CENSUS, NESTING AND PRODUCTIVITY OF BALD EAGLES

SOUTHEAST ALASKA 1966

By Fred C. Robards and James G. King

United States Department of the Interior

Fish and Wildlife Service

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ABSTRACT

A study of the bald eagle (Haliaeetus leucocephalis) in southeast Alaska was conducted during the period March 15, 1966 to July 7, 1966. The first surveys were for the purpose of counting the total eagles present and to start the task of locating nests. The initial count of 803 birds was made and 214 eagle nest locations were found and recorded. The study area of Admiralty Island and adjacent lands was segmented into 86 individual study plots comprised of 10 miles of seacoast. From that total there was selected by random means 10 plots to be subjected to intense study. Data relative to nest types, nest construction, preference locations and eagle nesting in relation to human disturbance were recorded. An analysis that compared nest density to waterfront type proved that first choice nest sites were those fronting on the open seacoast.

The 10 study plots averaged 1.33 nests per mile of beach and 5.3 active nests was the average for each plot. The expanded figure for the entire study area is 456 active nests ± 48 with a confidence limit of 95 %. A block of 72 nests that contained eggs on May 9, 1966 was carefully inventoried again in June and July. The number of eggs found on May 9 was 141 for an average of 1.96 eggs per nest. A count of downy young was made on June 7 and there were 116 found, or an average of 1.61 young per nest. The final count of pre-flight nestlings on July 7 was 102 nestlings for an average of 1.42 per nest.

Survival to the downy young stage was 82% and to pre-flight status 72 %. Production for the study area computed to 95 % confidence limit would be as follows:

Egg Production.	894	±	94
Downy Young Produced	734	±	77
Survival to Pre-flight Stage	648	±	69

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Southeast Alaska is the coastal strip, sometimes called the Panhandle, from Portland Canal up the coast to Yakutat. Its mainland is a narrow belt of high, ice capped mountains and along its coast are many forested islands and countless bays and inlets. The climate is mild and most of the precipitation occurs during the winter. Annual rainfall averages 99 inches, but varies from 150 inches at Ketchikan to 60 inches at Haines. Temperatures are not extreme; the January average is 30° F, the July, 57° F.

A start toward learning population levels, distribution, nesting habits and productivity of the bald eagle (Haliaeetus leucocephalus) has now been made in certain areas of southeast Alaska.

The study area embraced by this report includes Admiralty Island, a portion of Douglas Island, the islands within Auke Bay near Juneau and the Chilkat River Valley near Haines. Admiralty Island is the primary study area and it comprises about 6.5% of the total coastline in southeast Alaska. The observations carried forth on Douglas Island and the small islands of Auke Bay were made while enroute to Admiralty Island from Juneau, Alaska. The Chilkat Valley was included for a spot check of a different habitat type and because it carries such a high wintering population of eagles. All of this area is forested with largely virgin stands of Sitka spruce (Picea sitchensis) and western hemlock (Tsuga heterophylla) except for the Chilkat River valley where the river is bordered by stands of large cottonwood (Populous trichocarpa).

This study was initiated in March 1966 when an aerial reconnaissance of Admiralty Island, the Chilkat River Valley and Douglas Island was made by use of a Cessna 180 aircraft. Records were maintained on the total number of eagles and eagle nests found in each of the study areas. Close attention was given to the exact geographical location of each bird and nest and these were plotted on to strip maps that had been prepared for such use. The eagles observed were classified as either adult or subadult and an attempt was made to describe nest locations exactly to ease the problem of later contact and observation. Personnel working on the project in addition to the writers were Keith R. Banning and Karl Alstead, Bureau of Sport Fisheries and Wildlife, Juneau, Alaska.

The total nests for Admiralty Island was estimated by plot census method since the area is too large for an accurate total inventory. Clutch size and survival of young was determined by three surveys from helicopter that covered 72 active nests.

Census and Population Composition

Several flights were made in March 1966 during periods of suitable weather to complete a first count of eagles before nest activity commenced.

Admiralty Island was covered in total and this survey included all small islands and islets embraced within the outer limits of the main island. The small island surveys included the entire island, the Chilkat River count simply the valley floor from that river's mouth to its confluence with the Kelsall River.

The contrasting white head of the adult was easily recognized against the dark foliage of the spruce-hemlock forest but the rather drab dress of younger birds served as camouflage and only those perched in obvious positions were seen. It was almost immediately apparent that most sub-adult eagles were by-passed without being seen. Adult eagles in some instances gave the appearance of being paired but most were perched by themselves at prominent locations. Admiralty Island was the only area where a total count of eagles was made and the count of 784 adults to 19 sub-adults points up that aerial observation from a swift moving aircraft is not precise enough to locate the dark birds when observers are also recording adult birds and nests. As observers gain experience some improvement in counts can be expected. Counts are now going to be made

with joint use of plane and vessel to determine the true balance between age classes. Specifically, aircraft may be efficient for counting birds or nests but too fast for recording both on the same flight. The nest count was difficult and the 214 nests recorded in March represent only those that were conspicuously located or were within trees with sparse foliage. A seasonal inventory of eagles should be planned to determine population changes during the several seasons. The use of a plane was limited to the single seasonal count since it was not available and funds were not adequate for charter of either fixed wing aircraft or helicopter for additional eagle counts. Vessel survey counts are being planned on a seasonal basis as it is without doubt the best possible means other than helicopter.

Little work has ever been undertaken to study the bald eagle in southeast Alaska and there is little recorded. The only specific eagle count that gives inventory figures is excerpted from the diary of Ray Woolford and it covers coastline included in our study area. It is fairly recent and was completed by pilot Ray Woolford, then serving as Wildlife Administrator, with James G. King as observer. That count is compared below with the March 15, 1966 census for the exact coastal area that was covered in their count of March 11, 1961 for the Glass Peninsula-Seymour Canal portion of Admiralty Island.

Beachline Area	Mileage	Total Eagles 1961	Total Eagles 1966	Eagles per Mile 1961	Eagles per Mile 1966	% Gain
Pt. Retreat to Pt. Arden	68	60	71	.8824	1.0441	18%
Pt. Arden to Pt. Hugh	54	45	64	.8333	1.1852	42%

Beachline Area	Mileage	Total Eagles 1961	Total Eagles 1966	Eagles per Mile 1961	Eagles per Mile 1966	% Gain
Gambier Bay	68	18	27	.2647	.3971	50%
Gambier Bay coast to Pybus Bay	15	17	25	1.1333	1.6667	47%
Pt. Hugh to head of Seymour Canal	66	20	72	.3030	1.0909	260%
Douglas Island	42	20	32	.4762	.7619	60%
Totals	313	180	291	.5751	.9297	62%

It is interesting to note the general gain in all portions of Admiralty Island covered by these survey areas. The general overall increase of 62% probably reflects the visibility factor of a Grumman Goose vs Cessna 180 on floats. It would seem that the bias involved makes the two sets of figures worthless from a standpoint of comparison and it cannot be said that there has been an increase in eagles from 180 to 291 during the span of five years.

Ralph H. Imler's unpublished "Alaskan Bald Eagle Studies" lists an average of .81 eagles per mile of beach for Admiralty Island compared to our average in 1966 of .93 eagles per mile. A conclusion cannot be based upon a comparison of these counts since Imler's was primarily a summer study by vessel and the 1966 figures result from a winter aerial census.

Recording of Nest Data

The initial complete survey flight around Admiralty Island added a great deal of information. The number of nests located (214) far exceeded early expectations. To record nest information an Eagle Nest Record Card was devised for use and a replica of it is shown below.

EAGLE NEST DATA CARD - BALD - GOLDEN

Observer's Name _____

Address _____

Transportation Used _____ Date _____

Geographic Location of Nest _____

_____

_____

Usable Landmark to Relocate Nest _____

_____

_____

NESTING SITE

Merchantable Timber _____

Tree Species _____

Shrub Species _____

Cliff or Other Location, Describe.

_____

_____

Ht. from Ground ____ Sea Level ____

NEST ACTIVITY

No Activity _____

Adults in Locality _____

Active Nest Building _____

Incubating Eggs _____

Brooding Young _____

Eggs in Nest, Number _____

Young in Nest, Number _____

Date of Hatch _____

Date Young Left Nest _____

Mortality Observed _____

Cause of Mortality _____

_____

COMPLETE A DATA CARD FOR EACH OBSERVATION IF CHANGE IN NEST STATUS.

USE REVERSE SIDE FOR SUPPLEMENTAL DATA OR TO ADD NOTES ON ABOVE.

The data cards are made of heavy duty paper, punched so that they may be inserted in loose leaf binders for field use or to be kept for permanent record. The nest cards can then be arranged chronologically to match the particular survey being made and the observer has available certain information to facilitate relocation of a specific nest. If new data is gathered on any nest it is simply entered into the proper blank on its respective card.

Nest Study Plots

The intense search procedure needed for locating eagle nests used aircraft time heavily and it was soon apparent that a nest survey could not be conducted to cover the entire coast of Admiralty Island. The coastline of the main island and the smaller islands and islets contained within the outer limits of the main island was measured off into 10 mile sections. A total of 86 potential study plots representing a total of 860 miles of coastline was thus available. From that total, ten study plots were selected at random means for complete nest survey. A map of Admiralty Island is shown here as Figure 2 to show the geographic locations of the several plots selected.

In the appended pocket inside the back cover of this report can be found eight maps designated as Figures 3-10 which are large scale sections that show the specific coastline of the study plots. The screened area defines the limits of the measured 10 mile coast. The diamond shaped symbols represent inactive nests that are known to have been unused during the nesting season. The star shaped symbols are those found in use and within the study plot they represent the geographic location of

the active nests that were found by thorough aerial search in 1966.

In addition to the ten formal study plots there were three additional 10 mile segments of coast where a search was made for all possible nests. Maps are enclosed as Figures 11, 12 and 13 and bear the same nest symbols as for the Admiralty plots. A map showing the Chilkat River area as Plot 1B and Figure 14 is the only one that does not comply with a sample area of only 10 miles and the scale is one-fourth that used for the other illustrations. (See Figure 2).

Locating the Nests

The locating of eagle nests is by no method an easy task and only by continued searching can one approach finding the total nests in any given area. During late winter it is fairly easy to locate a sizeable number of nests by making the survey immediately after thawing weather has removed snow from the trees. Observers should then look closely for the snow remaining on the nest platform and many nests will be found, even some of those that would be difficult to see during other seasons of the year. In late spring when paired eagles are nest building the task of finding nests becomes more difficult but close scrutiny of the large trees in the vicinity of perched eagles will usually divulge the location of one or more nests. The nests generally appear brownish against the background of green foliage but those nests located within or behind dense cover can be found only after viewing from several angles. In looking for nests the first sign to look for is either a lone perched bird or a pair. The pairs seem to remain in their own territory and one or both are often very near or at the nest site. If a single adult eagle

is spotted then the next obvious observation is to spot the exact tree from which the second eagle is flushed for often it will be the nest location. After eggs are deposited this method is the best means of locating nests but it becomes difficult near the end of the incubation period or when very young eaglets are in the nest.

Once egg laying has commenced the nesting pair is often found at or very near the nest tree and the active nest is fairly easy to locate. The same is true during early incubation but as the incubation progresses the female becomes more secretive and more difficult to flush from the nest. The interval between nests or nesting territories seem generally to be about the same size. This is evidenced by the uniformity of nests within the study plots where the least number of active nests was four and the greatest number seven within the 10 mile zone. If a void occurs in the nest density pattern there is generally a very obvious reason that prevents nesting such as small second growth timber as in Study Plot No. 54 or an iced-in bay area such as Windfall Harbor in Study Plot No. 21. It was found that perhaps ten fly-by flights were necessary before observers were satisfied that all nests had been located.

Nest Types

There were several different types of nests observed. The easiest to locate were those nests located tip top the tree and these nests were found in both live and dead trees. These nests are generally made possible by storm destruction of the tree top immediately above a set of branches. The resulting stool of branches in the case of a live tree makes an excellent cradle for the nest material. Often in the case of

live trees one or more of the branches will attain superiority and it grows upward and back over across the nest. It is this type of nest that becomes one of the most difficult to find because the branches growing up and around the trees' top form a canopy cover and a concealed nest. Still three other types of nests occur in the snag top of a live tree, an occasional nest found below the mid point of a live tree and those found in recently dead trees that retain many of their branches. Seldom are any nests observed in scrub trees if any large trees are in the vicinity. No cliff nesting was observed but one ground nest was found on a small island that provided no trees whatsoever. This one nest is comprised largely of grass with an intermixing of driftwood, kelp and feathers.

Nest Construction

The nests usually are built upon a support base made up of either tree crotches plus smaller limbs or the main tree trunk plus two or more large limbs. The platform is then comprised of sticks and branches most of which are drift picked up off the beaches. Many of these may be three to four feet in length and not over 1-1/2 to 2 inches in diameter. The weight of these sticks would seldom exceed a weight of 2 to 2-1/2 pounds. The nest lining is comprised of twigs, smaller branches, beach rye grass, moss, small pieces of kelp, feathers and other miscellaneous debris found about the beach. Old nests often support growths of grass and moss during late summer they often bloom with a new growth of greenery.

As the survey progressed ancient nests were found that had weathered the ravages of wind and storm but they were not included in the nest

count unless they appeared capable of use. Periodically an assortment of sticks and trash would be found where a nest had either been started and abandoned or been blown out by windstorm. If the remnant or nest start was judged to be unusable during the 1966 nesting season it was not recorded as a nest.

Preference Nest Sites

In all zones of the survey it is evident that eagles select the largest trees available for the location of their nests. Trees must, of course, provide a suitable limb situation to hold the nest platform and there is for obvious reasons a preference for spruce trees rather than hemlock because the former has larger limbs that make possible a more stable nest. Approximately 85 to 90 percent of all nests in spruce-hemlock forests are located in spruce trees and those in hemlock are generally in trees with deformed or broken tops. On the contrary, it was found in the Chilkat River Valley that most eagles were locating their nests in large cottonwood trees. This tree is practically nonexistent on Admiralty, Douglas and the small islands covered by this survey. All of the eagle nests found either front on the seacoast or the major streams, the nests on the islands were within 200 yards of salt water and the river valley nests no more than 150 yards from a waterway.

On the Chilkat River nests are generally located in a crotch formed by two or three limbs at a position above mid-tree. There were a few nests found in spruce trees but perhaps 75 % of all nesting was in the large cottonwood trees that front directly on the river. Along the Chilkat the spruce-hemlock forest stands are situated behind a cottonwood fringe

and are found in most instances 100 to 300 yards from the river. In both habitat types there were found nests located in dead snags and without exception the choice seemed to be always the largest and oldest trees available. Many nests are located in the first large trees fronting on the open beach and others just inside the forest fringe. All nests are oriented to the sea or major waterway and without question the highest nesting density is along the open coast. One or more flight corridors are regularly used to approach or leave the nest unless the nest tree stand by itself and has no obstruction. It would be logical to think that eagle nesting would have some relation to salmon stream availability but this proved not to be the case. Evidently the stable source of food is derived from the sea or large river rather than from small streams or fresh water lakes.

Exposure to wind and sun do not seem to be large factors affecting distribution of nesting eagles since those areas subjected to normal prevailing winds from the north or southeast seemingly follow the average nest density pattern. Examples of this are Study Plots # 7, # 27, # 36 and # 45 which are all hard hit by southeasterly storms and # 82 which is wide open to northerly weather. The single exception seems to be the wind blast area near the mouth of the Taku River where wind velocities may reach and exceed 60 to 70 miles per hour during the early spring. The size or merchantability of the beach fringe timber does not appear to be a criterion of acceptability. If in any major segment of the forest there is poor or scrub timber the eagles simply seem to accept the largest of the trees present that afford nest locations. Several observations that appear worthy of mention were made relative

to certain zones of the survey area that seem to be avoided by nesting eagles. The forest fringe opening directly upon a late thawing bay area failed to reveal the presence of even a single nest that was actively used. An example of this can be found in Study Plot # 21 where not a single nest could be found facing upon Windfall Harbor which generally remains ice-bound until late April or May of each year.

Second growth timber areas within the study area evidently provide no suitable nesting sites if there remains any virgin stands of timber in the vicinity. Perhaps it would be utilized if no larger trees were to be found in otherwise suitable habitat. In Study Plot # 54 and to a lesser extent Study Plot # 7 may be found logged areas that display a noticeable nest shortage. Vessel anchorage areas, spring sport fishing spots and others where there is constant boat traffic near shore seemingly decrease nesting. Clear-cut beach logging removes the suitable trees and creates a void for nesting opportunity. When the tree margin is set back from the beach any appreciable distance it appears that zone is completely bypassed. Fringe areas close to towns and highways are found to be either partially or totally avoided

Beach Type Analysis

An analysis of the seacoast making up the 10 miles of beach within each study plot was completed and every 1/2-mile segment was classified as to type. This was done for the specific purpose of showing the nest site preference for certain coastal areas. The following table gives the mileage breakdown for each plot as it seperated into one or more of the five zones described in the tables left column.

Mileage in Study Plots by Beachfront Type

Study Plot No.	7	19	21	24	27	36	45	53	54	82	Total
Admiralty Island, Exposed seacoast open directly to main surrounding water body.	4				5	8.5	3	4.5	3	3	31
Admiralty Island, Semi-exposed seacoast opening on protected waters.	6		5.5		3	1					15.5
Admiralty Island, Seacoast fronting on small salt water bays free of ice by April.			2.5		1		4	5	6	6	24.5
Admiralty Island, Seacoast fronting on salt water bay areas iced-in as of April.		1	2		1	.5			1	1	6.5
Island and Islet Areas immediately adjacent to or within outer limits of Admiralty Island.		9		10			3	.5			22.5
Study Plot Mileage	10	10	10	10	10	10	10	10	10	10	100

Mileage in Appended Study Plots by Beachfront Type

Douglas Island, Auke Bay Islands	Study Plot A-1	Study Plot A-2	Study Plot A-3	Total
Douglas Island, Exposed seacoast open directly to main surrounding water body.	10	10		20
Douglas Island, Seacoast fronting on small salt water bay free of ice by April.			1	1
Island and Islet Areas in Auke Bay north of Douglas Island.			9	9
Study Plot Mileage	10	10	10	30

The next table shows a seacoast mileage breakdown for the Admiralty Island area, the 10 study plots and the percentage value of each within the several classifications. The trend is for the study plots to follow the area breakdown quite closely and they are thought to be a very good representative group.

Comparison of Admiralty Study Area and Study Plot Beachfrontage

	Admiralty Area Mileage	% of Total Area	Study Plot Mileage & % of Total
Admiralty Island, exposed seacoast open directly to main surrounding water body.	287	33	31
Admiralty Island, semi-exposed seacoast opening on protected waters.	80	9	13.5
Admiralty Island, seacoast fronting on small salt water bays free of ice by April.	289	34	24.5
Admiralty Island, seacoast fronting on salt water bay areas iced-in as of April.	85	10	6.5
Island and Islet areas immediately adjacent to or within outer limits of Admiralty Island.	119	14	22.5
Totals	860 miles	100 %	100 miles & 100 %

In the sample there is represented a high proportion of island, islet and seacoast opening upon protected waters and the other types of coast are correspondingly less well represented. The study plots do provide for good coverage of all types of seacoast environment.

Each eagle nest found in a study plot has been classified relative to the beach type immediately between it and salt water. In the following table there is shown the actual number of nests for each plot as they occur on the several types of seacoast.

Study Plot	7	19	21	24	27	36	45	53	54	82	Total
Open Coast Area	9	0	0	0	8	14	5	11	3	8	58
Protected Coast	5	0	8	0	3	0	0	0	0	0	16
Ice Free Bay	0	0	2	0	0	0	2	5	7	5	21
Iced-in Bay	0	0	0	0	0	0	0	0	1	0	1
Islands & Islets	0	13	0	14	0	0	7	0	0	3	37
Totals	14	13	10	14	11	14	14	16	11	16	133

The average number of eagle nests found for each mile of seacoast type in the study plots is shown in the following table.

Beachfront Type	Mileage	Total Nests	Average Nests per Mile
Open Coast Area	31	58	1.87
Protected Coast	15.5	16	1.03
Ice Free Bay	24.5	21	.86
Iced-in Bay	6.5	1	.15
Islands & Islets	22.5	37	1.64
Totals	100	133	1.33

Active eagle nests within the study plots are shown in the next table separated by the beach type in which they occur.

Active Eagle Nests Segregated by Beachfront Type

Study Plot	7	19	21	24	27	36	45	53	54	82	Total Nests
Open Coast Area	5	0	0	0	3	5	2	4	2	2	23
Protected Coast	0	0	4	0	2	0	0	0	0	0	6
Ice Free Bay	0	2	1	0	0	0	2	2	2	2	11
Iced-in Bay	0	0	0	0	0	0	0	0	0	0	0
Islands & Islets	0	5	0	5	0	0	2	0	0	1	13
Totals	5	7	5	5	5	5	6	6	4	5	53

An estimated total active eagle nests for the entire Admiralty Island study area is computed by using the average active nest incidence in study plots multiplied by the total coast mileage of similar habitat.

	Study Plot Active Nests	Study Plot Mileage by Type	Nest Incidence By Type Mile	Total Mile-By Type	Total Active Nests for Study Area
Open Coast Area	23	31	.742	287	213
Protected Coast	6	15.5	.387	80	31
Ice Free Bay	11	24.5	.449	289	130
Iced-in Bay	0	6.5	0	85	0
Islands & Islets	13	22.5	.578	119	69
Totals	53	100	.53	860	443

Productivity

The ratio of active to inactive nests was established during April of 1966 by means of repeated observations from a Cessna 180 aircraft. The table below lists active and inactive nests by study plot, their average distribution per mile of beach, the total nests for each plot and finally the average total nests for each mile of coast.

Study Plot	Active Nests	Active Nests per Mile	Inactive Nests	Inactive Nests per Mi.	Total Nests	Total Nests per Mile
7	5	.5	9	.9	14	1.4
19	7	.7	6	.6	13	1.3
21	5	.5	5	.5	10	1.0
24	5	.5	9	.9	14	1.4
27	5	.5	6	.6	11	1.1
36	5	.5	9	.9	14	1.4
45	6	.6	8	.8	14	1.4
53	6	.6	10	1.0	16	1.6
54	4	.4	7	.7	11	1.1
82	5	.5	11	1.1	16	1.6
Totals	53	.53	80	.8	133	1.33

The 10 sample plots out of the 86 total plots contained an average of 5.3 active nests for each plot. This gives an expanded figure of 456 active nests for the entire study area $\pm$ 48 with 95% confidence limit. Thus one would expect that there are between 408 and 504 active eagle nests in the study area. Expansion of inactive nests by the same method yields a total 688 nests $\pm$ 112 and a grand total of between 984 and 1,304 nests.

Comparison, Nesting Density, Admiralty, Douglas Island-Auke Bay and Chilkat River Areas

Zone	Plot No.	Total Nests	Active Nests	Average Active Nests Per Beach Mi.	Average for Zone
Admiralty	7	14	5	.5	
	19	13	7	.7	
	21	10	5	.5	
	24	14	5	.5	
	27	11	5	.5	
	36	14	5	.5	
	45	14	6	.6	
	53	16	6	.6	
	54	11	4	.4	Admiralty Study
	82	16	5	.5	Plot Average .53
Douglas Id.	1A	8	5	.5	
	2A	8	4	.4	Douglas Island &
Auke Bay	3A	12	7	.7	Auke Bay Average .533
Chilkat	1	7	5	.5	
	2	12	6	.6	
	3	9	4	.4	
	4	6	3	.3	
	5	6	2	.2	Chilkat River
	6	12	4	.4	Plot Average .4
Total for all Plots		213	93	.49	.49

The three plots on Douglas Island and the islands of Auke Bay are very similar to the Admiralty Study area habitat. Average nests shown for the two zones are nearly identical, .53 and .533 respectively. One would expect that the Chilkat River area could not support a nesting population as high as the coastal strip, and this is supported by the average of only four nests per plot.

Productivity cont.

To determine average number of eggs, hatching success and the average number of young reared, three surveys were made via chartered helicopter. To keep cost at minimum the nests selected for this sampling were those located near Juneau. These included nests on Douglas Island, the small islands of Auke Bay and those on north Admiralty Island. The tables below give the results obtained and the date of each survey for the block of 72 nests inventoried. A factor not included in these surveys was the number of active nests that failed to reach the incubation stage survey conducted on May 9.

Productivity - 72 Nests

No. in Nest	Eggs 5/9/66	Downy Young 6/7/66	Preflight Nestlings 7/7/66
0	0 nests	4 nests	9 nests
1	6 "	20 "	24 "
2	63 "	48 "	39 "
3	3 "	0 "	0 "
Total eggs	141	Total downy young 116	Total feathered nestlings 102

Survival Rate and Average Per Nest

	Egg Survey 5/9/66	Downy Young Survey 6/7/66	Pre-flight Survey 7/7/66
Count	141	116	102
Average Per Nest	1.96	1.61	1.42
Survival %	100	82	72

The survival rates from incubation to pre-flight stage are shown in the above table and the survival from the downy young to pre-flight stage was 88%. Productivity for the Admiralty Island Study Area is developed in the following table by multiplying total active nests by the survival rate found in the 72 nest survey.

Bald Eagle Production - Admiralty Island

	Eggs (May)	Downy Young (June)	Pre-flight Nestlings (July)
Minimum nests 408	800	657	579
Maximum nests 504	988	811	716
Mean	894 ± 94	734 ± 77	648 ± 69

Bald Eagle Protection

The high incidence of inactive nests may be caused by a tendency to alternate use of nests within a territorial zone or it may reflect the many years that the bald eagle was in unprotected status. The Territorial government of Alaska placed a bounty on the bald eagle in 1917 and there was a bounty paid during most years until 1952. The bounty started at $ .50 per bird, was increased to $ 1.00 in 1923 and payments were made at that rate until 1941. The first bounty system was discarded in 1946 after the legislature had failed to appropriate money for several years. A new bounty act was passed by the 1949 Legislature and there was an increase in the amount paid to $ 2.00 per eagle. This bounty system remained in affect until prevented by Federal protection in July 1952. Just how many were killed during the span of time from 1917 to 1952 will

always remain a mystery since many persons destroyed eagles without thought of bounty payments. Others were probably discarded either because of mishandling or when the Treasurer's Office failed to remit because of fund shortage. The Session Laws of Alaska and Annual Reports of the Alaska Territorial Treasurer have been used for source material and for purposes of the record the number of eagles bountied during the years 1917-1952 is shown in table form.

Bald Eagle Bounty Data 1917-1952

Period	Appropriation	Bounty Per Bird	Eagles Bountied	Funds Expended
1917-1918	7,500	.50	5,229	2,614.50
1919-1920	5,000	.50	4,239	2,119.50
1921-1922	2,500	.50	4,528	2,263.50
1923-1924	18,000	1.00	20,497	20,497.00
1925-1926	20,000	1.00	7,312	7,312.00
1927-1928	12,500	1.00	27,843	27,843.00
1929-1930	10,000	1.00	8,196	8,196.00
1931-1932	8,000	1.00	4,999	4,999.00
1933-1934	10,500	1.00	7,490	7,490.00
1935-1936	12,000	1.00	3,009	3,009.00
1937-1938	15,000	1.00	12,793	12,793.00
1939-1940	10,000	1.00	7,970	7,970.00
1941-1942	(no funds appropriated)		1,872	1,872.00
1943-1944	" "	"	---	---
1945-1946	* 1,528		1,528	1,528.00
1947-1948	(no bounty)		---	---
1949-1950	**15,000	2.00	6,450	12,900.00
1951-1952	17,000	2.00	4,318	9,636.00
1953	*** (no bounty)			
Totals	164,528	---	128,273	133,042.50

* Bounty Act of 1917 repealed. $1,528.00 appropriated to pay 1941-1942 claims.

** Bounty Act of 1949 enacted. Bounty raised to $2.00 per bird.

*** Bounty Act of 1949 repealed.

The Territorial Treasurer's Reports list a breakdown of eagle bounties paid during certain years by Judicial Division.

Bald Eagles Bountied in Judicial Divisions

Period on Record	Southeast Alaska 1st Judicial Division	Northwest Alaska 2nd Judicial Division	South & Southwest 3rd Judicial Division	Interior Alaska 4th Judicial Division
1917-18	3,958	0	1,270	1
1921-22	2,023	0	240	1
1923-24	11,475	2	3,195	0
1925-26	7,008	1	299	3
1939-40	5,551	3	2,408	8
1941-42	1,110	0	762	0
Totals	31,125	6	8,174	13

It is interesting to note that 31,125 of the total 39,318 eagles were harvested in southeast Alaska, 8,174 from the south and southwest coast while only 19 were taken in Interior Alaska and along the Bering Sea. A semi-protective regulation was put in force on July 1, 1952 which was largely responsible for the repeal of the eagle bounty system. The " Bald Eagle Act " was amended in 1959 to afford full protection for Alaska's bald eagles.

Data on the bounty system is being entered in this report for the sole purpose of inserting it into the record. Many of the documents that supported bounty claims have already been destroyed and it was necessary to go to the Alaska Historical Library to find the above documented records.

Behavior

Not many notes were made relative to eagle behavior but in general there was no aggressiveness exhibited toward aircraft or other conveyance used. Birds that were flushed from nests either perched again nearby or remained on the wing at a safe distance. There is always an exception and the eagles from 3 nests displayed hostility and were inclined to attack either the aircraft or helicopter. On two different dates the helicopter pilot resorted to evasive action and at still another nest one adult eagle flew directly at the fixed-wing aircraft.

Nest abandonment caused by repeated disturbance during the nesting period was not noted and it appears to be a rather negative factor on surveys of this type. Visits during the late incubation period and when the young were small had a spacing of one month and it seems that no harm was done. Just before hatching and for the period when the eaglets are tiny it is often impossible to raise the adult from the nest by means of conventional aircraft. This is also true in a few cases with the helicopter and eagles have remained on the nest with a noisy "chopper" hovering within 50 to 100 feet of the nest.

Transportation

Fixed-wing aircraft was found to be practical for nest spotting and for classification of nests as active or inactive, but the helicopter was an absolute necessity for inventory of eggs and downy young eaglets. For this study there were several different forms of transport used and each seems to have its' place and be a necessary part of the overall scheme.

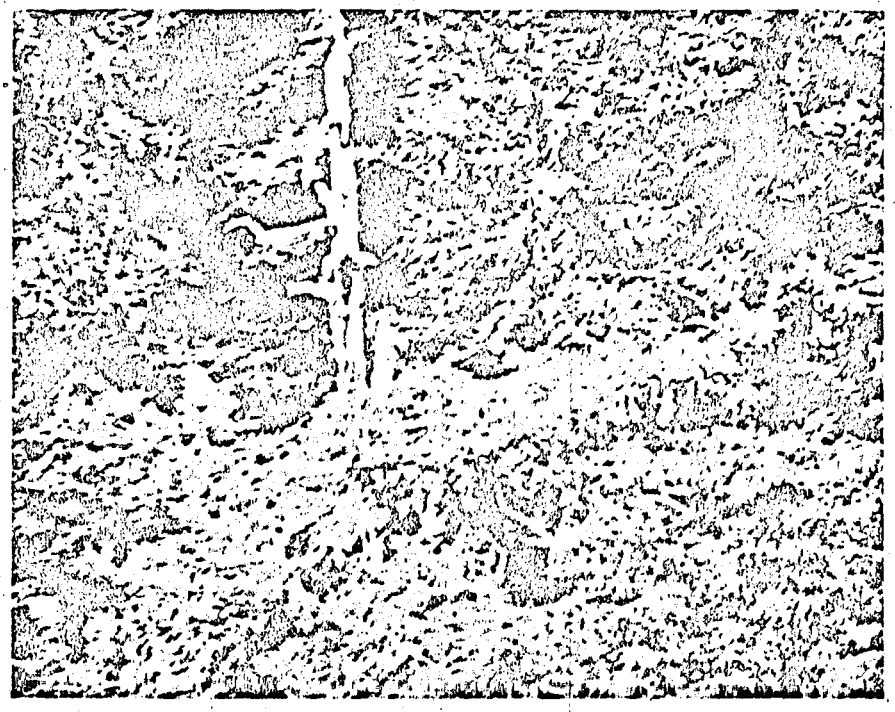
The helicopter provides the single method that is capable of working on all facets of such a study and cost alone provides the barrier that prevents it from being used. The Cessna 180 aircraft was used for census work, the locating of nests and later classification as to active or inactive status. The practical transportation mode for each of several observations is checked in the listing below.

Work to be Accomplished	Helicopter	Aircraft	Vessel	Foot
Census of Adult Eagles	Good	Good	Slow	
Census of Sub-adults	"	Fair	Slow	
Locating of Nests	"	Fair		
Status Active-Inactive	"	Fair	Slow	
Egg Inventory	"	Not Practical		
Hatching Success	"	" "		
Pre-flight Inventory	"	Good	Fair	
Timber Species	"	Fair	Fair	Good
Timber Merchantability	"	Good	Fair	Good

If there is no comment listed above, the means of transportation is thought to be completely impractical.

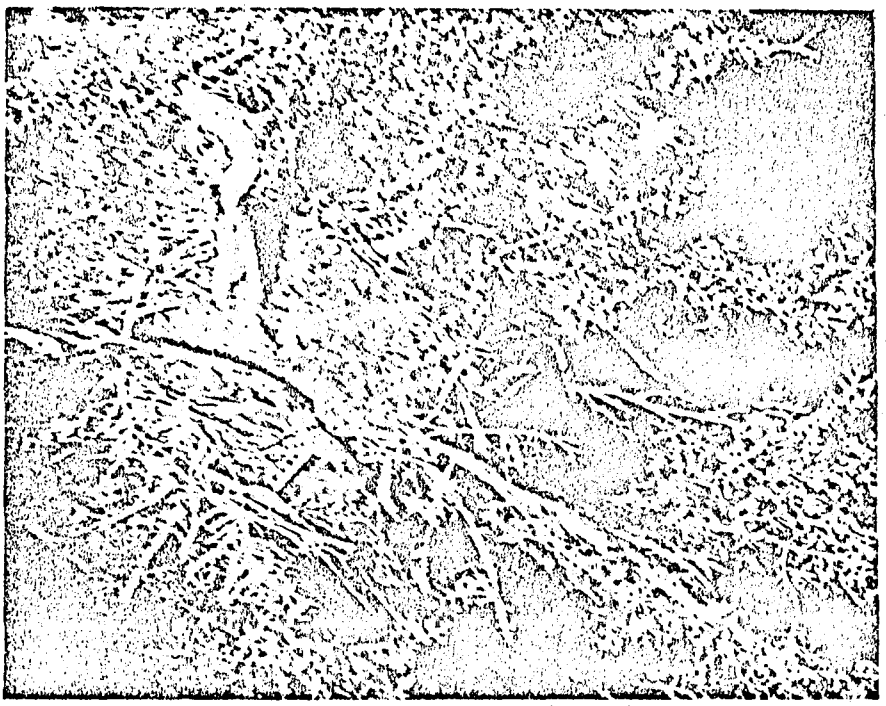
A medium sized nest well toward the top of a large spruce tree. This type of nest is easily found since it sky-lines well from either low flying aircraft or a surface vessel.

Nests in snags are readily found by use of any mode of transportation. If the entire tree is dead a nest such as this will soon be destroyed by nature.

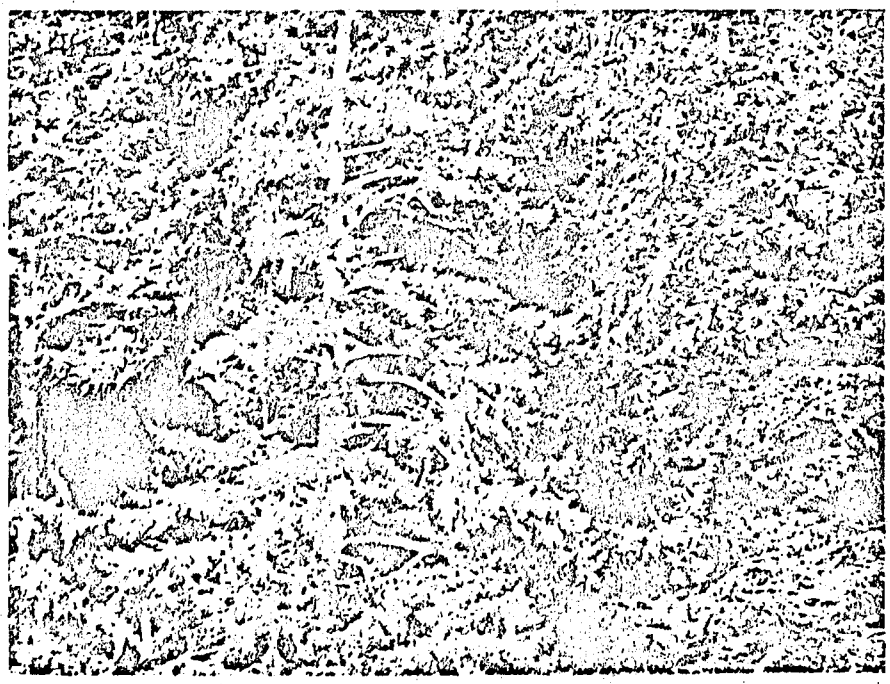


A platform nest made possible by a dead topped tree. Easy to find by aircraft but completely hidden from below and consequently difficult to locate from a boat or on foot.

Eagle nest with the average clutch of two eggs. This nest is situated in the top of a slightly deformed tree.

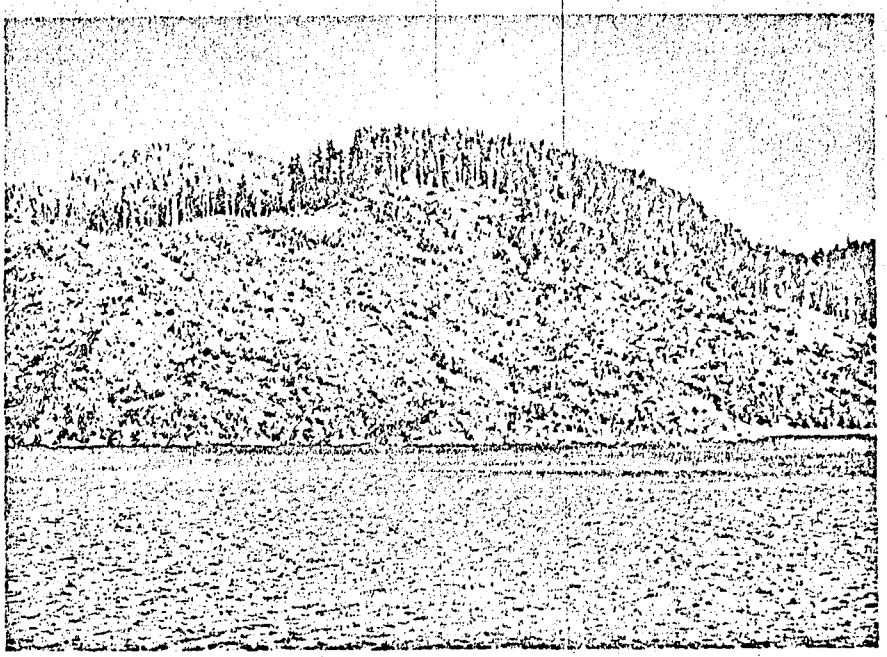


A nest with an overhanging canopy of branches is generally difficult to locate unless a bird flushes. This nest containing two downy young is easily visible from one side but completely hidden from the other.



The most difficult to find are eagle nests confined well within the dense foliage of a mature spruce tree. The nest is located slightly left of the pictures center, at mid-tree.

Even the helicopter failed to raise this broody eagle from her nest. The screen of branches around her nest evidently was judged to be ample protection.



A recently logged beach show has stripped this area of nest habitat for years to come. Some nest trees were probably felled during this operation if the area had a normal nest distribution. It is doubtful that eagles would utilize the timber standing on top of the hilltop if other virgin timber stands could be found along a nearby beach.

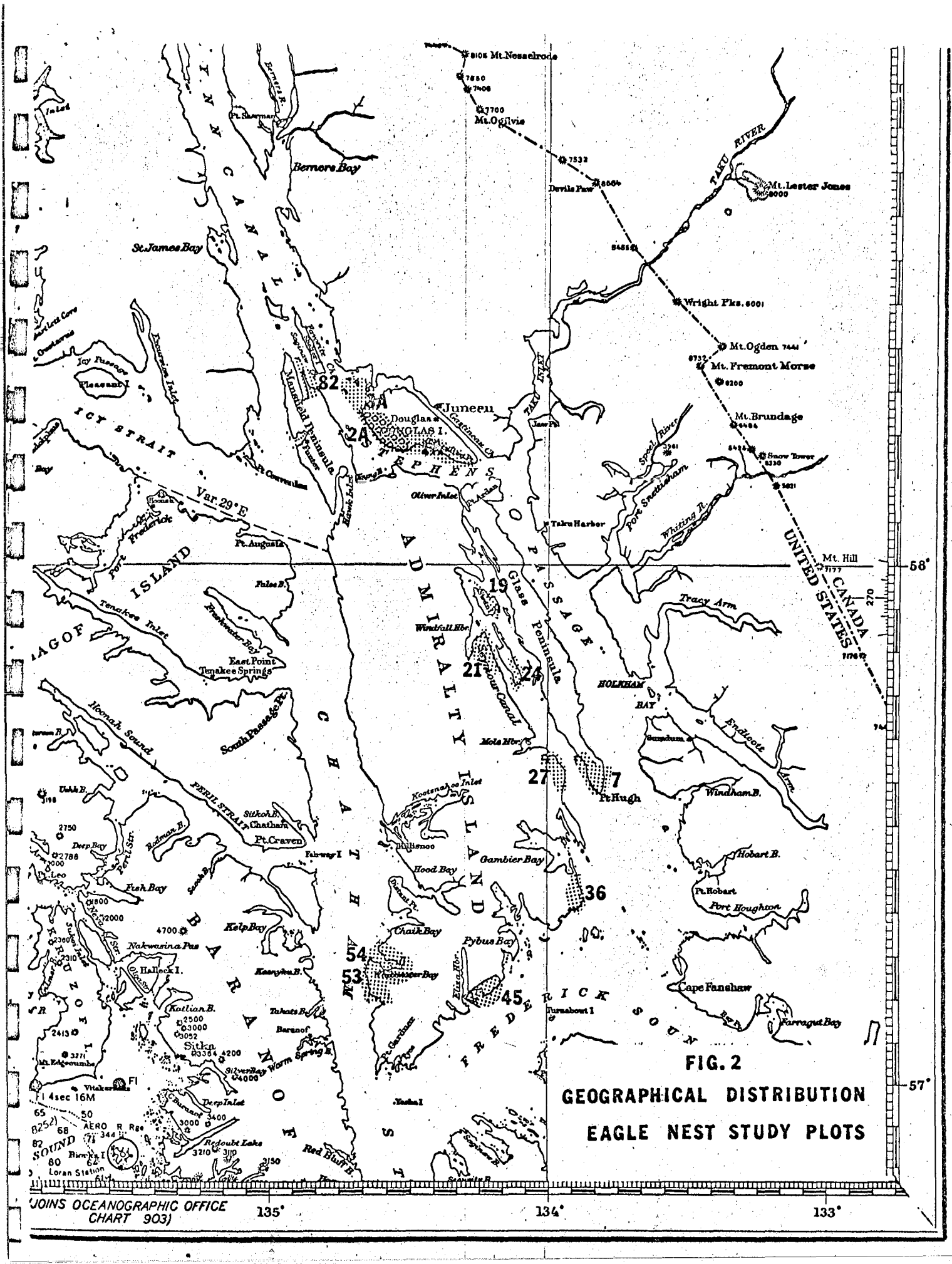


FIG. 2

GEOGRAPHICAL DISTRIBUTION

EAGLE NEST STUDY PLOTS

(JOINS OCEANOGRAPHIC OFFICE CHART 903)

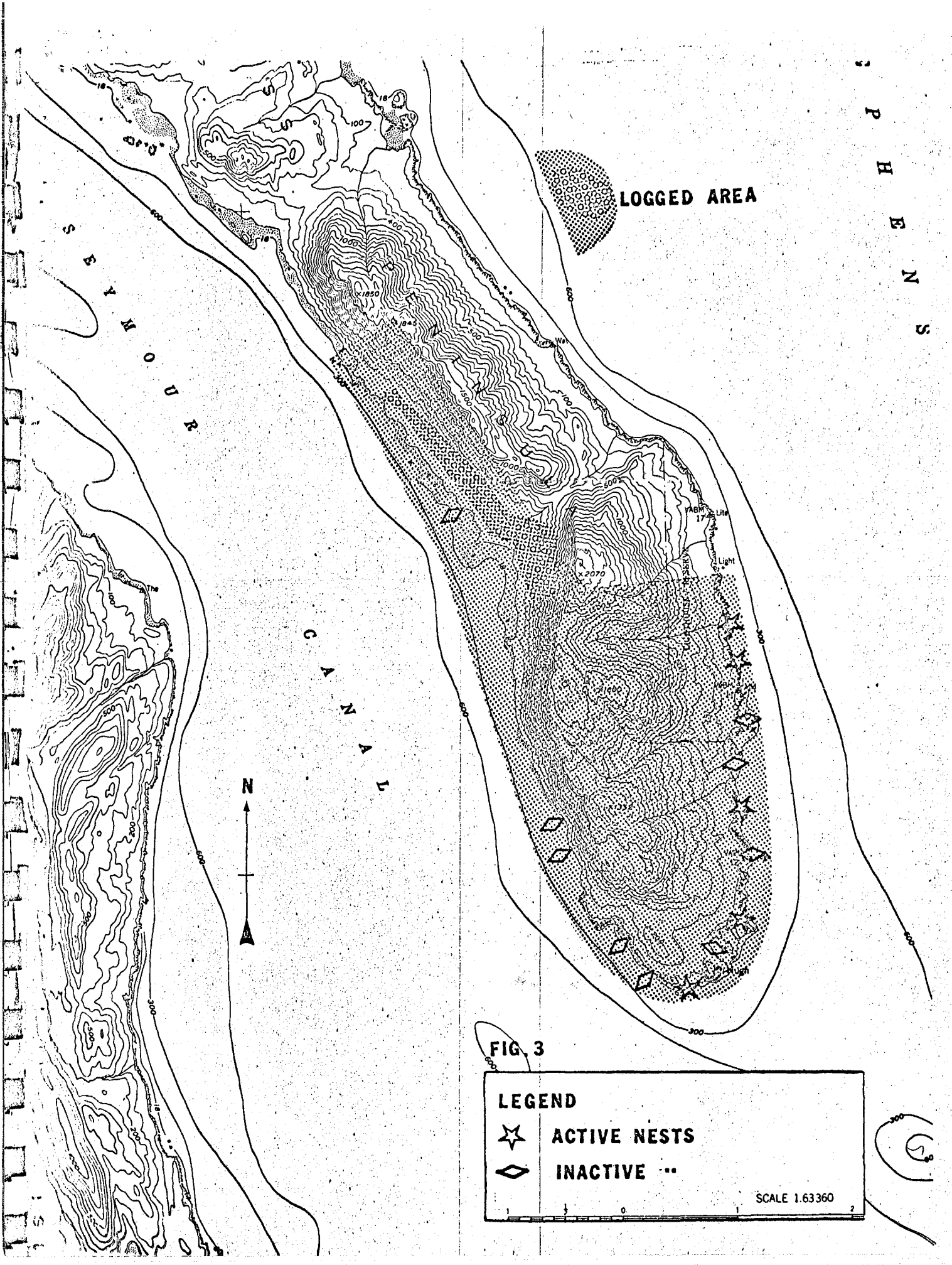

LOGGED AREA
SEYMOUR
CANAL
N
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1.63360

FIG. 3

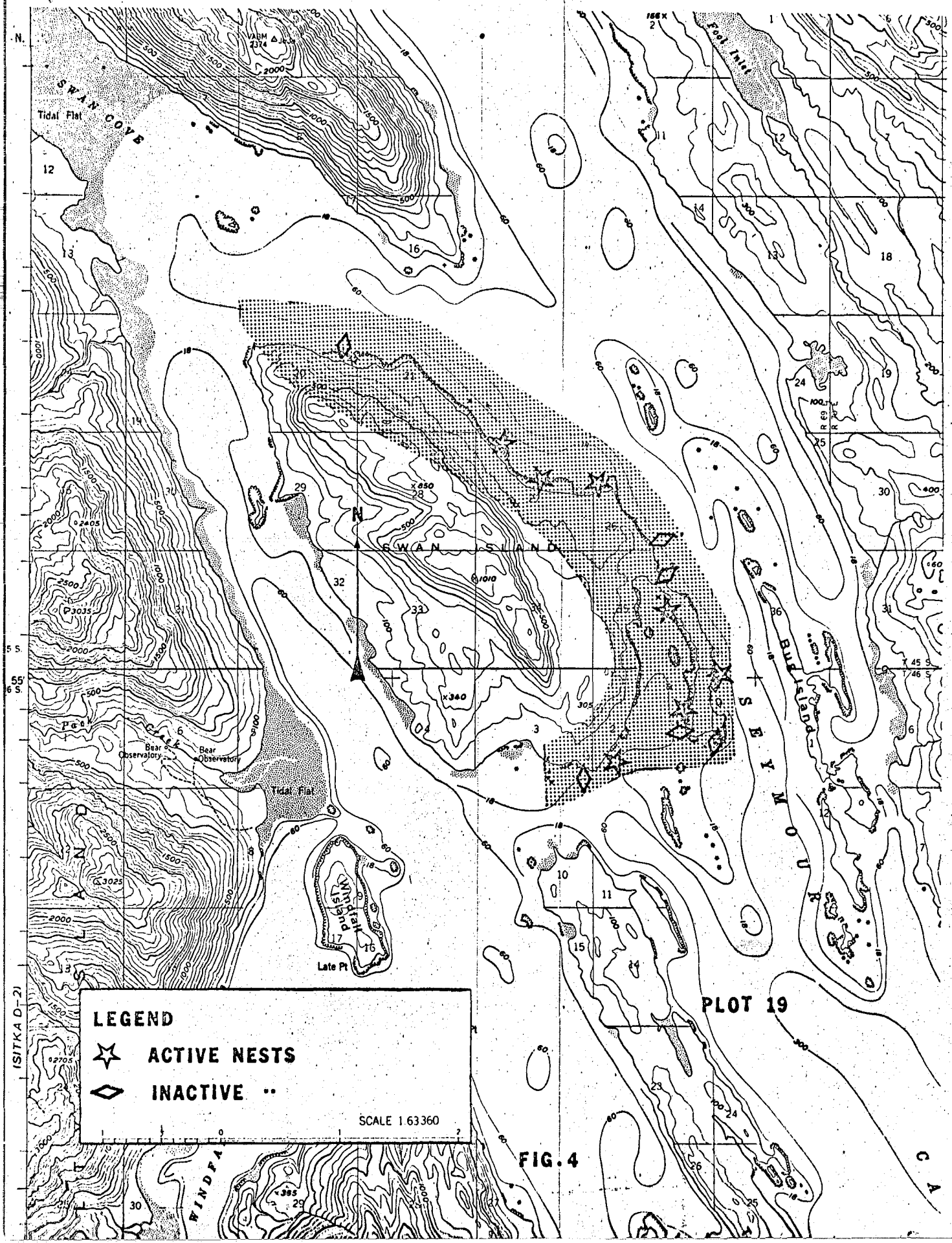

SWAN COVE
Tidal Flat
Fool Inlet
SWAN ISLAND
Bear Observatory
Bear Observatory
Tidal Flat
Windfall Island
Late Pt
Bud Island
SEYMOUR
PLOT 19
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1:63360
(SITKA D-2)
WINDFA
CA

FIG. 4

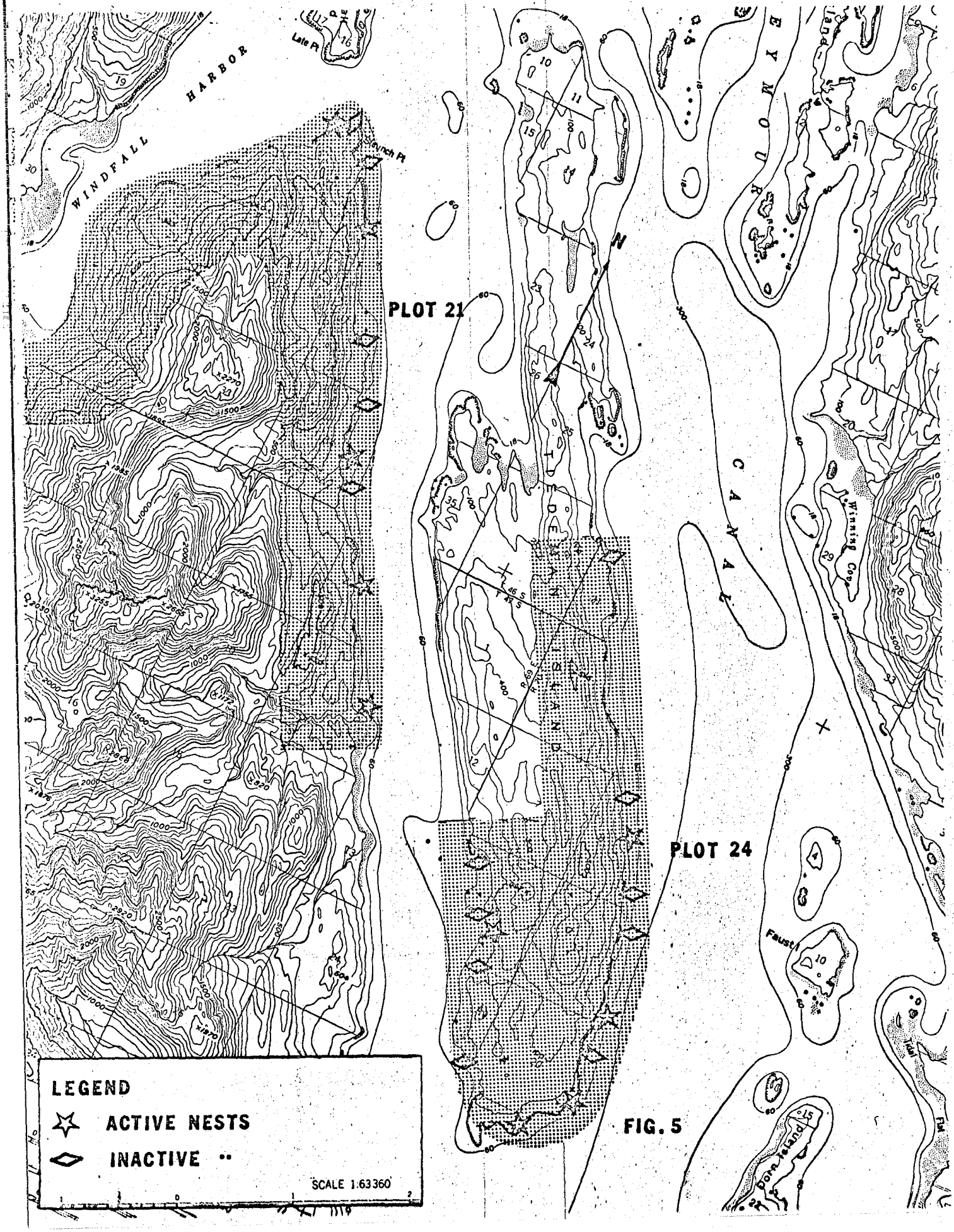

WINDFALL HARBOR
Late Pt
Lynch Pt
PLOT 21
PLOT 24
CANAL
Winning Cove
Faust
Donaldson
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1:63360

FIG. 5

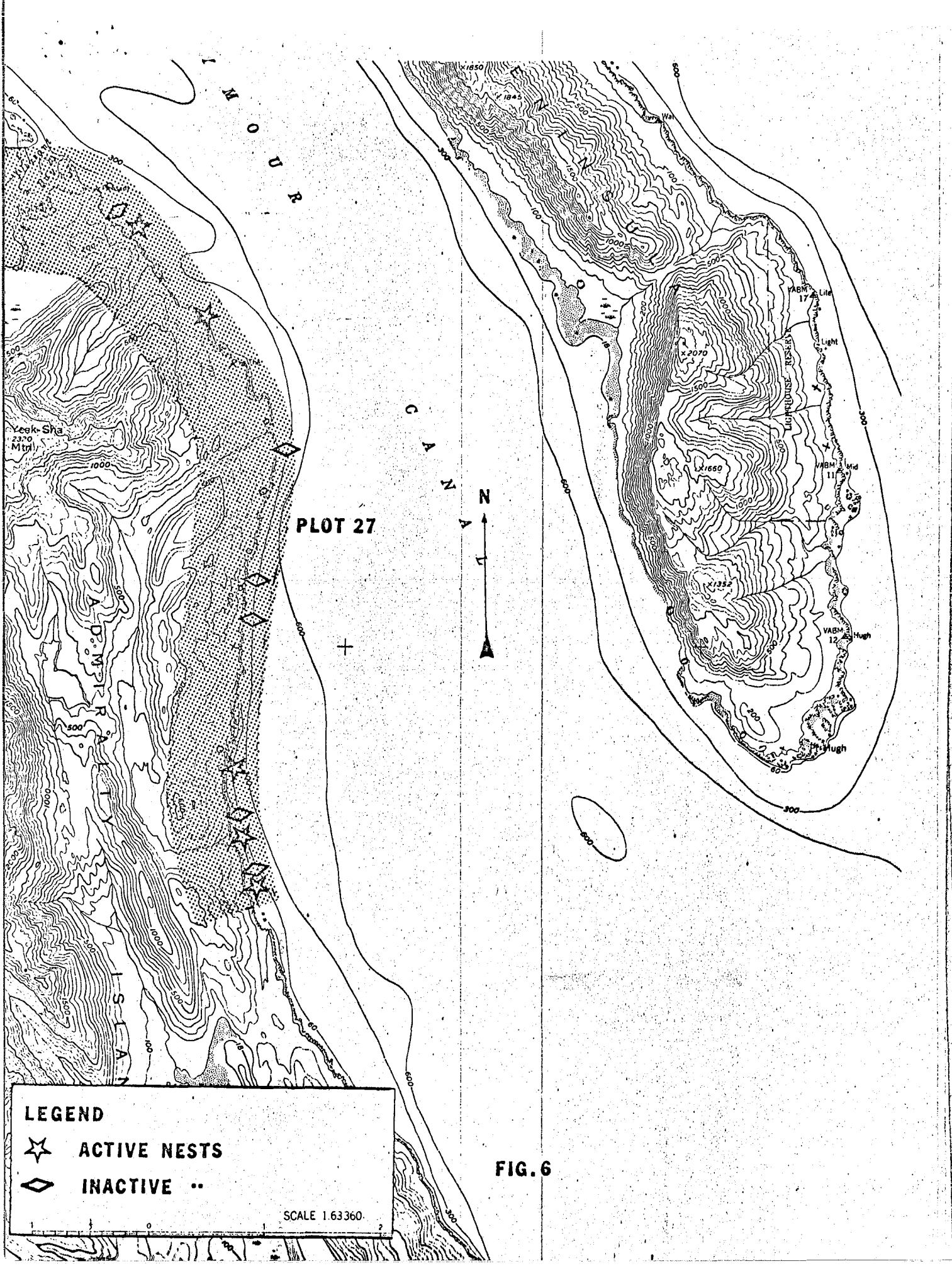

PLOT 27
N
LEGEND
ACTIVE NESTS
INACTIVE ..
SCALE 1:63360
LIGHTHOUSE RESERVE
Yeek-Sha
2370
Mtn
VABM
17
Lite
Light
VABM
11
Mid
VABM
12
Hugh
Hugh
Wal
x1850
x1845
x2070
x1660
x1352

FIG. 6

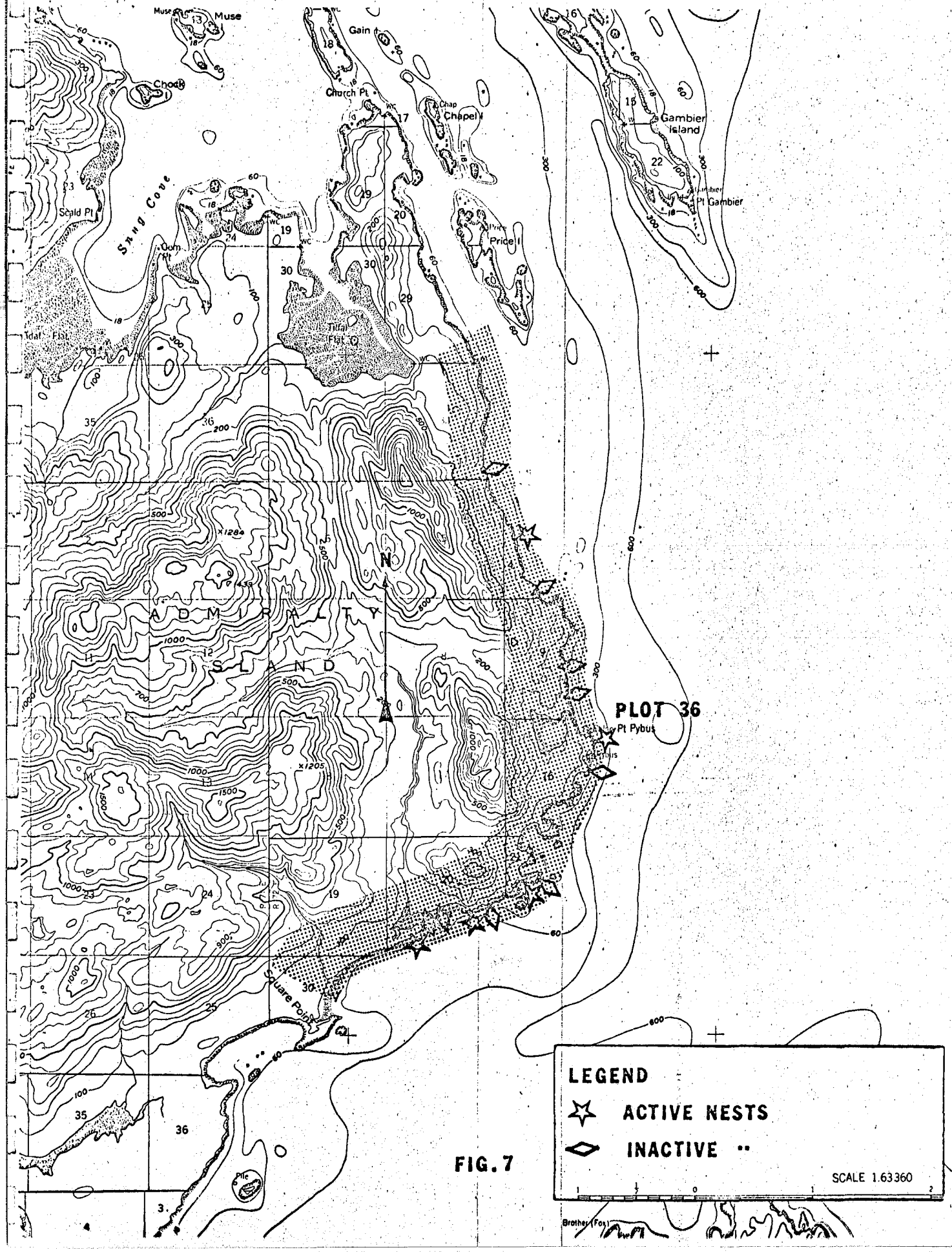

Muse
Muse
Gain
Chod
Church Pt
Chap
Chapel I
Gambier Island
Pt Gambier
Scald Pt
Snug Cove
Gum Pt
Pride I
Tidal Flat
Tidal Flat
ADMIRALTY
ISLAND
N
PLOT 36
Pt Pybus
Square Point
Pile
Brother (Fox)
LEGEND
ACTIVE NESTS
INACTIVE "
SCALE 1:63360

FIG. 7

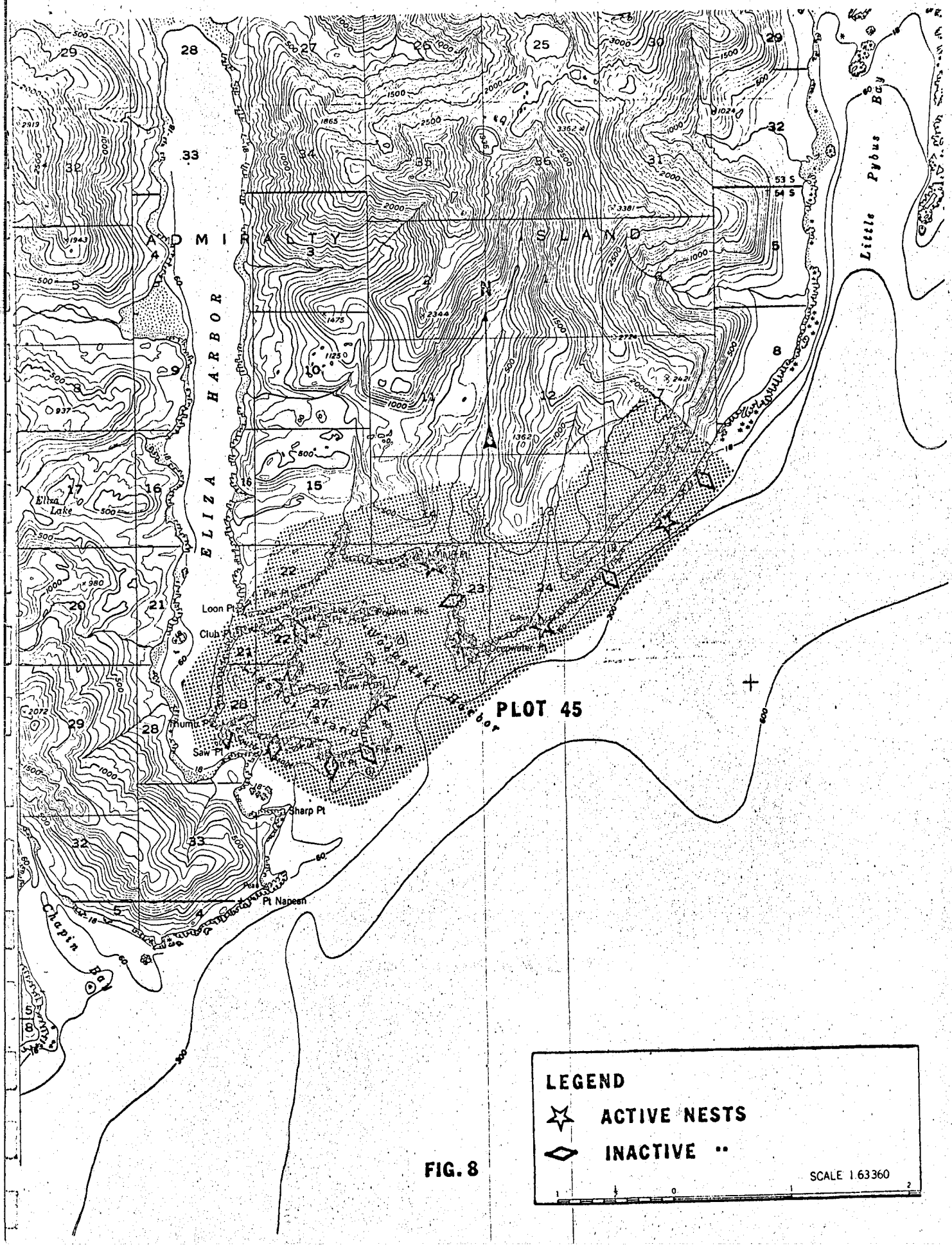

ADMIRALTY ISLAND
ELIZA HARBOR
Little Pybus Bay
Eliza Lake
Loon Pt
Club Pt
Pole Pt
Polaroid Rks
Cove
Cannery
Oceanwater Pt
Thumb Pt
Saw Pt
Sharp Pt
Pt Napeen
Chapin Bay
PLOT 45
LEGEND
ACTIVE NESTS
INACTIVE "
SCALE 1:63360

FIG. 8

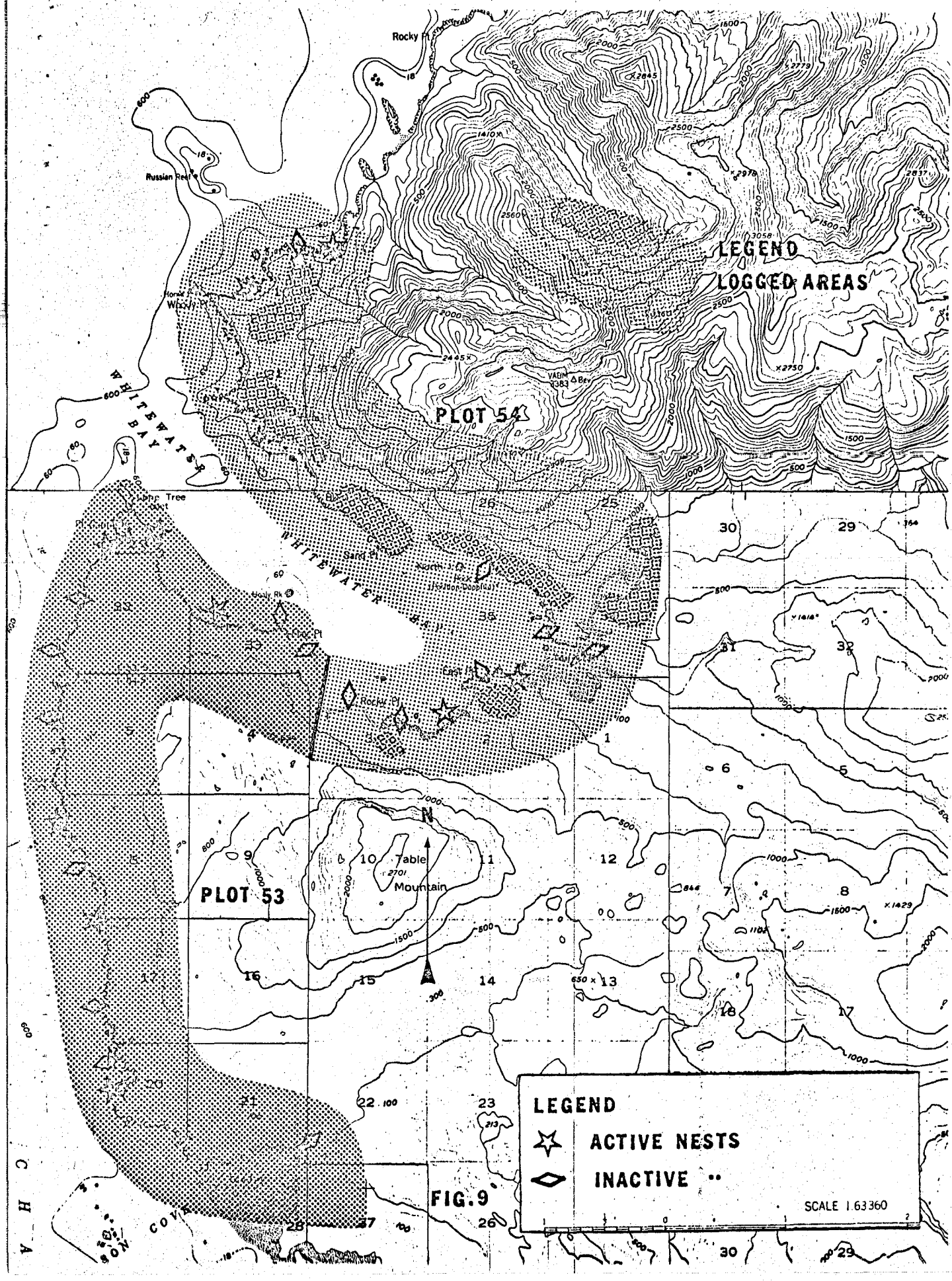
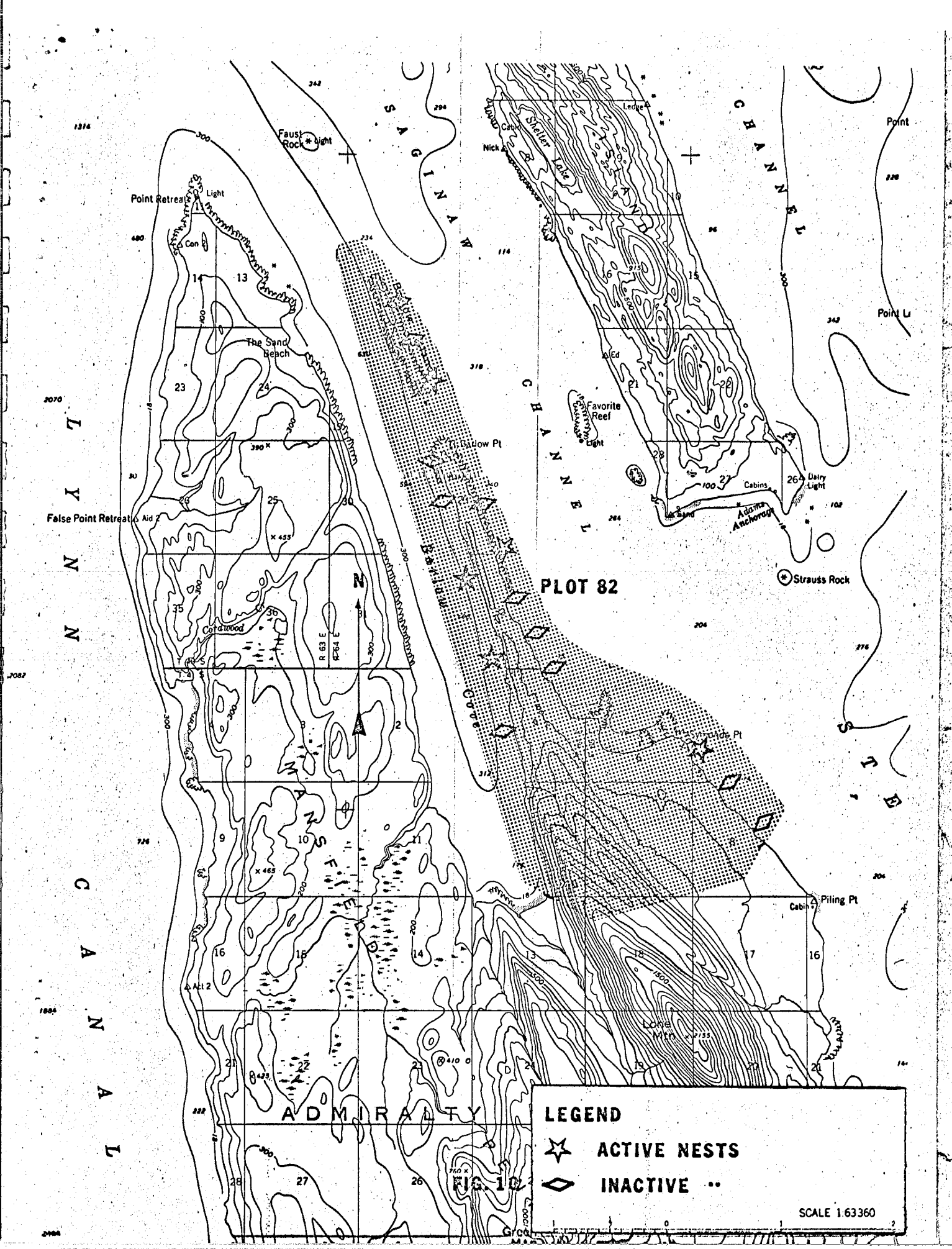
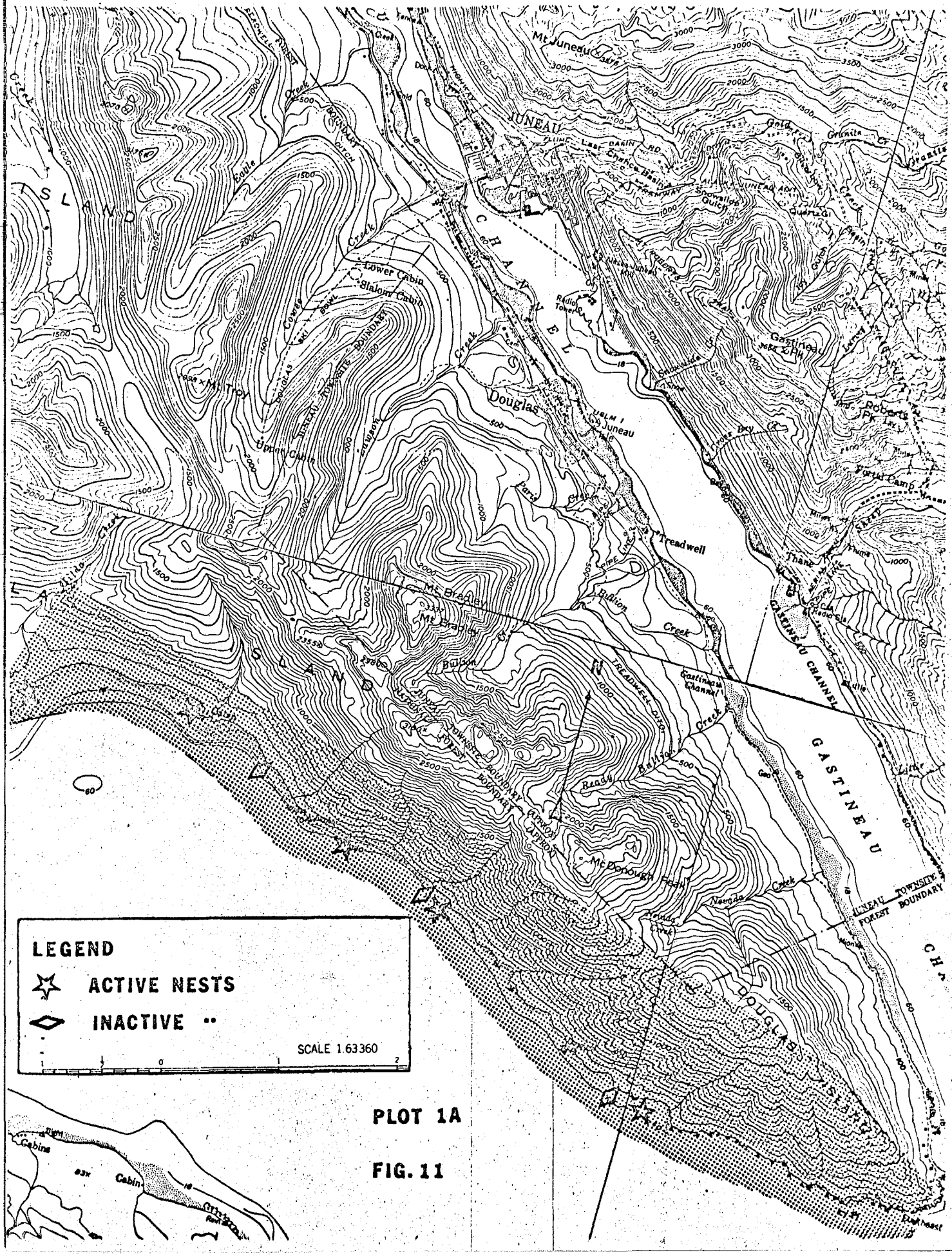

LEGEND
LOGGED AREAS
PLOT 54
PLOT 53
WHITEWATER BAY
Rocky Pt
Russian Reef
Table Mountain
N
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1:63360

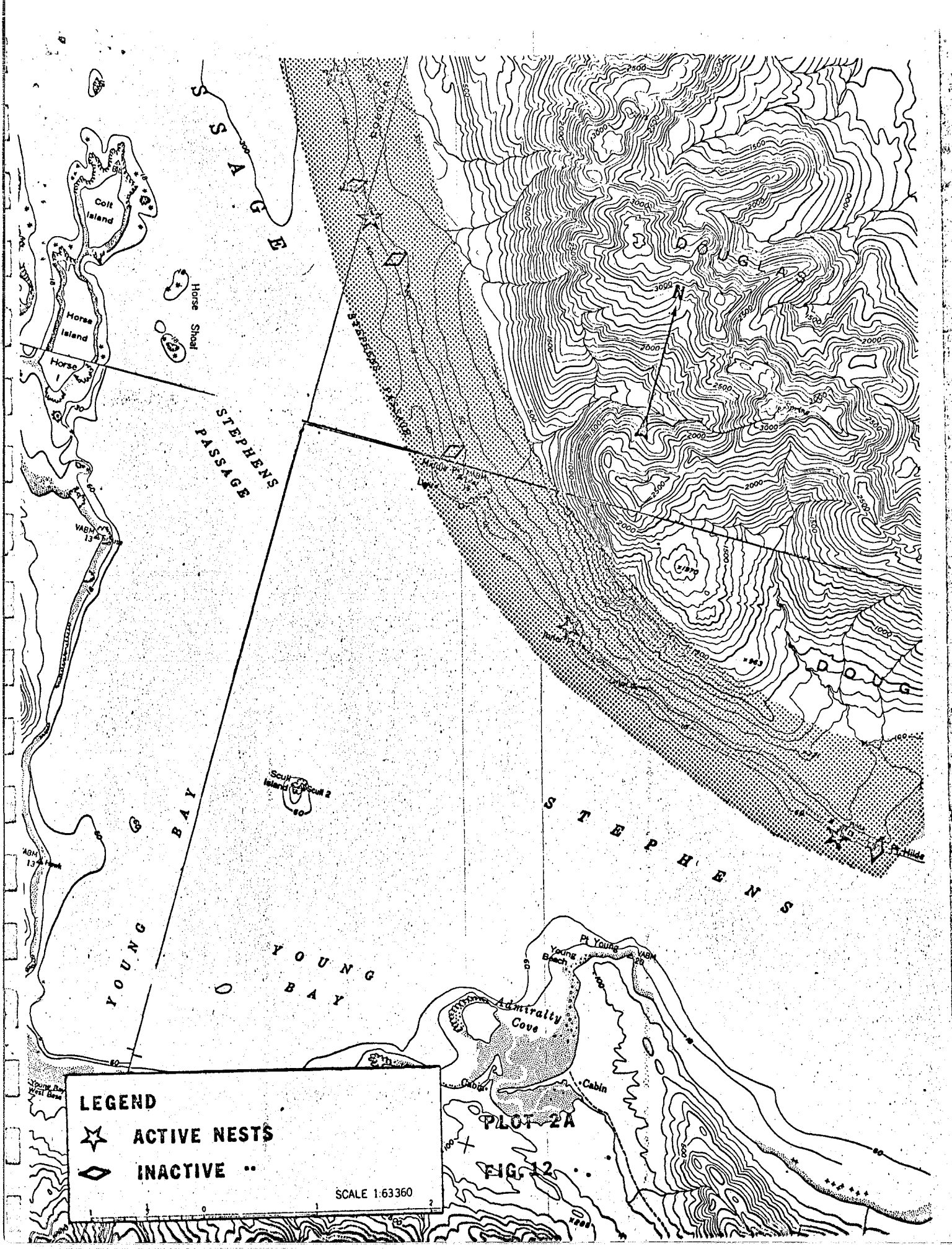
FIG. 9


PLOT 82
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1:63360
SAGINAW
CHANNEL
LYNN CANAL
ADMIRALTY
Faust Rock
Light
Point Retreat
Light
The Sand Beach
False Point Retreat
Aid 2
Cordwood
Shelter Lake
Nick
Cabin
Ledge
Ed
Favorite Reef
Light
Tidbow Pt
Cabins
Dairy Light
Adams Anchorage
Strauss Rock
Point
Point Li
Piling Pt
Cabin
Lone Mtn
Aid 2
R 63 E
R 64 E
FIG. 10



PLOT 1A

FIG. 11

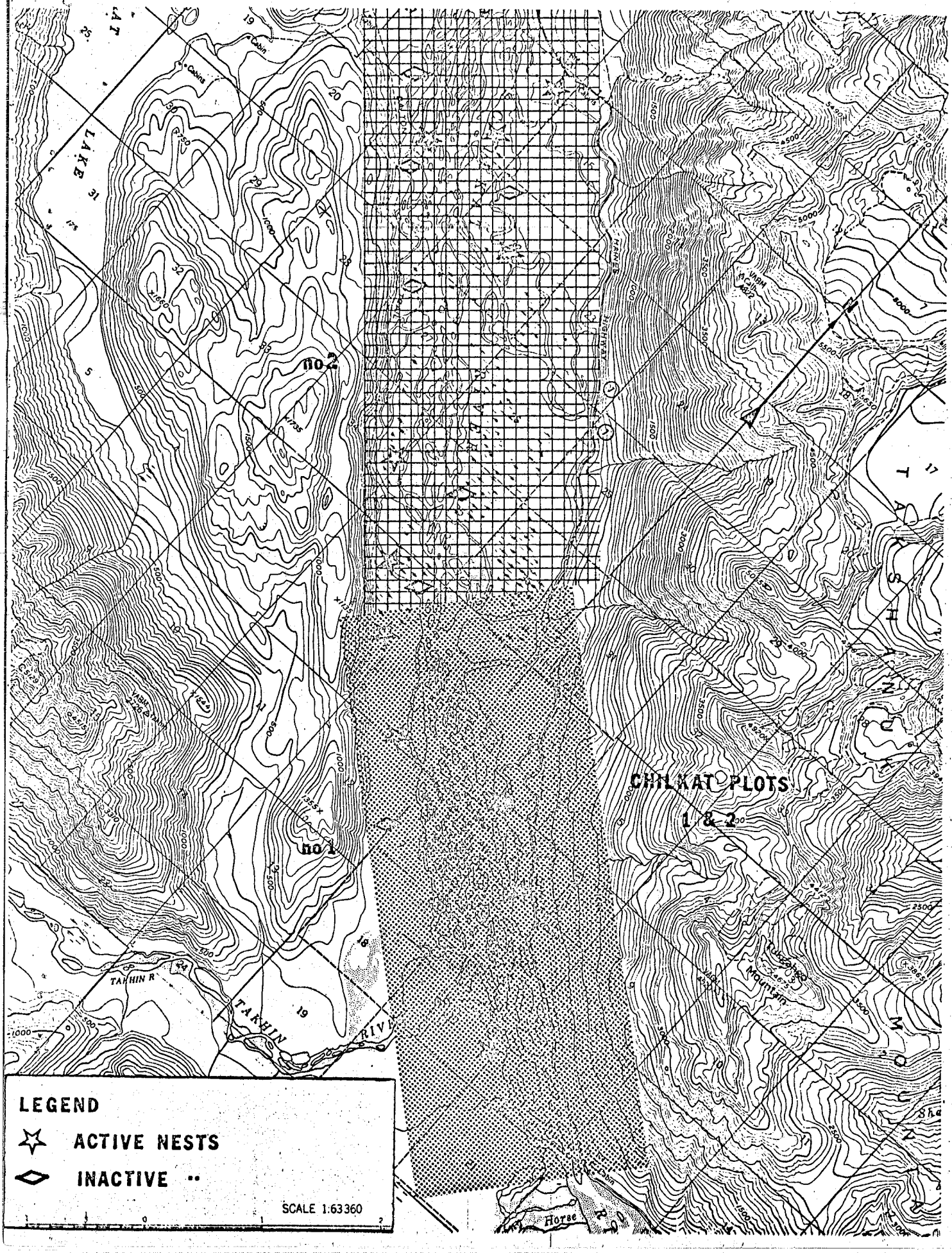


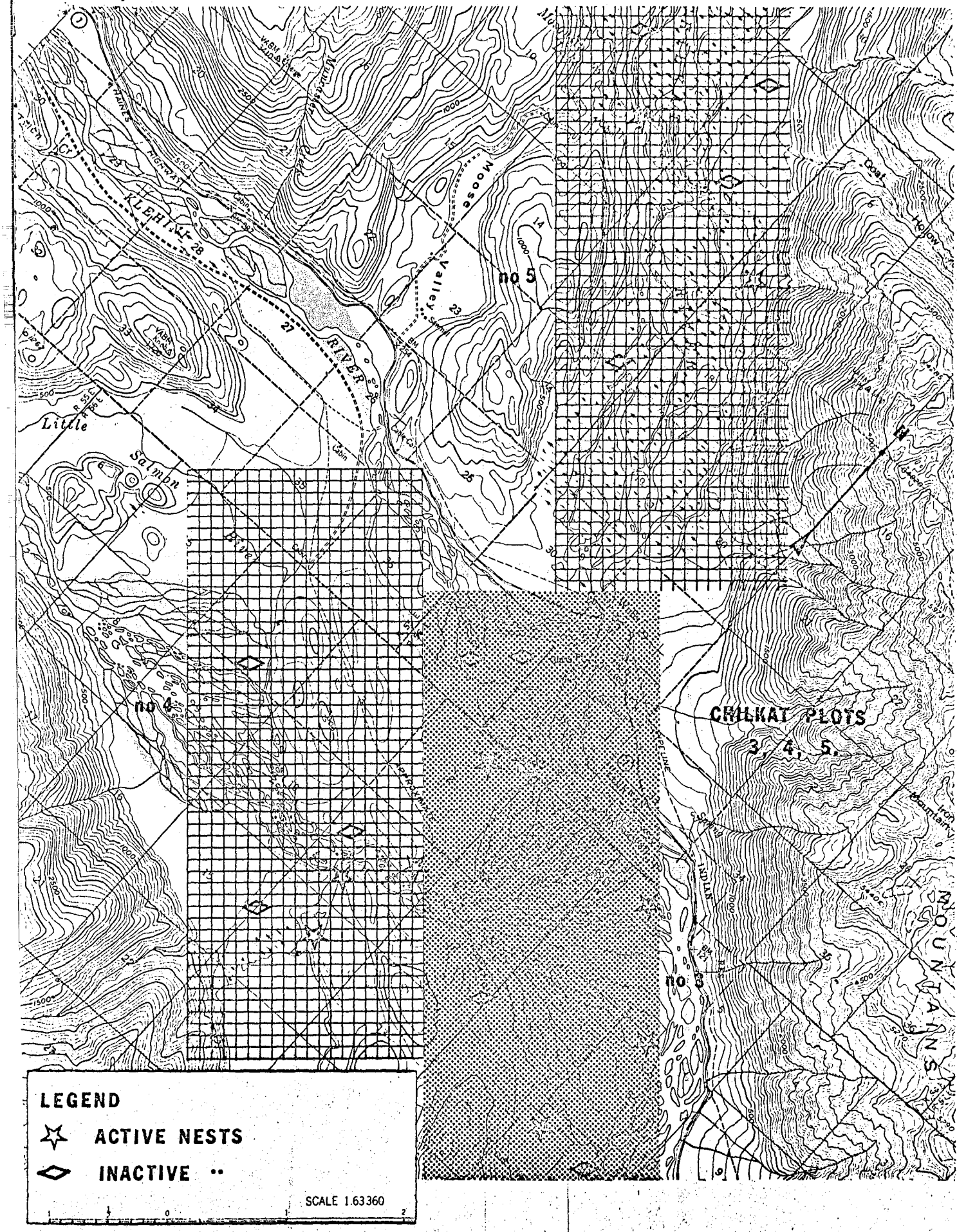
PLOT 2A

FIG. 12

PLOT 3A

FIG. 13


CHILKAT PLOTS
1 & 2
no 1
no 2
LAKE
TAKHIN R
TAKHIN
Mountain
Horse
LEGEND
ACTIVE NESTS
INACTIVE
SCALE 1:63360


KLEHINI
RIVER
Moose
Valley
Little
Salmon
Coast
Hollow
no 5
no 4
no 3
CHILKAT PLOTS
3, 4, 5.
MOUNTAINS
LEGEND
ACTIVE NESTS
INACTIVE ••
SCALE 1.63360