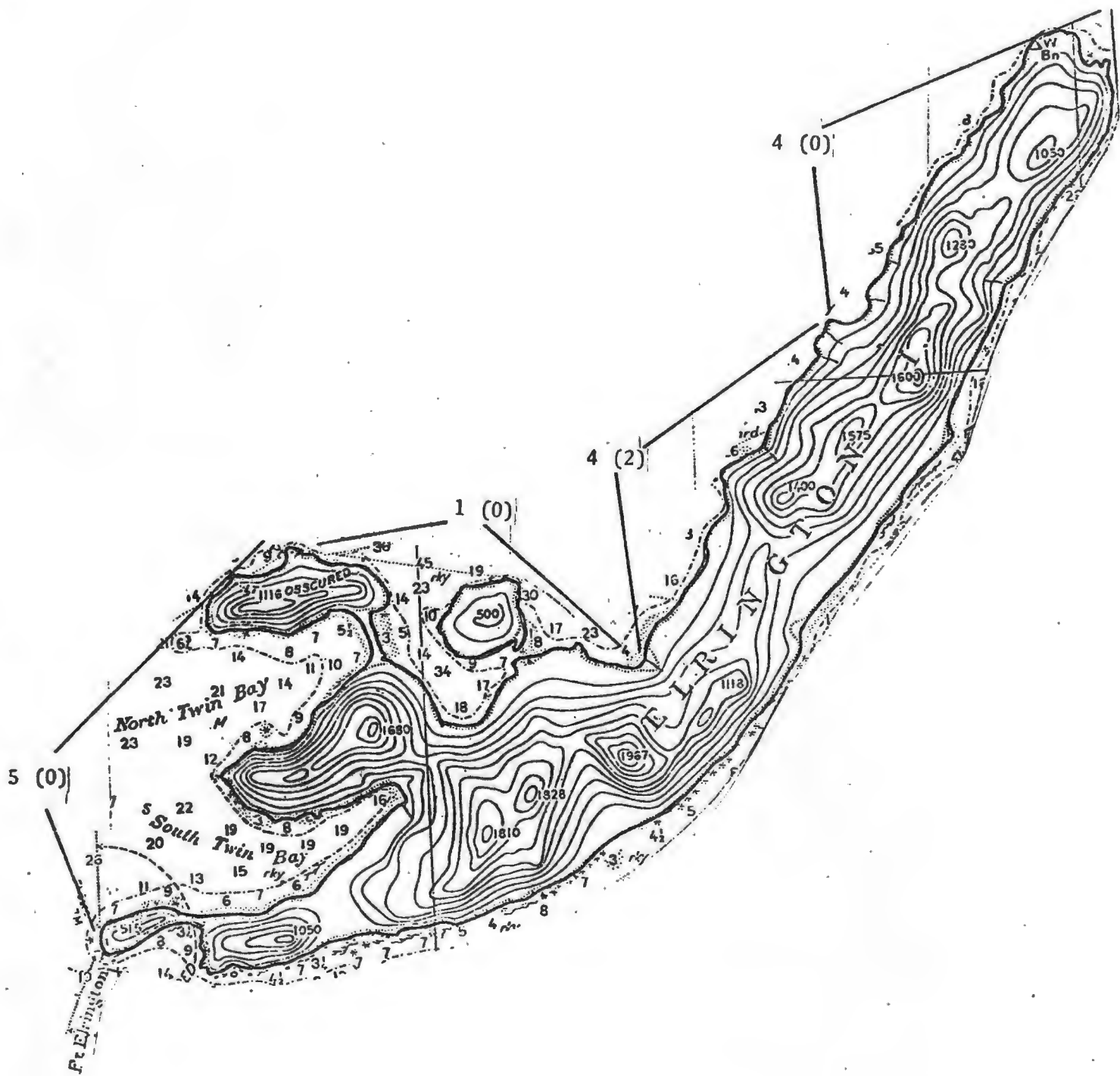


Fig. 1. Sea Otter  
 Elrington Island  
 March 15, 1974  
 Boat Survey  
 Total Otters = 14  
 Total Pups = 2  
 Pups/100 Adults = 17

( ) = Pups

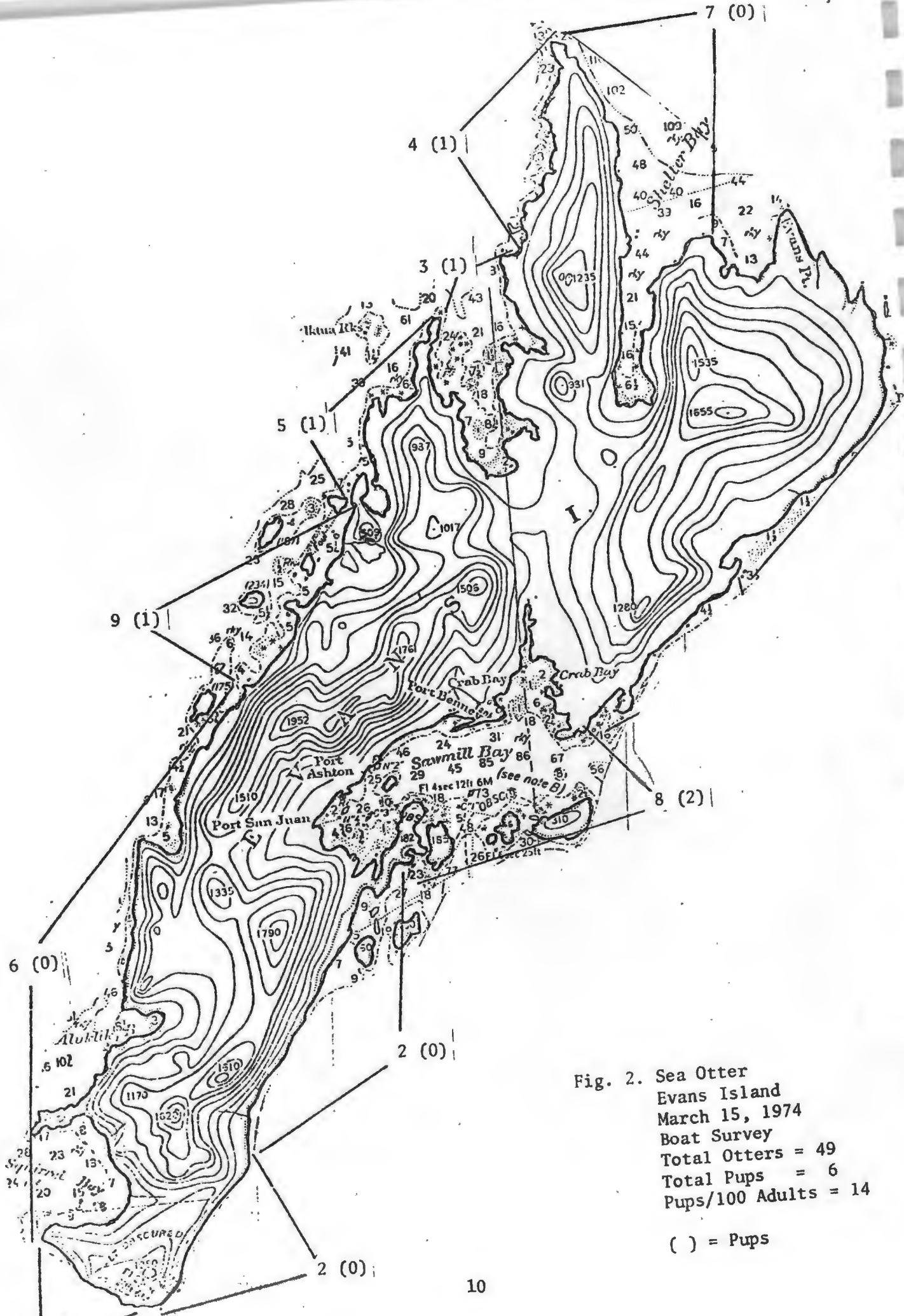


Fig. 2. Sea Otter  
 Evans Island  
 March 15, 1974  
 Boat Survey  
 Total Otters = 49  
 Total Pups = 6  
 Pups/100 Adults = 14  
 ( ) = Pups

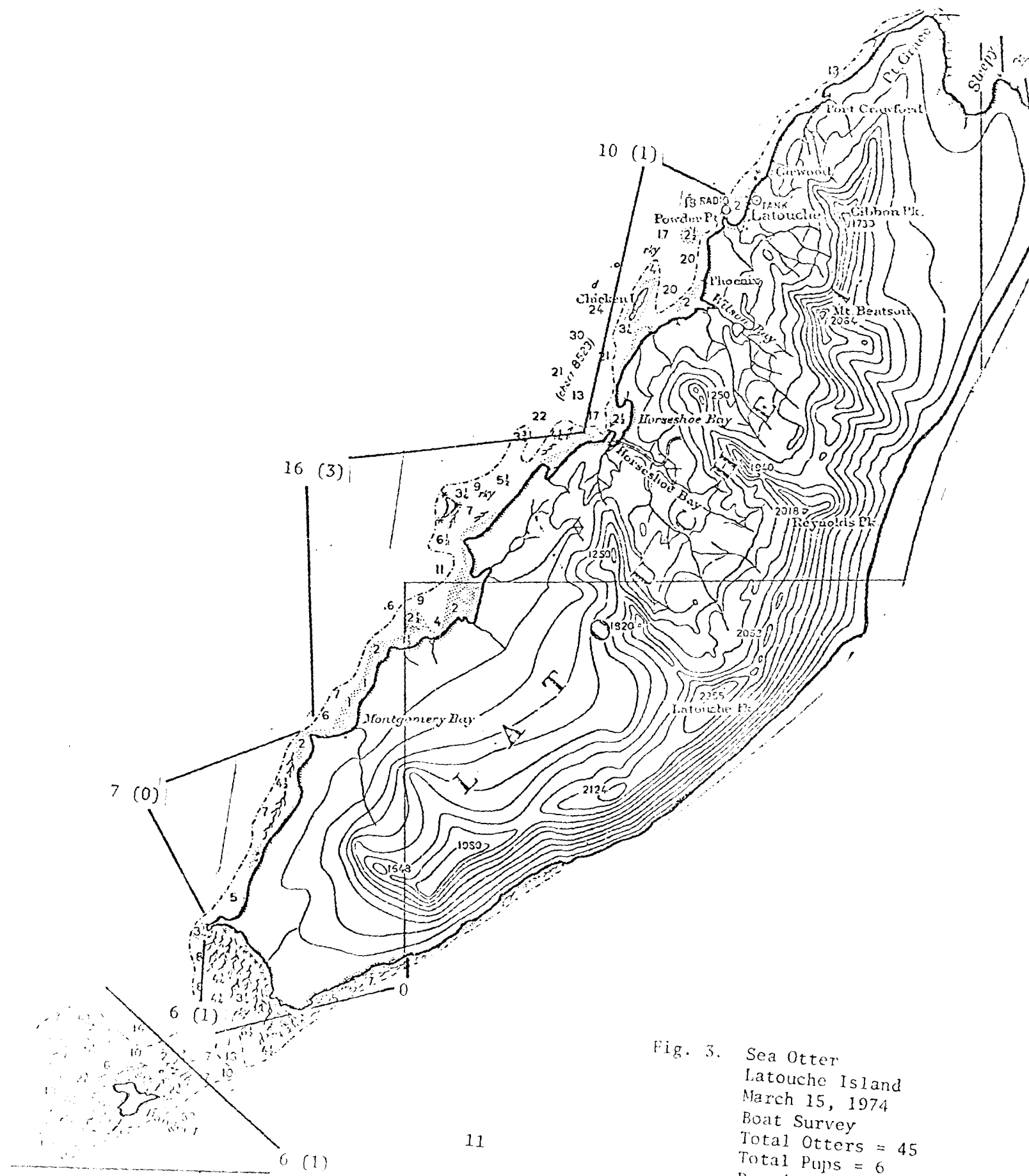


Fig. 3. Sea Otter  
 Latouche Island  
 March 15, 1974  
 Boat Survey  
 Total Otters = 45  
 Total Pups = 6  
 Pups/100 Adults = 15  
 ( ) = Pups

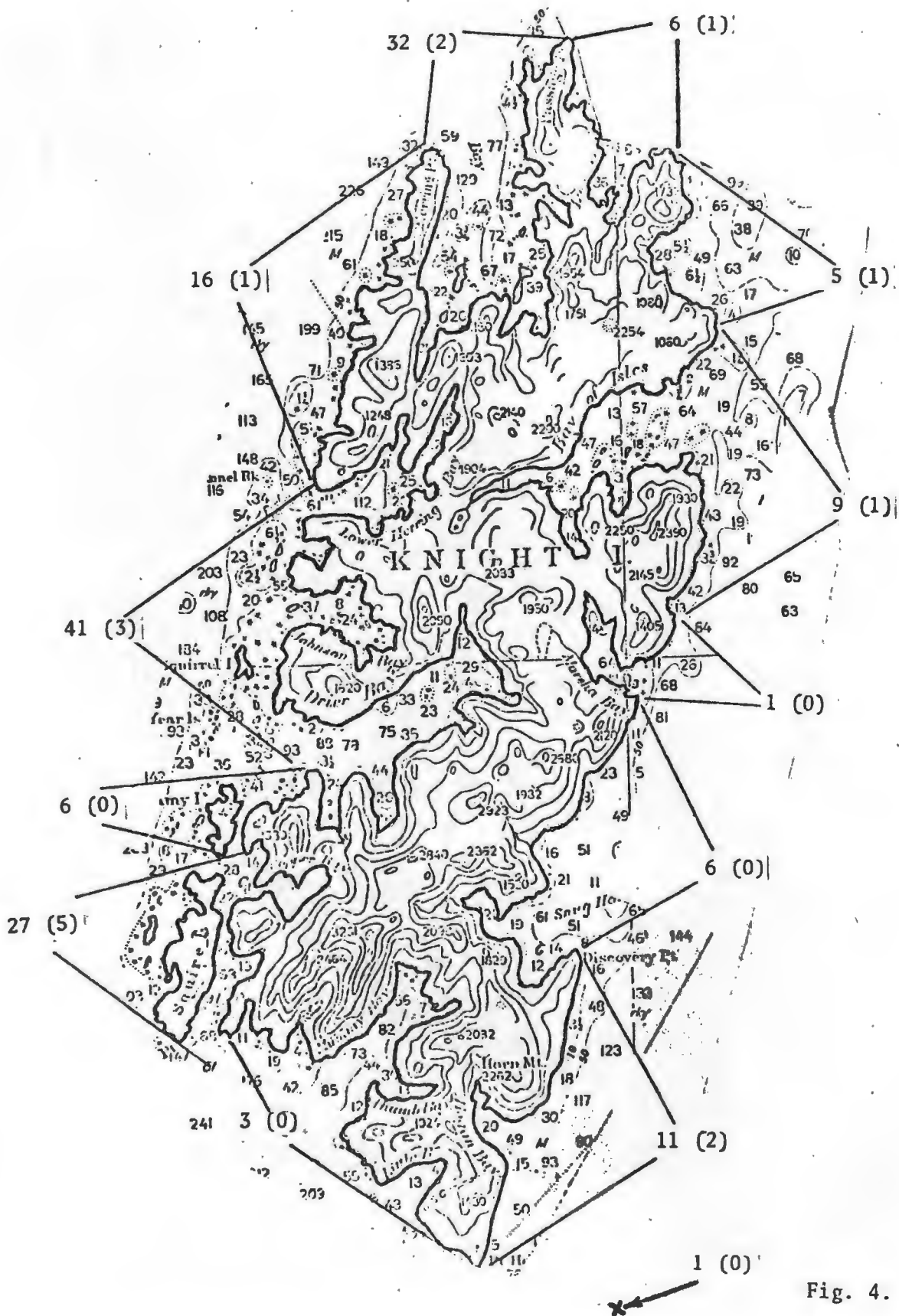


Fig. 4. Sea Otter  
 Knight Island  
 March 16-18, 1974  
 Boat Survey  
 Total Otters = 164  
 Total Pups = 16  
 Pups/100 Adults = 1

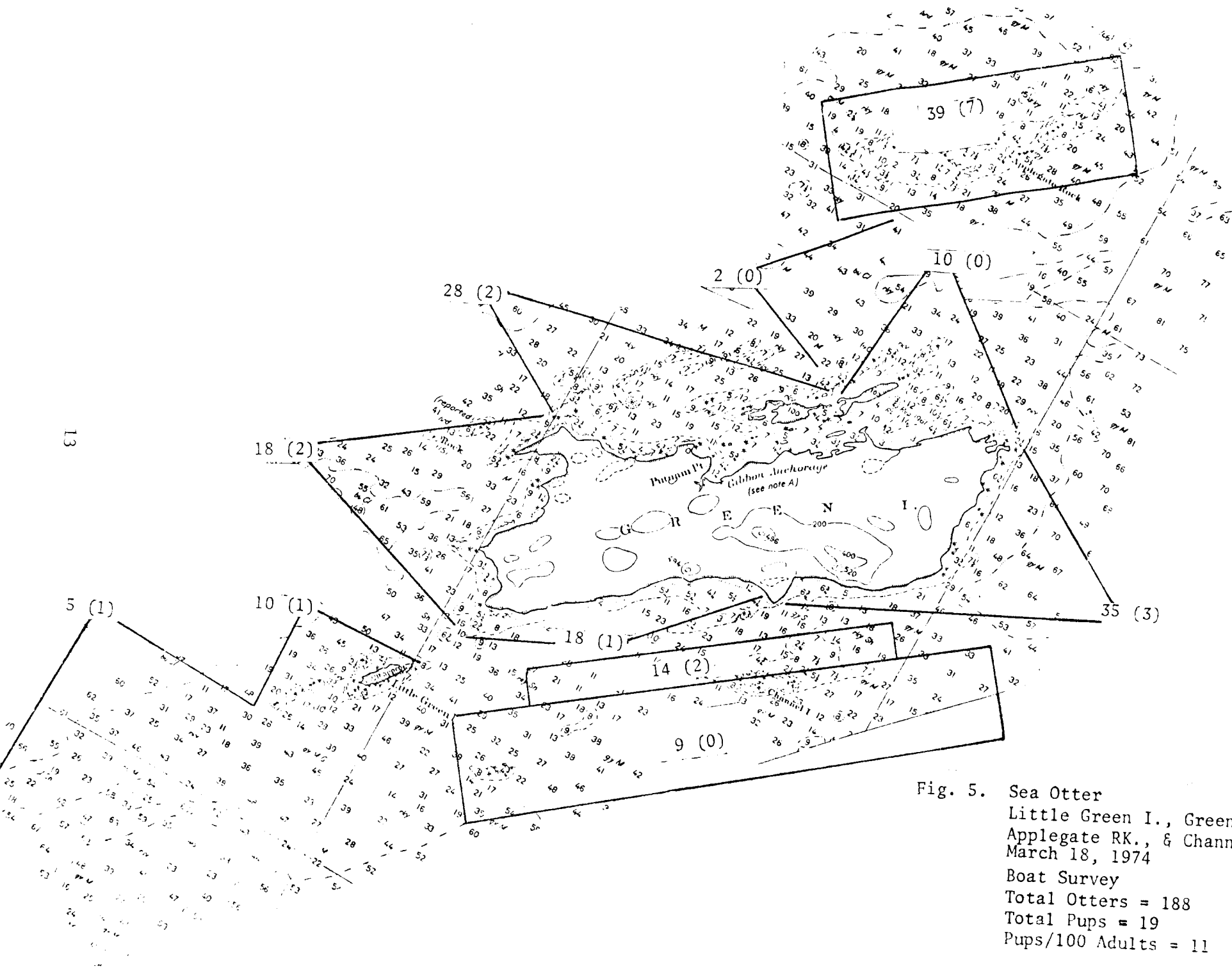


Fig. 5. Sea Otter  
 Little Green I., Green I.,  
 Applegate RK., & Channel I  
 March 18, 1974  
 Boat Survey  
 Total Otters = 188  
 Total Pups = 19  
 Pups/100 Adults = 11

( ) = Pups

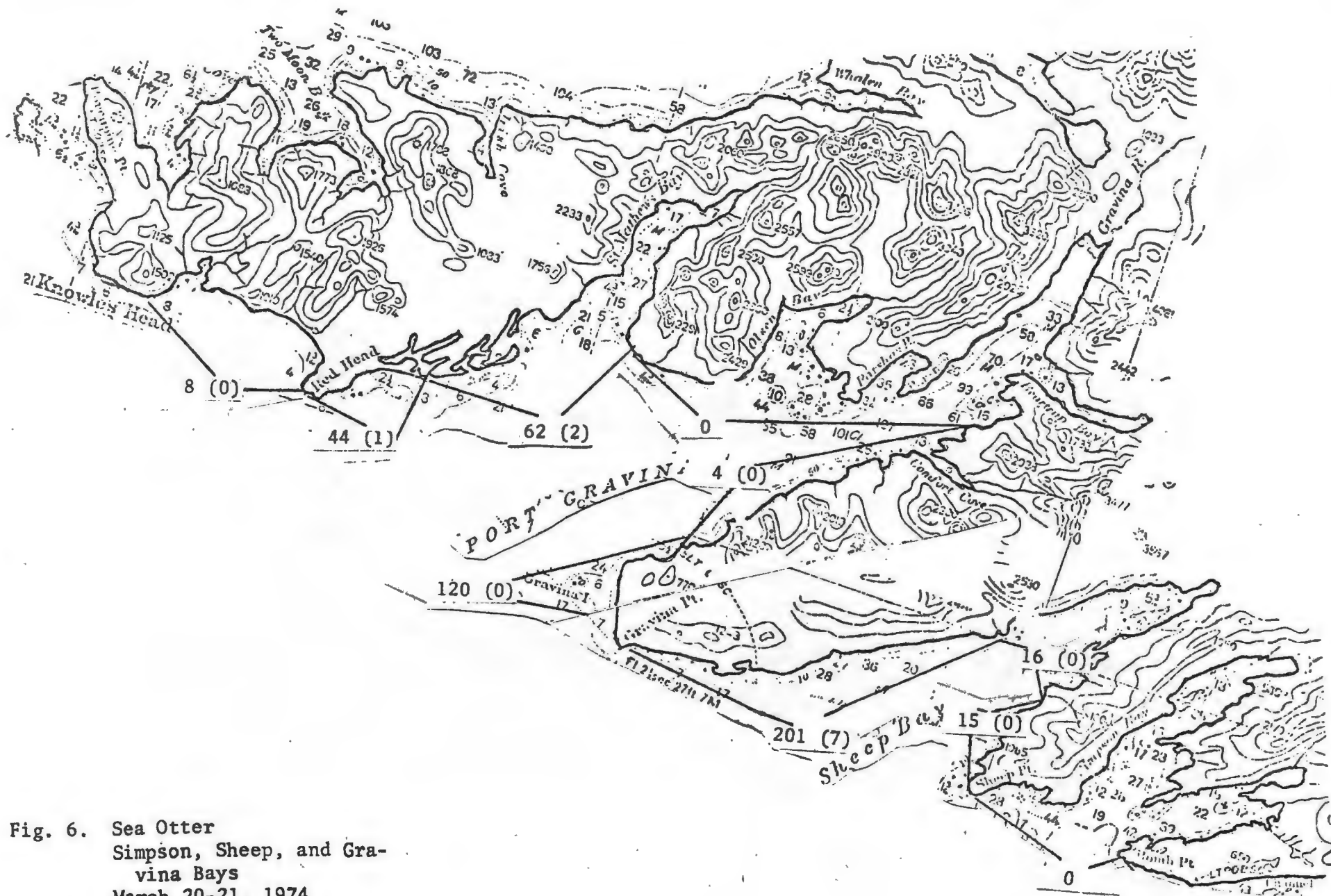


Fig. 6. Sea Otter  
 Simpson, Sheep, and Gra-  
 vina Bays  
 March 20-21, 1974  
 Boat Survey  
 Total Otters = 470  
 Total Pups = 10  
 Pups/100 Adults = 2

( ) = Pups



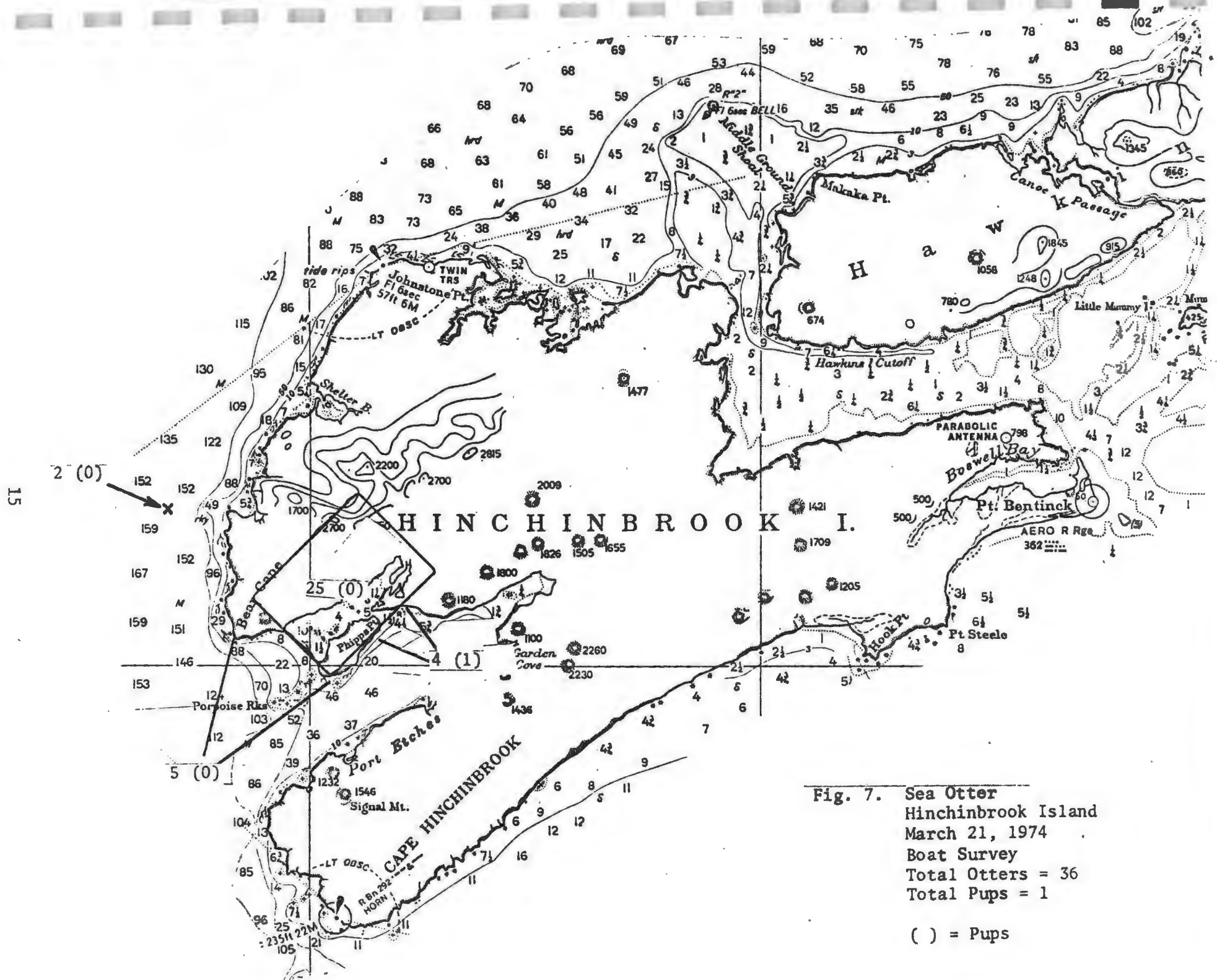


Fig. 7. Sea Otter  
 Hinchinbrook Island  
 March 21, 1974  
 Boat Survey  
 Total Otters = 36  
 Total Pups = 1

( ) = Pups

Table 2

Pup/Adult Ratios of Sea Otters Sighted on Boat Survey  
March 15-25, 1974

Area	Adults*	Pups	Pups/100 Adults
Elrington Island	12	2	17
Evans Island	43	6	14
Latouche Island	39	6	15
Knight Island	148	16	11
Applegate Rock	34	7	21
Green, Little Green, and Channel Island	135	12	8
Sheep Bay	225	7	3
Gravina Bay	235	3	1

\* All single animals, including subadults and large pups not attended by a female at the time of sighting, are classed as adults here.

that are relatively free of offshore rocks and kelp. It is even possible that a "male area" in large, shallow areas is not geographically discrete but occurs wherever a group of non-breeding males have gathered together.

The most persuasive argument against Sheep and Gravina Bays containing male areas is that there is no comparable female area nearby. The nearest large concentrations of females are in Port Etches on Hinchinbrook Island and the Green Island-Port Chalmers area. These areas are 30 to 50 miles away and much of the area between appears to be underpopulated, although not ideal, sea otter habitat.

Surveys of the Port Gravina-Sheep Bay area have been erratic, but they indicate rapid repopulation of the area. Few otters had been seen in that area prior to the late 1960's when a pod of up to 60 sea otters was reported in the vicinity of Red Head. In 1970, 100 were counted in Port Gravina and around Knowles Head, but none were seen in Sheep Bay. On the June 1973 helicopter survey, 192 were counted in and around Port Gravina and five were recorded in Sheep Bay (Pitcher and Vania 1973). When the helicopter survey was repeated in March 1974, 104 were counted in Gravina Bay and 202 in Sheep Bay. A few days later, the boat survey was conducted and 238 were counted in Gravina Bay and 232 in Sheep Bay. These counts seem to indicate there was a rapid increase in numbers and subsequent expansion of range, although variability in counting conditions and short term otter movements may have made the increase appear more precipitous than it really was.

Allowing for the effects of variable counting conditions and methods, the numbers of sea otters around Port Gravina and Sheep Bay have increased at a rate higher than possible by reproduction alone. Substantial numbers have immigrated from other areas. Few females with pups have been seen in other areas where this type of movement has been observed, indicating that there is a preponderance of males or subadults of both sexes (Kenyon 1969). No attempt was made to estimate the ages of otters counted from the boat, but both subadults and adults were seen.

The Port Gravina-Sheep Bay area seems to fit the pattern of an area that has recently been populated by an influx of large numbers of otters from other areas. The area may have contained a high population of males, but this would be a temporary situation. It could not be considered a "male area" in the sense that the term has been used in the Aleutians.

The immigrants probably came from Hinchinbrook and Montague Islands. If so, there would be fewer otters of certain sex and age classes in those areas.

#### RECOMMENDATIONS

Repetitive pup/adult counts should be made in Prince William Sound throughout the year to determine if significant seasonal changes occur. These counts should be made from a boat or shore. Selective collections of otters should be made to determine the sex and age of otters utilizing areas that have low pup/adult ratios.

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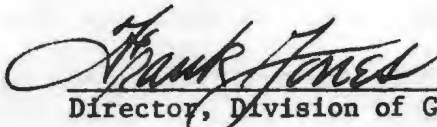
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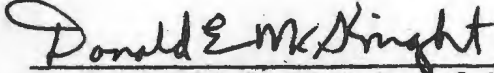
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