SECOND SURVEY AND MONITORING OF BIRDS AND MAMMALS OF KISKA ISLAND, JUNE 1986 (IN SUPPORT OF THE EPA EXPERIMENTAL COMPOUND 1080 USE PERMIT G704-EUP-28)

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OBJECTIVE Continuation of surveying and monitoring the birds and mammals of Kiska Island to establish baseline conditions prior to and the first breeding season after the experimental application of Compound 1080. The purpose of the project is to evaluate Compound 1080 as a potential introduced fox eradication tool on Kiska and perhaps other select islands within the Aleutian Islands Unit of the Alaska Maritime National Wildlife Refuge.

METHOD OF STUDY A complete circumnavigation survey of Kiska for bald eagles was accomplished using the 88 ft. charter vessel. Nearshore boat surveys and beach transects were conducted from the Kiska Harbor area to document three species of special interest (bald eagle, glaucous-winged gull and arctic fox). Six passerine transects were also conducted in the harbor area. Surface counts for least and crested auklets were conducted in the Sirius Point auklet colony on 12 10x10 m plots. Two time-lapse cameras were set up in the old lava flow and two time-lapse cameras were established in the new lava flow. The major vegetational components of the 12 surface count plots were identified and their extent of coverage of each plot was visually estimated. All transects and plots were permanently remarked as needed to allow future surveys and obtain population indices. All plots and time-lapse camera sites were photographically documented, a 35 mm camera equipped with B&W film was used to document auklet numbers on a major landing rock. Predator counts and auklet age class counts were also conducted.

MAIN FINDINGS Fifteen bald eagle aeries were observed during circumnavigation. Two near shore boat surveys were conducted with the following mean results for species of special interest on the south and north transects respectively: 0 and 0 arctic fox, 134 and 172 glaucous-winged gulls and 7 and 9 bald eagles. Mean results for species of special interest on the south and north beach transects respectively are as follows: 0 and 0 arctic fox, 72 and 20 glaucous-winged gulls and 4 and 2 bald eagles. Results from the passerine surveys were quite variable due to the varying weather conditions during the surveys with the lapland longspur the most abundant species observed. Results at surface counts and time-lapse camera photos at Sirius Point were good with least auklets being most abundant with the five highest counts ranging from 22-45, while crested auklets ranged from 3-7. The time-lapse and 35 mm cameras also recorded more least auklets than crested auklets and also more auklets in the new lava flow than the old lava flow. No arctic fox were observed in either the old or new lava flow while conducting surface count plots or on the time-lapse film. Glaucous-winged gull was the most prevalent predator.

CONCLUSIONS
The survey results will provide additional good baseline data of pre-eradication conditions to compare with post-eradication conditions at Kiska Island.

MANAGEMENT IMPLICATIONS Assuming eradication efforts are successful with Compound 1080, data gathered now will be used to help justify EPA registration of the toxicant and its future use on other select refuge islands to benefit migratory birds and the endangered Aleutian Canada goose.

ADDITIONAL REMARKS

UPDATES OR SUPERSEDES I.D. NO.

PROGRAM

FOR COPIES OF PUBLICATION OR REPORT CONTACT Refuge Manager, Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge, P.O. Box 5251 NAS Adak, FPO Seattle, Washington 98791-0009.

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OBJECTIVES

During the nineteenth and early twentieth century, fur traders introduced arctic foxes to the majority of the islands of the Aleutian Chain. These islands were previously free of mammalian predators. Populations of foxes persist on numerous islands today and in some cases, their effect on native avifauna has been devastating. Introduction of arctic fox is the primary reason for the Aleutian Canada goose becoming an endangered species and for lower populations or eliminations of some seabird species from some islands. The U.S. Fish and Wildlife Service (FWS) is currently undertaking an effort to eradicate introduced arctic foxes on 69,598 acre, Kiska Island within the Aleutian Islands Unit of the Alaska Maritime National Wildlife Refuge. This action will have direct and immediate benefits for the indigenous bird populations by releasing them from the limiting effects of fox predation. Equally important to our wildlife conservation mandate, Kiska Island will once again be available as nesting habitat for the endangered Aleutian Canada goose.

To accomplish introduced arctic fox eradication on Kiska the FWS proposes to use the toxicant sodium monofluoroacetate, also known as Compound 1080. The Kiska fox population was estimated at 657 animals in 1983 (Steinacher 1984). Follow-up removal activities will also require other methods such as shooting, the use of traps or snares, and possibly, M-44's. Incumbent upon the FWS in this endeavor is the need to: 1) evaluate the effect of the treatment on arctic fox, the target species; 2) monitor the impact of the eradication program on non-target wildlife species, in particular, raptors and avain scavengers; and 3) evaluate and document the recolonization and population trends of other avain species whose populations have been suppressed by the presence of foxes. These three tasks are therefore important objectives ancillary to the primary objective--the removal of introduced arctic foxes from Kiska Island. If Compound 1080 proves to be successful on Kiska as a fox eradication tool then the FWS will seek authorization from the Environmental Protection Agency (EPA) to use it on other select islands to benefit the endangered Aleutian Canada goose and seabirds. This summer's work is the second effort to gather baseline information on the wildlife populations of Kiska and the first following the application of Compound 1080 baits at Kiska in March 1986. Initial pre-treatment surveys were conducted in June 1985.

STUDY AREA

Kiska Island is located in the Rat Island Group of the Aleutian Islands, Alaska (Figure 1). The Rat Island group extends from Amchitka pass westward nearly 180 miles to Buldir Island. Included are Semisopochnoi, Amchitka, Rat, Little Sitkin, Segula, Kiska, Buldir, and several small unnamed islands. The group is mountainous except for the eastern section of Amchitka

which is relatively flat. Kiska is the second largest island in the Rat Island Group, containing approximately 28,177 ha (69,598 acres) and 144 km (89.5 mi) of shoreline. Amchitka is the only island larger than Kiska in the group. Kiska Island is irregularly shaped with many large coves and bays and is oriented predominantly in a northeasterly to southwesterly direction (Figure 2). It measures about 38.5 km (22 mi) in length, and varies in width from about 0.9 km (1.5 mi) to 3.7 km (6 mi). The island is very rugged and mountainous, with the northern end of the island dominated by the active Kiska Volcano. The crater of this volcano has two summits, the higher and most westerly being 1,221 m (4,004 ft) high. Immediately south of the volcano is a low valley about 3 km (2 mi) wide, which contains several lakes. This valley extends nearly across the island from east to west. Flat-topped, boulder-strewn ridges rising to over 305 m (1,000 ft) occur between the lake area and Kiska Harbor. A low, narrow pass cuts across the island from the southwest corner of Kiska Harbor to a small bight on the west coast. South of this pass, the southern portion of Kiska Island consists of sharp, rugged ridges 457 to 518 m (1,508-1,709 ft) high, extending to the southwestern corner of the island. Ridges are quite precipitous on the western side, but slope gradually on their eastern sides to the shoreline of Vega Bay. The valleys and lower slopes of the island are covered with vegetation while the higher elevations are generally bare and strewn with boulders. The shores of Kiska are mostly rocky fringe around most of the island (Sekora 1973). Kiska Island has an excellent protected harbor located on the east side, about in the middle of the island. Located in the Kiska Harbor area are Salmon Lagoon and Trout Lagoon.

During World War II (WWII), the island was occupied by the Japanese and later by the Americans and Canadians. A portion of the island has been declared a National Historical Monument due to its WWII significance. War debris litters much of the southern end of the island and is concentrated around Kiska Harbor, where a still functional pier makes the island accessible. Kiska Harbor was the focus of WWII military activity and the hillsides above the harbor are scarred from bombing raids and shore bombardments. When Kiska was abandoned in 1946, military debris of Japanese and American-Canadian origin was left. Remnants of the Japanese occupation of Kiska include trench systems, tunnels, dug-outs, a shrine, anti-aircraft batteries overlooking Kiska Harbor, a one-man submarine base and two beached freighters. The two freighters are near shore. Other ships are sunk in the harbor. Little remains of the once extensive garrison erected by the American-Canadian forces. The airstrip's runway matting has been overgrown and the roadways have become revegetated. Ruins of buildings and utility systems are strewn over the island with wreckage of aircraft also occurring. Only two (WWII) buildings remain standing. One is a large metal quonset hut in the harbor area and the other is a wooden building overlooking

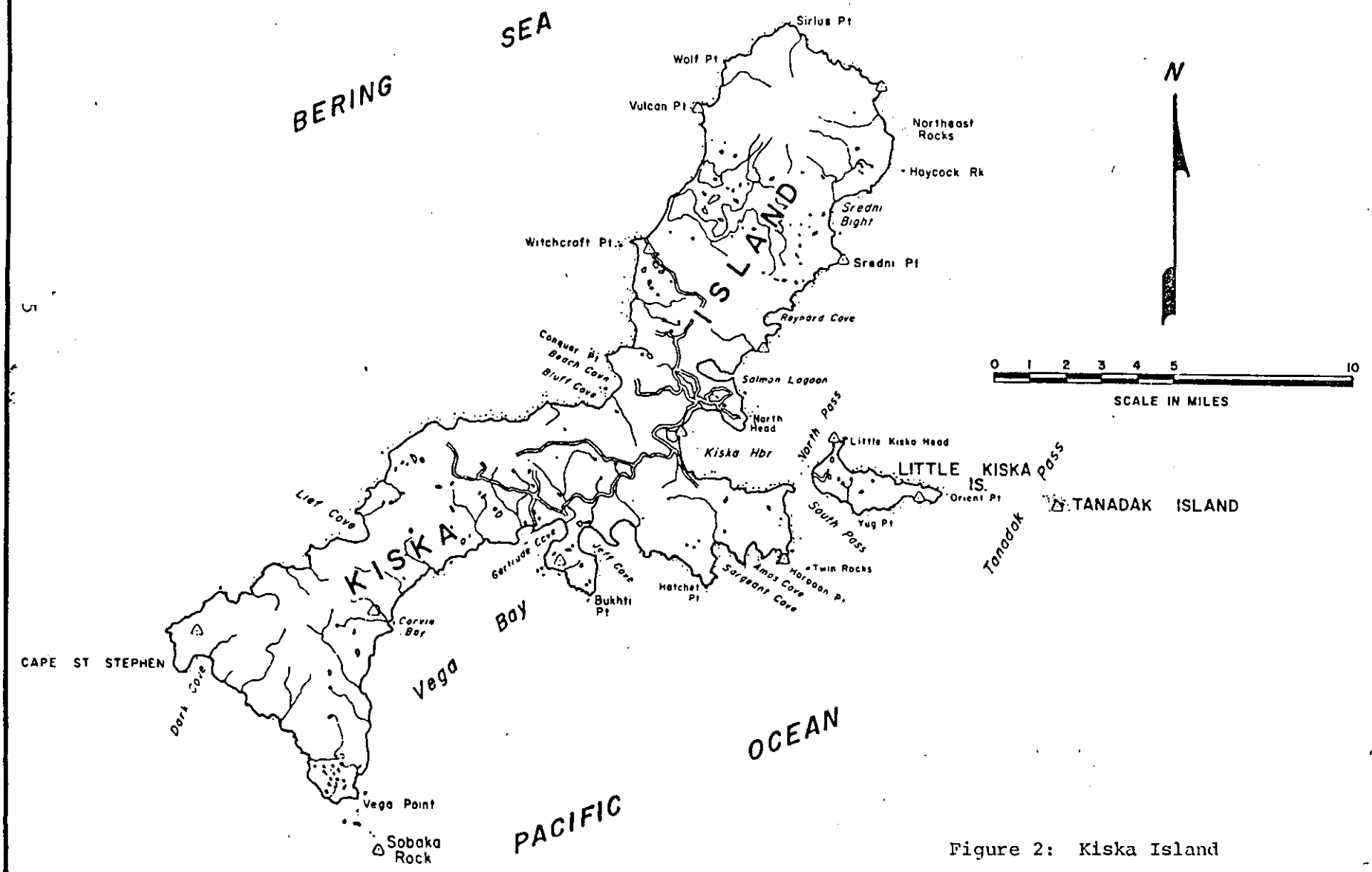


Figure 2: Kiska Island

Witchcraft Point on the west side of the island. The only other structures still standing, are about six outhouses. Time and many Aleutian storms have taken their toll and destroyed all other WWII structures. Although a fairly comprehensive road system was built, during WWII, and is shown on the map (Figure 2), the majority of it no longer exists. Only a few roads in the Kiska Harbor and runway areas are still usable.

Arctic fox and some red fox were introduced to most of the Aleutian Islands at the turn of the century by Russian furriers. Fox farming was continued by Americans in the 1930's and early 40's. Only Buldir Island, Chagulak Island, and some smaller islands in the Aleutian Chain escaped having foxes introduced to them, as they were inaccessible due to cliffs and rugged shorelines. After introduction, fox populations flourished on many islands and decimated native bird populations. The Aleutian Canada goose is listed as an endangered species, predominantly as a result of fox introductions in the Aleutians. Ground and burrow nesting seabird populations were also severly impacted and in some cases eliminated by fox. Cliff and crevice nesting seabird populations were also limited by foraging foxes. These changes in seabird populations are best shown by increases of 150 to 1,500 percent in various species which have been documented on Alaid/Nizki island since fox eradication (Zeillemaker and Trapp 1986). They can also be shown by comparing results of Murie's 1937 survey with those of recent surveys.

PAST BIOLOGICAL STUDIES

Olaus Murie (1959), in his 1937 biological survey of the Aleutians, observed 41 species of birds on Kiska Island. No Aleutian Canada geese were recorded during his survey. The only species noted as common or abundant were red-throated loon, harlequin duck, common eider (nesting on offshore rocks), rock ptarmigan, rock sandpiper, glaucous-winged gull, least auklet (a large colony on the north end of the island), rosy finch, song sparrow, lapland longspur and snow bunting. He specifically cited the large least auklet colony on the north end of the island. Murie (1959) stated that the island had an abundance of invertebrate food and that the fox undoubtedly fed on the birds at the north end of the island (least and crested auklets) extensively and probably prevented many waterfowl from nesting on the island. He collected 131 fox scats while on Kiska and found bird remains in about 21 percent of them. Two things should be noted concerning Murie's surveys: 1) it is the earliest wildlife survey of Kiska, accomplished after fox were introduced, and 2) he did not attempt to quantify all the wildlife resources of the island. The size of Kiska, normal inclement Aleutian weather, and survey techniques of the era precluded such details.

Although other biologists have visited Kiska on a few occassions, only four other noteworthy surveys of the island's

wildlife resources were completed in recent years. The number of limited surveys on Kiska is characteristic of most of the Aleutian Islands due to remoteness, difficult working conditions, weather and limited personnel. The other surveys were completed during the summers of 1978, 1983, 1985 and early spring 1986. The 1985 and 1986 surveys were in support of the EPA experimental Compound 1080 use permit #G704-EUP-28. Two surveys were completed in 1986 (March and June). The applicable March 1986 work will be summarized in this section of the report. All discussion (exception one item) of work conducted on Kiska in June of 1985 and 1986 will be discussed in the results section of this report. The one item of the June 1985 work that will be discussed in this section concerns the bald eagle; surveys for that species have occurred on all major surveys accomplished on Kiska.

The 1978 survey by Day et al. attempted to document the wildlife resources of Kiska by species and abundance. The results of that survey are shown in Figure 3. The survey concentrated on marine wildlife. As indicated in Figure 3, auklets were the most abundant species of marine birds nesting on Kiska. Day et al. (1979) estimated the populations at about 1,160,000 least auklets and 232,000 crested auklets. These birds were located in a large colony at Sirius Point on the north end of the island. The colony can be divided into three sub-colonies: 1) a large old lava flow area several centuries old (Coats et al. 1961), 2) a smaller new lava flow which rose from the ocean in 1965, and 3) a very small old flow or talus slope east of the main colony. The number of birds in these three sub-colonies was almot impossible to describe during the period of this survey. Day's estimate of approximately 1.4 million auklets (five times more least auklets than crested) makes the Kiska colony the largest known for these species. It must be noted, however, that it was thought to be a minimum figure, since many of the birds had fledged prior to the census. Parakeet and whiskered auklets were also observed during Day's surveys. Although an estimated 4,000 parakeet auklets were nesting on the north side of the island, there was no specific colony. The species typically nests in cliff crevices and talus slopes just above the beach. The whiskered auklets were off the coast in tidal rips near Cape St. Stephen.

Day et al. (1979) observed one nesting colony of black-legged kittiwakes on the cliffs midway between Wolf Point and the west side of the auklet colony. A total of 390 nests were counted and 839 kittiwakes were estimated from photos taken from an inflatable boat. Small scattered cormorant colonies were also observed along the cliff faces of the island (Figure 3). Puffins appeared to be nesting in low densities along the entire coastline, heavily utilizing offshore rocks and three Kittlitz's murrelets were observed in Gertrude Cove in 1978. Nocturnal species, such as Leach's storm-petrels, fork-tailed storm-petrels and ancient murrelets, were observed in small numbers, but no specific surveys of their numbers were

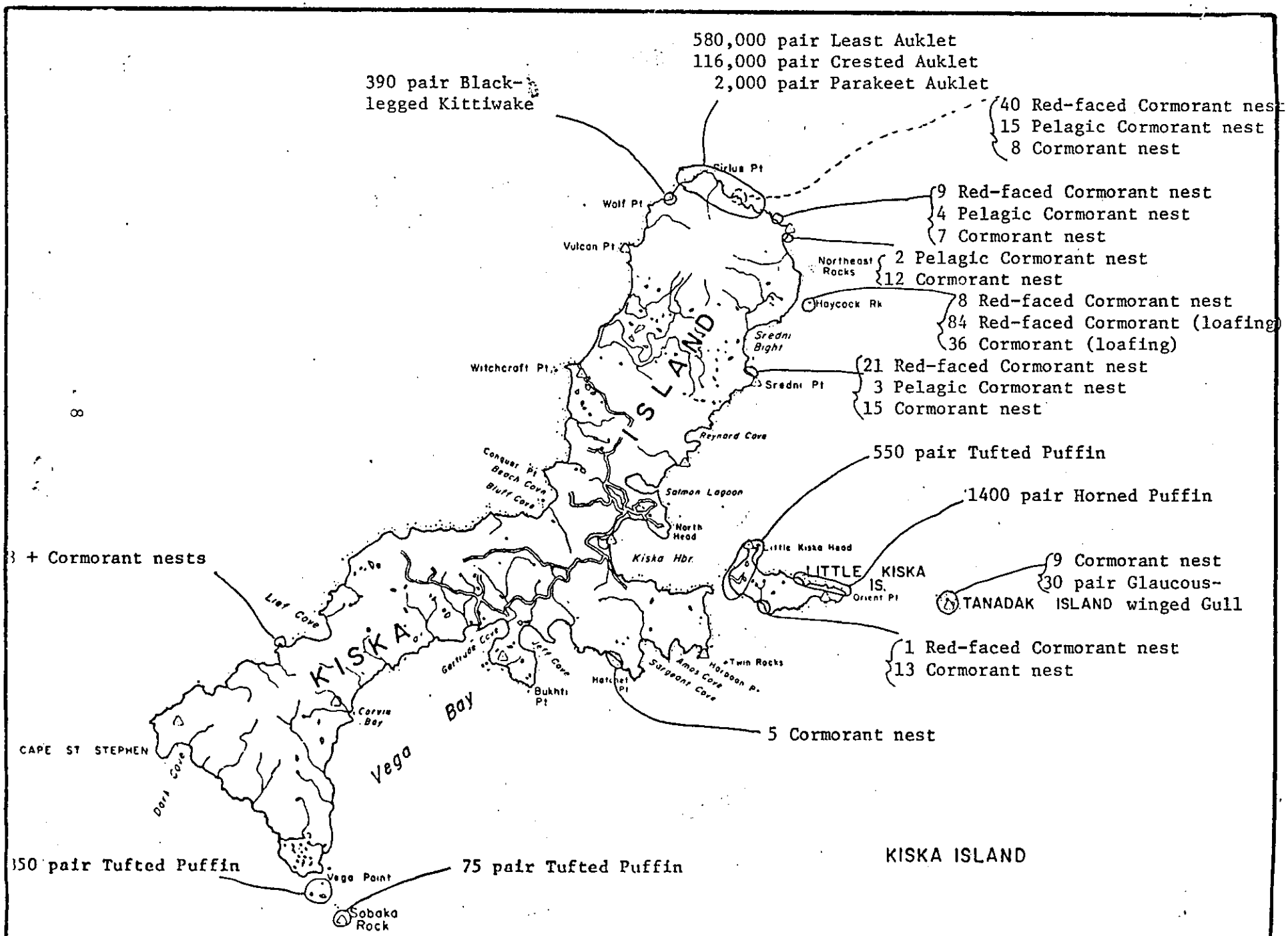


Figure 3: Location of seabird concentrations in the Kiska Island area. (Day et al 1979)

attempted. Low numbers of common eiders and harlequin ducks were also observed all around Kiska's coastline.

As stated by Day et al. in their 1979 report: "In summary, Kiska Island is a rather limited marine bird colony for variety. It hosts only a few cormorant colonies and a kittiwake colony, all small in size. However, the incredible populations of auklets nesting in the lava at Sirius Point make this island one of the most important marine bird colonies in the Aleutians, and certainly the largest auklet colony known to science."

No inland transects were completed on Kiska for passerine birds during the 1978 survey. Kiska hosts a summer population of lapland longspurs, resident snow buntings, resident rosy finches and Asiatic migrants in spring and fall. Although recorded by Murie in 1936-37, the song sparrow has not been reported from Kiska in recent years. The species is resident on most other Aleutian islands.

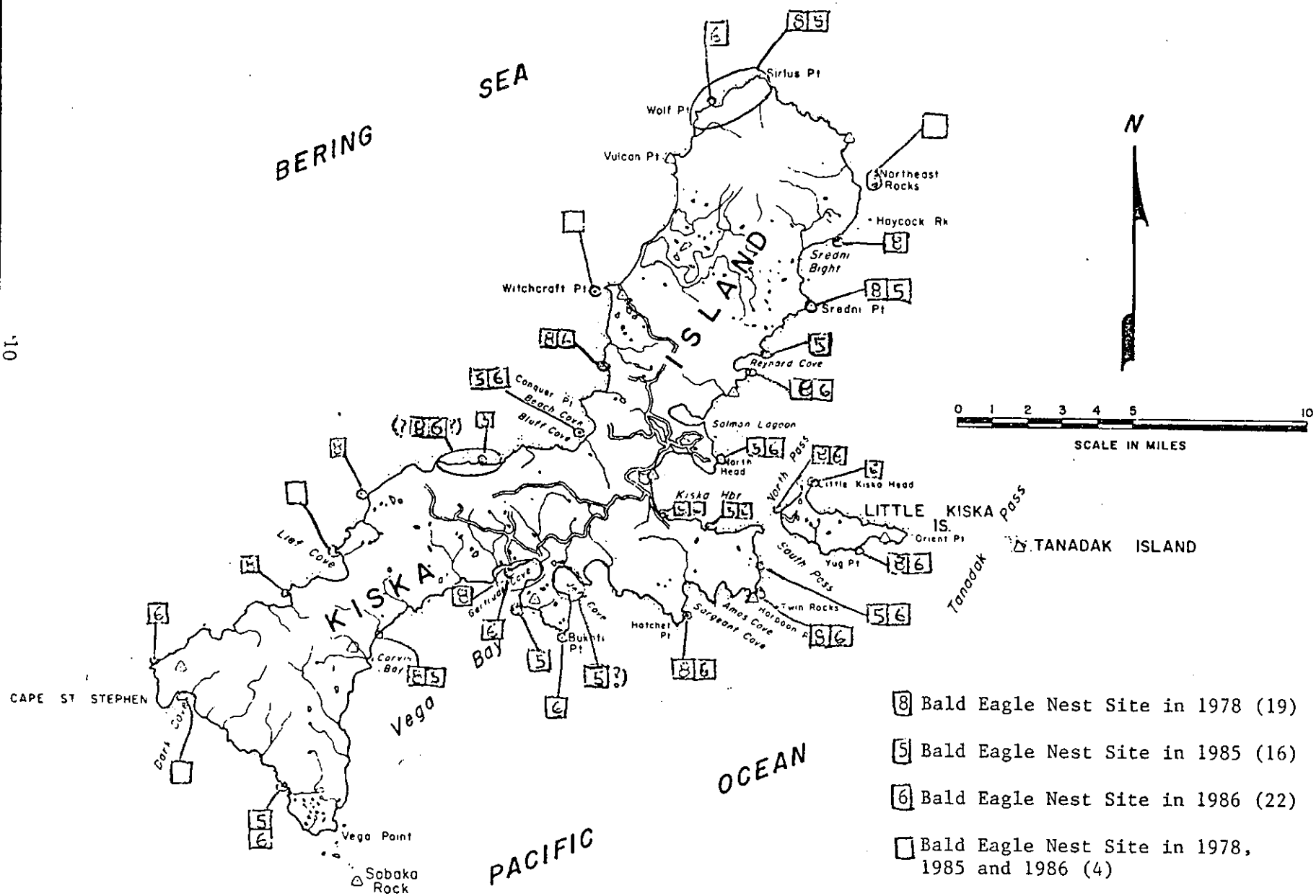
Bald eagles, peregrine falcons and their nesting aeries (of both species) were observed during the 1978 Kiska inflatable boat circumnavigation surveys by Day et al. These same species were also surveyed in June 1985 and March 1986. The June 1985 survey was conducted using the 88 ft charter vessel, M/V Maritime Maid, approximately 1/4 to 1/2 mile from shore, depending on offshore rocks. Several aerial bald eagle surveys were also conducted from a helicopter in March 1986. Although three different survey methods were utilized over several years, the results were similar as shown in Figure 4.

Marine mammals were also observed in 1978 when the island was circumnavigated by Day et al. The combined Kiska, Little Kiska, Tanadak and Tanadak Pass areas yielded 1,374 adult sea otters. The estimated population was 1,832 (Day et al. 1979). A total of 6,066 northern (or Steller) sea lions were also observed on Kiska at the following locations: 1) Cape St. Stephen, 2) near Lief Cove, and 3) at Vega Point. A few were also observed at three scattered locations on the north side of the island.

Another northern sea lion survey was completed on 29 March 1986. The survey was conducted from Northeast Rocks west and south to Vega Point during the early morning (0842 to 0950). The survey was flown at approximately 1,200 plus feet to try and keep the disturbance of the sea lions to a minimum. Two observers conducted separate counts using 10x40 binoculars. The total count ranged from 1,299 to 1,393 with a mean of 1,347 (Figure 5). Forty-seven percent of the sea lions were observed between Cape St. Stephen and Vega Point including Sabaka Rock. The other two areas of sea lion concentrations were north of Lief Cove and on the northern end of Kiska (Figure 5).

Two sea lion population estimates were also gathered during

FIGURE 4. Location of Bald Eagle Aeries Observed in 1978, 1985 and March 1986 On Kiska & Little Kiska Islands



Note: Aeries with question marks in parenthesis probably exist but are not known for certain. Also, the larger the circle for the nest site, the more uncertain we are about the exact location of the aerie.

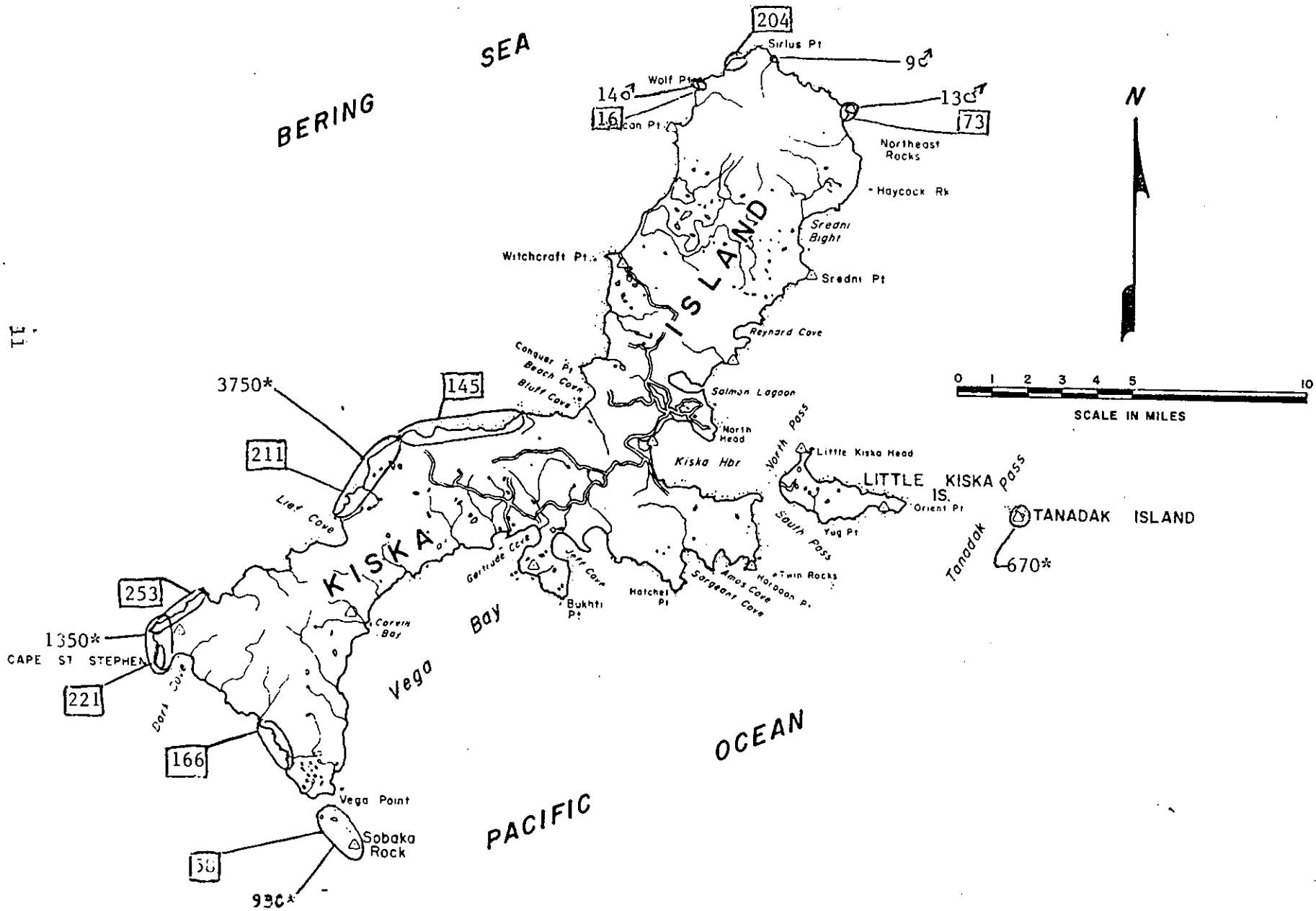


Figure 5 . Location of all Northern(Steller) Sea Lion Populations Near Kiska Island in 1978 &1986. Numbers marked With an Asterisk (*) Include Bulls, Cows & Pups. Numbers in Boxes Are From 1986

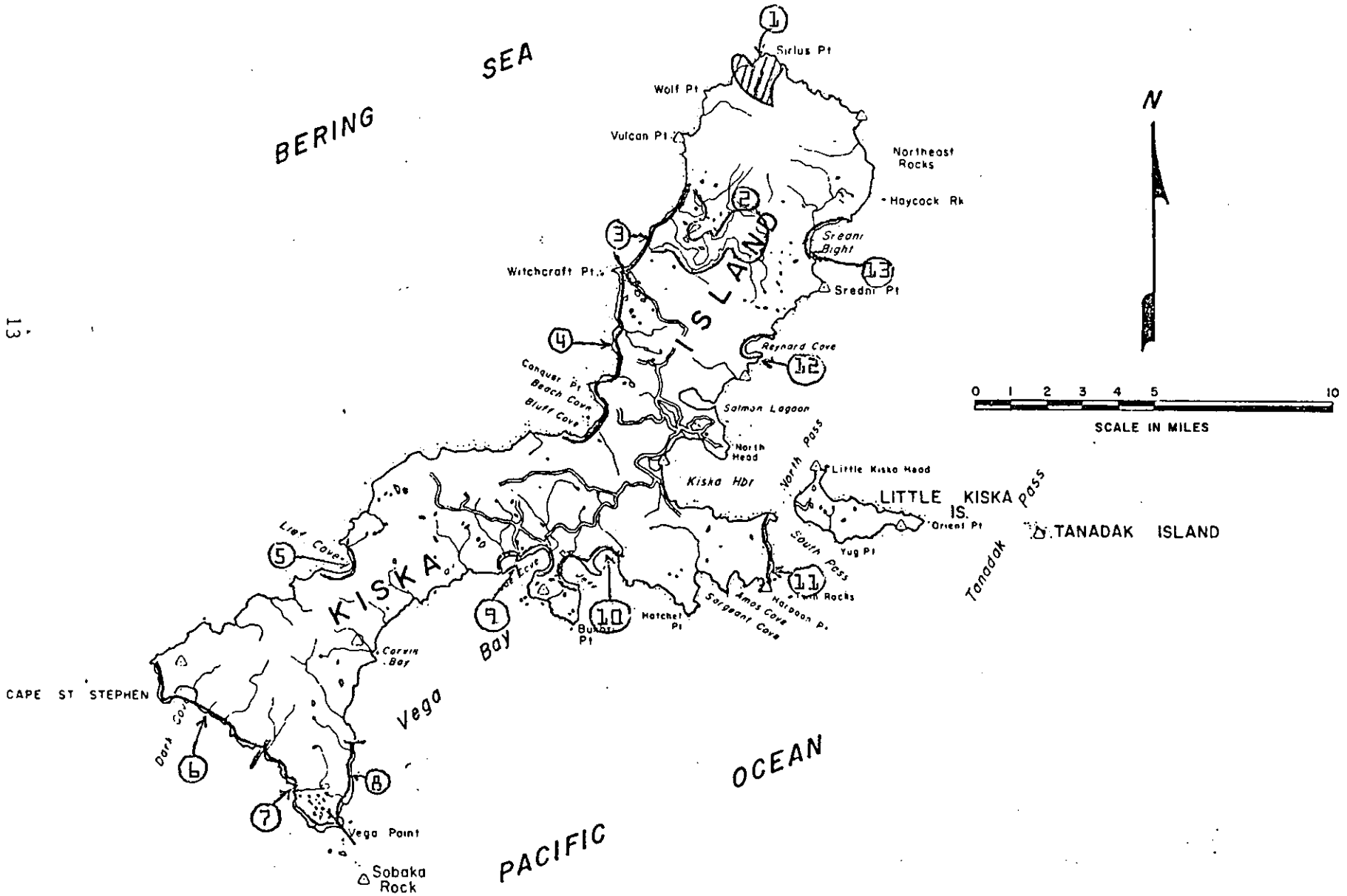
March 1986. The first estimate was gathered during the orientation flight around Kiska on 24 March when an estimate of 3,100 northern sea lions were observed. The sea lions were observed all along the west side of Kiska from Witchcraft Point south to Cape St. Stephen. The two areas of sea lion concentrations were north of Lief Cove (est. 2,000) and at Cape St. Stephen (est. 700). Day et al. (1978) also found their two highest sea lion concentrations north of Lief Cove and at Cape St. Stephen. The second estimate was gathered during the evening fox survey on the same day as the formal morning sea lion survey. No count was conducted, but it was felt that more sea lions were out that evening than during the morning sea lion survey. The two estimates were gathered during the late afternoon, early evening hours in contrast to the early morning hours when the formal sea lion survey was conducted. The lower numbers observed in 1986 may be attributed to: 1) the moving platform of the helicopter causing vibrations when looking through binoculars, making it extremely difficult to see clearly, 2) the helicopter disturbing the sea lions causing them to run into the water making counting difficult, 3) time of day of the counts and 4) part of the overall decline in sea lion populations throughout the Aleutians.

According to the 1978 survey, there were numerous fox dens in the Sirius Point lava flows with the auklets. Although no attempt was made at that time to estimate the number of dens, it was thought to be quite high. The 1983 survey conservatively estimated the arctic fox population on Kiska to be 657 animals (Steinacher 1984). That estimate was based on trapping and shooting programs in three specific areas of the island. The number of fox per kilometer of usable shoreline was then determined and extrapolated to provide an estimate for the entire island.

In March and April of 1986, as part of the surveying and monitoring of Kiska wildlife, aerial arctic fox surveys were conducted on Kiska. These surveys were conducted to establish and index the island's fox population prior to and immediately after the placement of Compound 1080 baits on Kiska. The surveys were conducted along thirteen transects established at that time to obtain the population index. Five of the initial transects were subsequently discontinued to minimize the impact of the aerial surveys on nesting bald eagles. The eight transects used were located in prime fox habitat on all sides of the island (Figure 6). The eight transects varied in length from 1.6 miles to 7 miles, had a mean length of 3.6 miles, and totaled 32.3 miles.

Four pre-baiting arctic fox surveys were flown between 26 March and 29 March 1986. All fox surveys were conducted in the late afternoon or early evening except one conducted on 27 March 1986. A morning survey was attempted on this day in hopes that fox surveys could be run twice a day. Only 43 fox were observed on this survey as compared to an average of 101

FIGURE 6: Location of Arctic Fox Survey Transects Established on Kiska Island, March 1986



Note: Transect #'s 9, 10,11, 12, & 13 were discontinued after the first day due to bald eagle nest disturbance problems and/or low fox numbers.

on the afternoon/evening surveys; thus the morning survey idea was discarded. The low number of fox observed is probably due to the fact that the nocturnal fox are at the end of an activity period rather than a beginning as they would be in the evening. The remaining three pre-baiting fox surveys produced good results with numbers ranging from 87 to 114 with a mean of 101 fox observed for all 9 transects each day. Transect number 2 around Kiska Lakes had the lowest mean number of fox observed each day with 0.7 animals. This is somewhat understandable since these lakes probably have little to offer as a winter food source. Transect number 6 at Cape Stephen had the highest mean number of fox observed each day with 30.3 animals. Transect numbers 5, 6, and 8 all had high mean densities of 6.1, 7.6, and 6.2 fox/mile of shoreline. All of these transects are located in excellent fox habitat with good food resources. Transect number 5 had a dead beached sperm whale and number 6 had a northern sea lion haulout area in it. Transect number 8 is located on the southeast corner of the island with a mixture of sand and gravel beaches where the prevailing SW storm winds would wash food ashore.

After completing the pre-baiting wildlife surveys, Compound 1080 Single Dose Baits(SDB's) were distributed over Kiska Island by hand placement from the helicopter over a 4-day period from 30 March to 04 April 1986. A total of 48,727 baits were dropped or placed, concentrating along the shorelines, upland fox trails, and the auklet colony at the Sirius Point lava flows. To lessen the potential impact of secondary poisioning problems to bald eagles, all accessible arctic fox carcasses were retrieved after the initial baiting. Carcass pickup began on 31 March during follow-up baiting when 12 carcasses from several locations around the island were picked up. In total, 132 arctic fox carcasses were retrieved by the field crew. Fifty-four additional fox carcasses were located in inaccessible areas and could not be retrieved. In addition to the fox carcasses, two glaucous-winged gull carcasses, one glaucous-winged gull wing, and one sea lion pup carcass were also retrieved for potential secondary poisoning analysis. Of the 132 fox carcasses retrieved, 81 were weighed and sexed. Forty-six of the carcasses (57 percent) were female and 35 (43 percent) were male. Weights of the foxes ranged from 2.8 kg to 6.4 kg with the heaviest male 1 kg heavier than the heaviest female. The remaining carcasses were not weighed or sexed due to limited time. Sixty-six foxes had their hindquarters removed and sent to the Denver Wildlife Research Center (DWRC) for Compound 1080 anaylsis along with the gull and sea lion carcasses. The sea lion carcass showed no trace of Compound 1080. The glaucous-winged gull carcasses, however, did show 1.8 and 3.3 micrograms of Compound 1080 per gram of sample (ppm). All 132 fox carcasses were buried in a collapsing World War II tunnel located in the Kiska Harbor area. The area was marked with two Carsonite posts with Compound 1080 poison warning signs.

Three post-baiting fox surveys were flown on 1, 3, and 4 April. The first survey was accomplished over an entire day while picking up fox carcasses. The final two surveys were conducted in the early evenings at a similar time frame as the pre-baiting fox surveys. During the first survey, 7 live arctic fox were observed in the fox transect areas with 12 live foxes observed outside the transect areas. This total of 19 live foxes observed on the island-wide survey compares with 144 arctic fox seen 24 March on the familiarization flight. Compound 1080 baits were dropped over each area where a live fox was observed. Only two live foxes were seen on the second survey and one on the third and final post-baiting survey. A comparison of pre- and post-baiting fox observations shows some dramatic changes. Pre-baiting fox observations on transect number 6 with the greatest number of observations averaged 30.3 animals. Post-baiting conditions on the same transect only averaged 1.0 animals. The highest mean density of arctic fox was found on transects 5, 6, and 8 with 6.1, 7.6, and 6.2 fox per mile of habitat in pre-baiting conditions. Post-baiting fox surveys found these densities dramatically changed to 0.43, 0.25, and 0.10 respectively. The average number of fox observed on all daily pre-baiting surveys was 101. Post-baiting arctic fox surveys averaged only 3.3 live animals. If the first island-wide survey is not included in the calculations, then the average was only 1.5 live arctic fox observed on the post-baiting surveys. More detailed information concerning the March 1986 Kiska work can be obtained in the report entitled "Introduced Arctic Fox Compound 1080 Baiting and Wildlife Surveys, Kiska Island, Aleutian Islands, Alaska - 24 March - 4 April 1986 (In Support of EPA Experimental Use Permit 6704-EUP-28)" (Deines et al. 1986).

METHODS AND MATERIALS

A detailed description of all methods used on Kiska during this survey is given in the study outline contained in the appendix. It should be noted, however, that some of the proposed methods had to be modified due to conditions found on Kiska which could not be anticipated, including continual inclement weather and time restraints encountered due to vessel scheduling in 1985 and 1986. A complete description of the modified techniques used and mensural data for the surveys as established in June of 1985 is contained in the appendix. Results from all surveys completed in June of 1985 are also contained in the appendix. Only new, additional or further modified techniques used in the June 1986 survey work on Kiska will be discussed in this section. Some of the additional or modified techniques used in 1986 were: 1) divided the north nearshore boat transect into 5 segments, 2) permanently marked passerine transect numbers 3 and 6 with Carsonite posts and made a slight adjustment to upper end of transect number three, 3) installed two time-lapse cameras in the new lava flow, 4) established one new surface plot in the old lava flow, 5) remapped and marked time-lapse camera sites, plots and trails, 6) photographically documented

the majority of all surface plots, observation points and time lapse camera sites, 7) mapped major landing rocks in each surface plot, 8) identified vegetation and estimated percentages found in all surface plots, and 9) established 35mm plot and landing rock sampling. Another major difference between 1985 and 1986 summer work on Kiska was the establishment of two separate camps in 1986. One camp was located in Kiska Harbor (Figure 7) and the other at Sirius Point (Figure 8). Different tasks were conducted simultaneously out of each camp. It should also be noted that the time spent on Kiska was severely reduced in 1986 due to budget constraints. In June 1985, 29 days were spent on Kiska, but only 14 days were spent there in June 1986. Due to the reduced number of days on the island, the establishment of two camps allowed the accomplishment of the minimal number of surveys instead of the maximum number of survey replications planned.

A brief summary of all field activities accomplished on Kiska in June 1986 is contained in the Appendix. All surveys were replicated to the maximum extent that weather and time would allow.

In June 1985, two nearshore boat transects were established. Both began in Kiska Harbor and proceeded as far north as Northeast Rocks and as far south as the southwest tip of Jeff Cove, respectively. The southern nearshore boat transect was subdivided into four segments. These segments were established to allow better representation of the different habitats encountered along the transect. The northern nearshore boat transect was not divided into smaller segments when initially established; this transect was subdivided into five segments in 1986 to better represent the different habitats encountered along that route also (Figure 9). The five segments will provide meaningful data to compare during future surveys of this transect, yet the totals from the entire transect will still be comparable with the 1985 north survey.

Permanent Carsonite posts were placed at each end of passerine transect numbers three and six in June 1986 to allow future crews to locate the routes. A slight adjustment to the upper ending point of transect #3 (approximately 50 m to the southwest) was also made at the same time.

In March 1986, three Compound 1080 bait weathering stations were established in the Kiska Harbor area. Twenty-four baits were placed in each of three small wire cages. This was accomplished to allow testing of bait viability over time in the harsh Aleutian weather. The plan called for six baits to be removed from each of the weathering stations and shipped to the Denver Wildlife Research Station for analysis.

As part of the experimental baiting of arctic fox on Kiska, which began in March 1986 with about 48,000 baits being

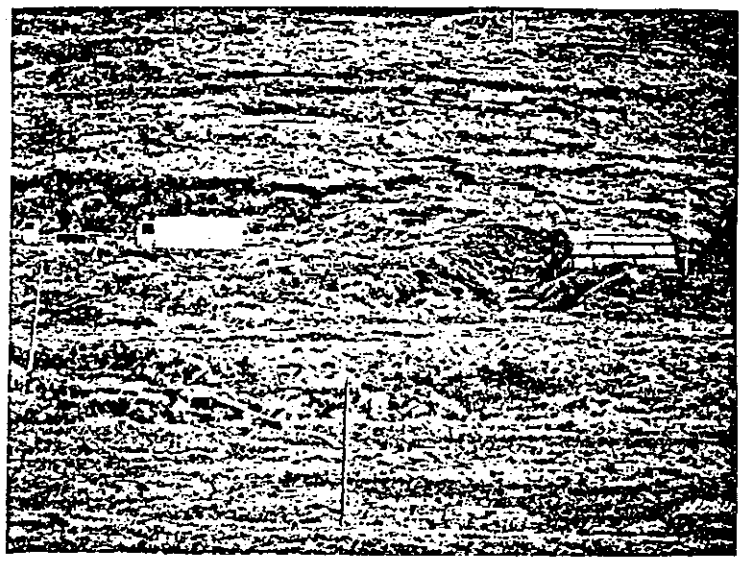


Figure 7: Weatherport Tent, Outhouse and Shower of Kiska Harbor Camp Located Above "Rusty Arch Hotel" Used in The Previous Year For Quarters

Figure 8: Tents and Other Facilities of the Sirius Point Campsite

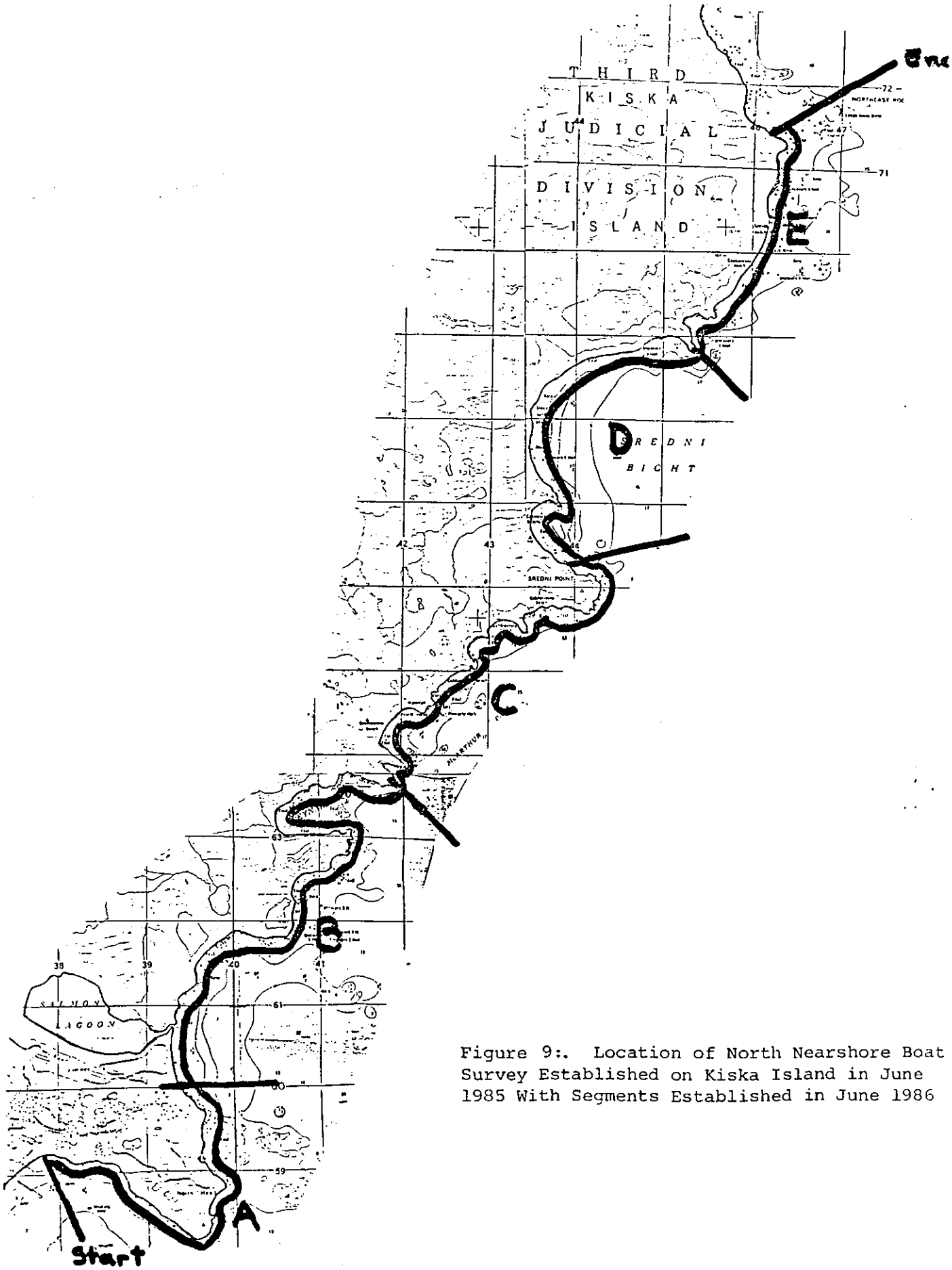


Figure 9:. Location of North Nearshore Boat Survey Established on Kiska Island in June 1985 With Segments Established in June 1986

applied, additional baits up to a total of 50,000/year could be placed on the island. This was done so that any arctic fox or any apparent fresh fox sign encountered could be baited. These baits were to be placed by hand in the areas where fox or fox sign was observed.

Two time-lapse cameras were successfully used in the old lava flow at the Sirius Point auklet colony in June 1985. In 1986, cameras were again used in the old lava flow and two additional time-lapse cameras were installed in the new lava flow. All cameras were setup in the same manner. The location of all cameras and the corresponding survey rocks were permanently marked with galvanized steel posts. The two new time-lapse cameras were placed at the fringe of the new lava flow (Figure 10).

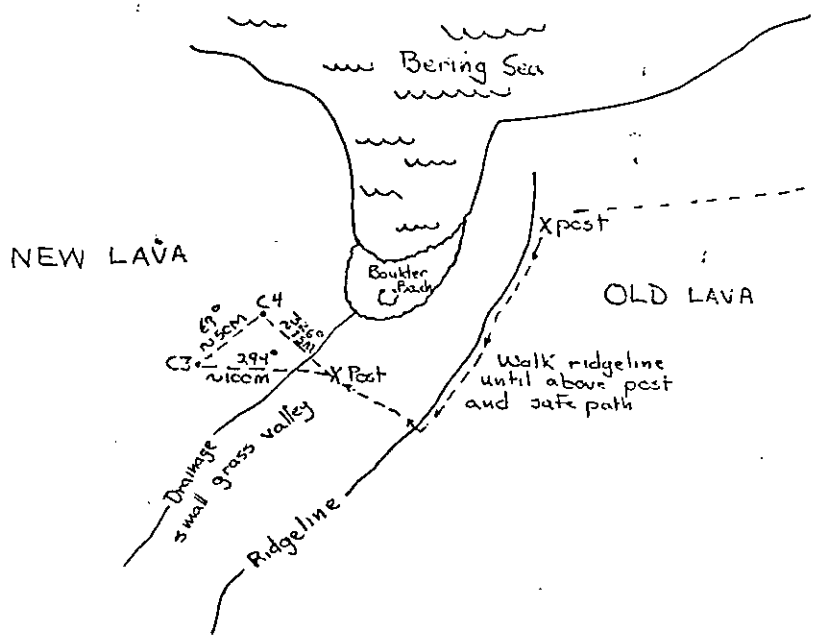


Figure 10. Location of Two Time-Lapse Cameras Placed in New Lava in June 1986.

Several black and white photos were taken of the cameras and their observation (survey) rocks (Figures 11, 12, 13, 14, 15, 16, 17). Special note should be made of the beach shown in Figures 10, 14, and 16 as it could be used as a future landing site (for camera setup or film replacement). Use of that beach will require relatively good weather, though. The walk across the old lava flow, although arduous, can be accomplished in most weather conditions.

Figure 11. Setting up Time-Lapse Camera C-3 and View of its Observation Rock (New Lava).

Figure 12. View of Time Lapse Camera C-4 in Foreground Looking Back Towards Time Lapse Camera C-3 and its Observation Rock (New Lava).

Figure 13 . View of Time Lapse Camera C-4 From Observation Rock (New Lava).

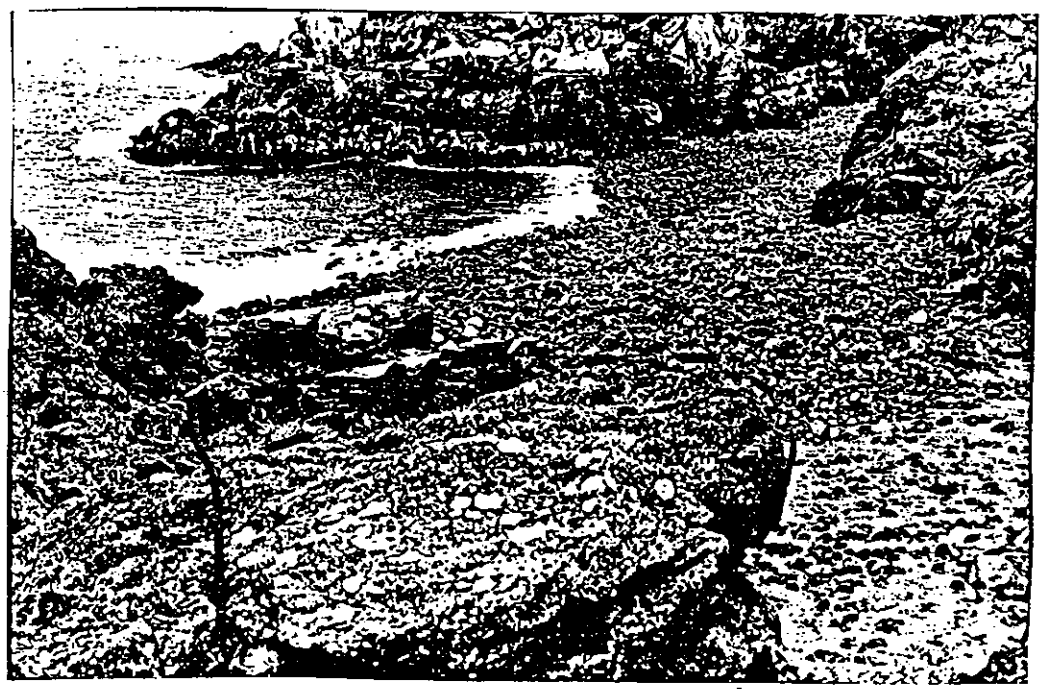


Figure 14 . View of Beach Below C-4's Observation Rock (New Lava).

Figure 15. View From Time Lapse Camera C-3 Looking Back Across the Valley Toward the Ridgeline in the Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

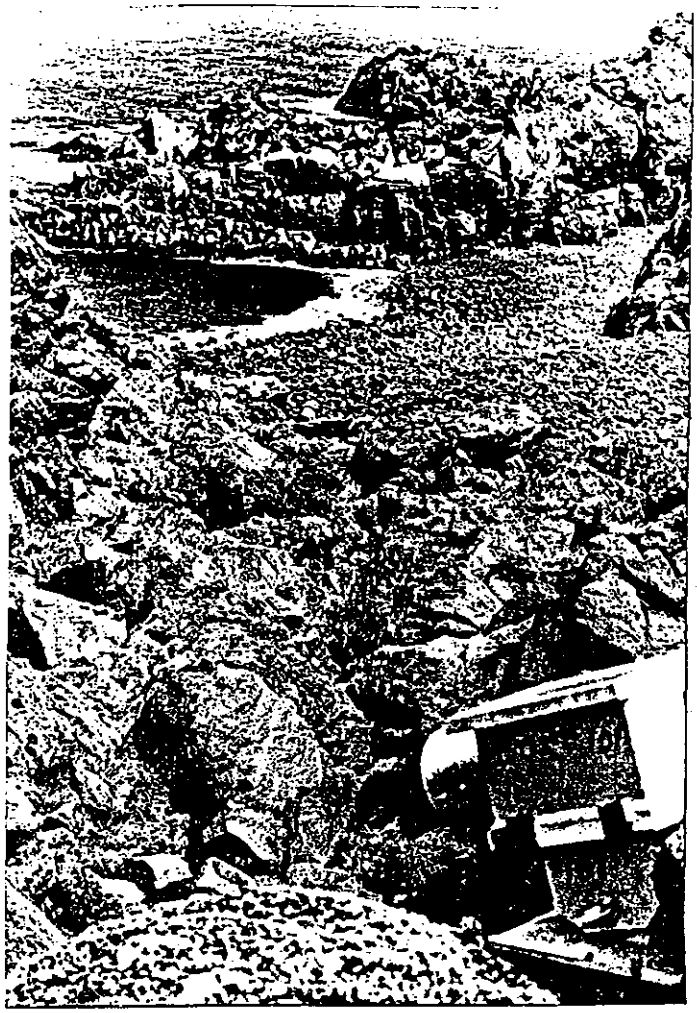


Figure 16. View of Time Lapse Camera C-3 Looking Toward Beach Below (New Lava).

Figure 17. View of Time Lapse Camera C-4's Anchoring Rocks (New Lava).

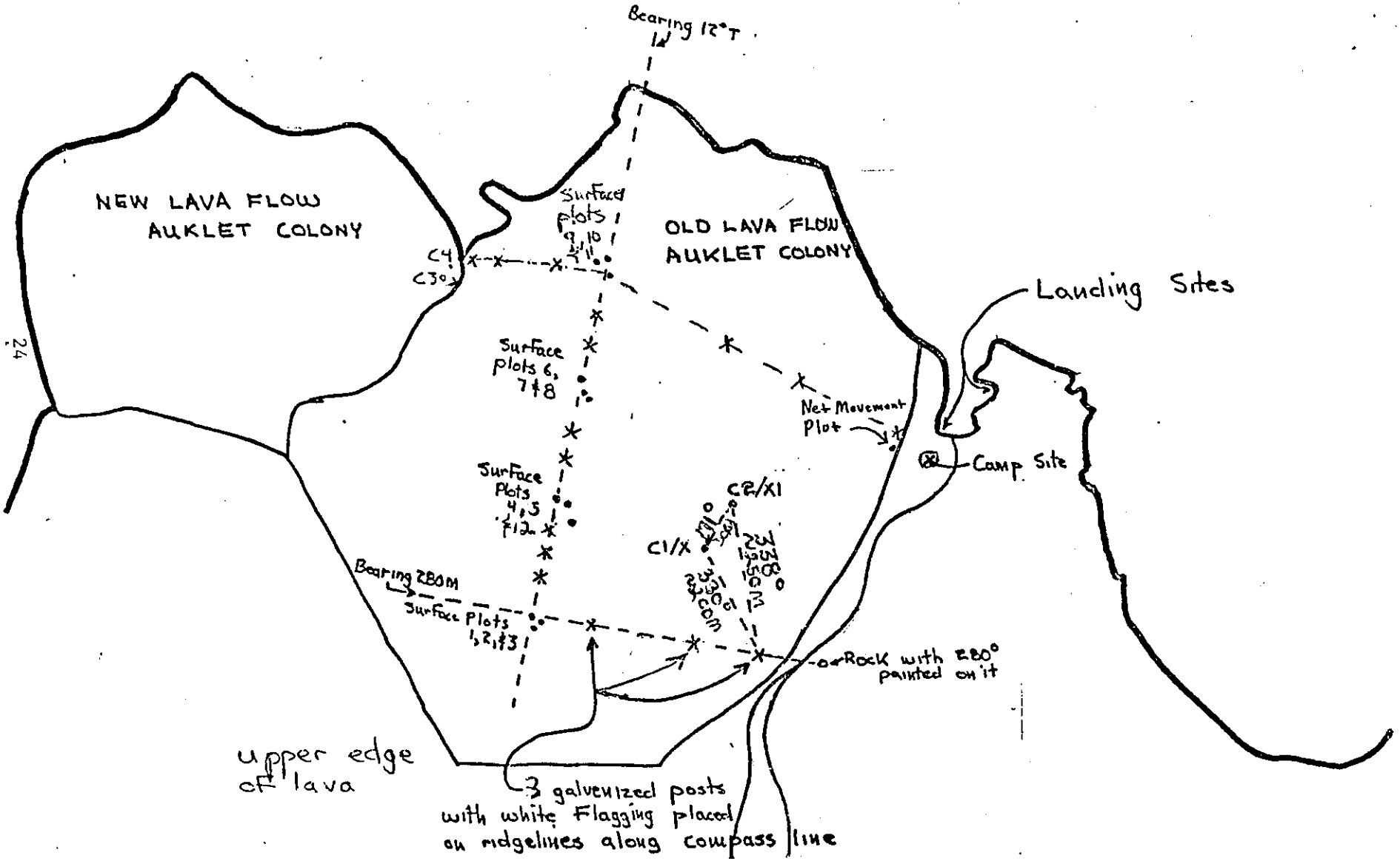


Figure 18. General Location of all Surface Count Plots and Time-Lapse Camera Sites Established in June 1985 and 1986 in Old and New Lava Flows of the Sirius Point Auklet Colony, Kiska Island.

Note: Scale: 12mm ≐ approximately 1000m
x = galvenized post or pipe which were generally placed along ridgelines

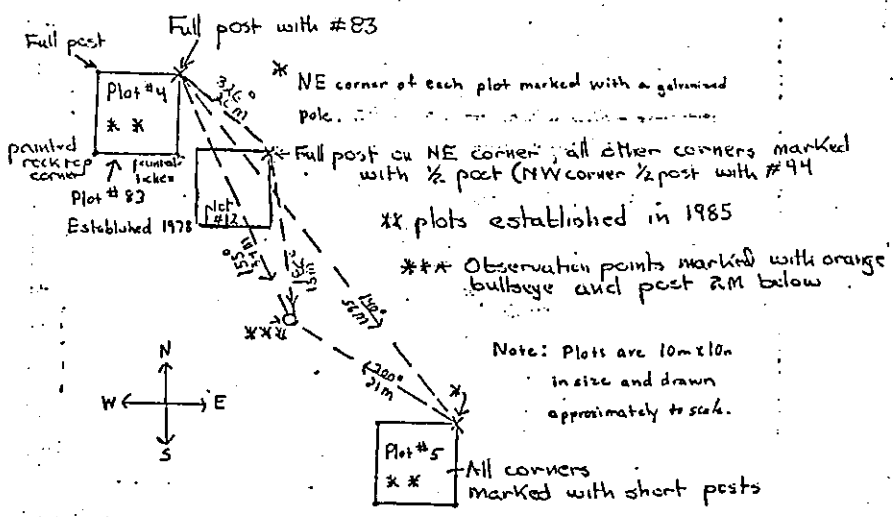


Figure 19: Specific location of surface count auklet plots 4 & 5 established June 1985 and plot 12 established June 1986 at Sirius Point old lava flow auklet colony; Kiska Island

One new 10 m X 10 m surface count plot was established in the old lava flow at Sirius Point. Plot #12 was established near plot #'s 4 and 5 (Figures 18 and 19). Survey of auklets on this new plot will be from the previously established observation point and follow previously established techniques. Mensural data for plot #12 is as follows: 603 m from the top of the colony, 126 m or 424 ft elevation above sea level, 640 m from the water and 5 slope. It should also be noted that the northwest corner of plot #12 is a 1/2 post with number 94 on it.

All previously established surface plot corner marking posts and trail marking posts were painted again in June 1986 to aid in relocating them. In addition, seven new posts were placed along the 12 degree compass line between the surface plot groups (Figure 18). Temporary surveyor's flags were placed between all trail posts to help observers safely exit the auklet colony under foggy conditions. A new trail was also established along the lower edge of the old lava flow extending from the lower set of plots to camp (Figure 18). The new trail was marked with three posts and temporary survey flags. This new trail allowed the biologists to enter or depart the lava from the lower end. This resulted in great time and energy savings. The less ground actually covered through the boulder strewn lava flow, the safer the working conditions. Another new trail marked with three posts and temporary surveyor's flags was also established from the lower plot group to the

site of the two new time-lapse cameras in the new lava flow (Figure 10 & 18). The compass bearing to the first post west on this new trail is 280 and from there on it is 270 . All surface plot corners which were not marked in June 1985 were marked with either a half or full galvanized post. Half posts were used unless they were not visible from the observation points.

Initially, two sets of polaroid photographs of all the plots were taken to assist observers while in the field. Then black and white and some color photographs were taken of the majority of the surface plots. These photographs were taken from the observation point to document the view each observer had of the plot and assist in relocating these plots in the future. A standard 35 mm camera was used with either a 28 mm wide angle, 50 mm standard, or 80-200 zoom lens (whichever gave the best photo of each particular plot). Several photographs were required to make a composite photograph of some plots (such as plot #5). The results of all photographs are shown in Figures 20 through 33, documenting plots #1 through 12 and the four observation points.

To aid future auklet observers in monitoring the surface plots at the old lava flow, all major landing rocks within each plot were visually mapped (Figures 34, 35, 36, and 37). In addition, the portions of the landing rocks that could be observed from the observation point were mapped. The effort will aid future observers in becoming familiar with surface plots and where to expect to observe major bird concentrations.

Two additional procedures were conducted this year to further describe the surface plots in the old lava flow. The major vegetation types in each plot were identified to species. Visual estimates of the vegetation were then made to determine what percentage of each plot they covered. Limited time precluded a more detailed vegetation survey.

One additional survey was conducted in the old lava flow to allow establishment of additional population trend information for least and crested auklets. A 35 mm camera with an 80-200 zoom lens and 125 ASA black and white film pushed to 400 was used in an attempt to document auklet numbers in two areas. Photos were taken at five minute intervals from the observation point at surface plot number five in hopes of allowing comparison of this information with the surface counts. The five minute interval was used because this is about the maximum interval which can provide good information on auklets using time-lapse camera equipment. Only one day of photo's (during the surface count survey times) was accomplished at plot five because of concern over film limitations and depth of field. Two days of additional photographs at a landing rock (Figure 38) approximately 15 feet south of the observation point were also taken. These photographs were taken following techniques developed the first day on plot five.

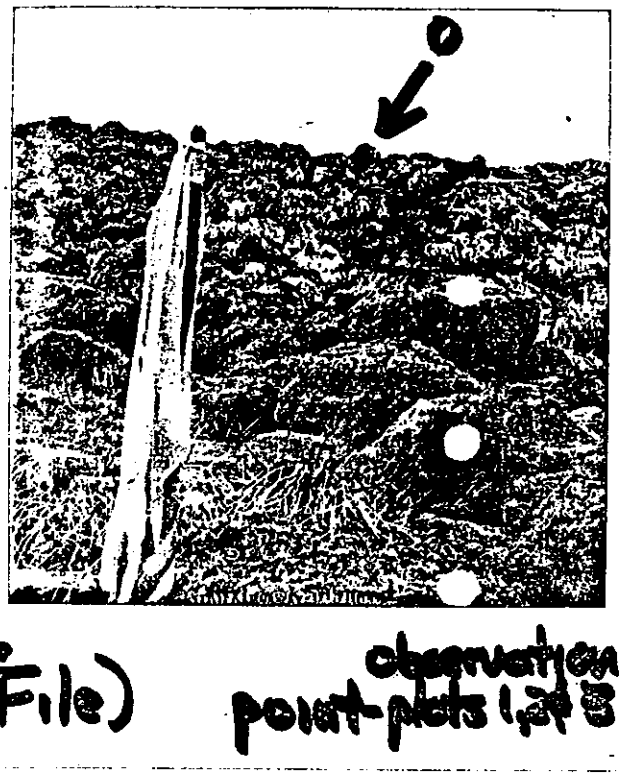


Figure 20. Polaroid Picture of the Observation Point for Plots 1, 2 & 3 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

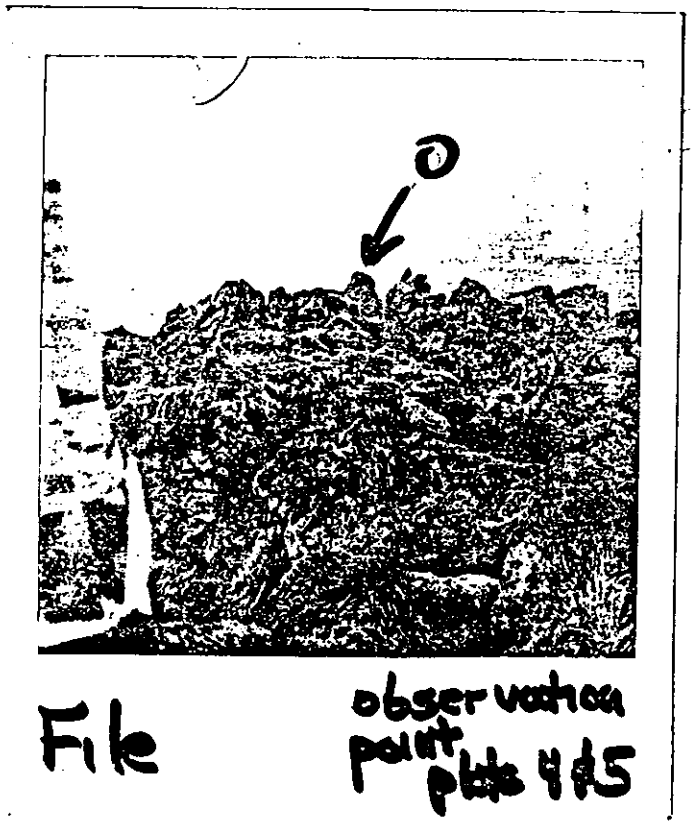
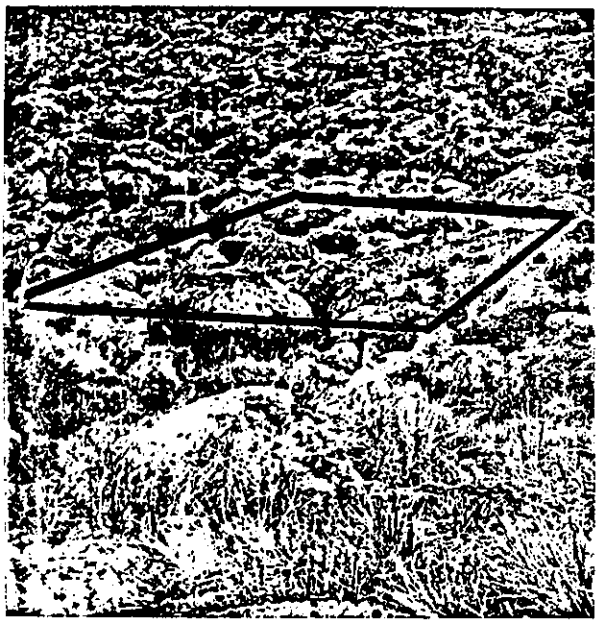


Figure 21. Polaroid Picture of the Observation Point for Plots 4, 5 & 12 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

Figure 22. View of Jim Fuller at Observation Point for Plots 6, 7 & 8 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

Figure 23. View of Observation Point for Plots 9,10 & 11 From Plot #9 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.



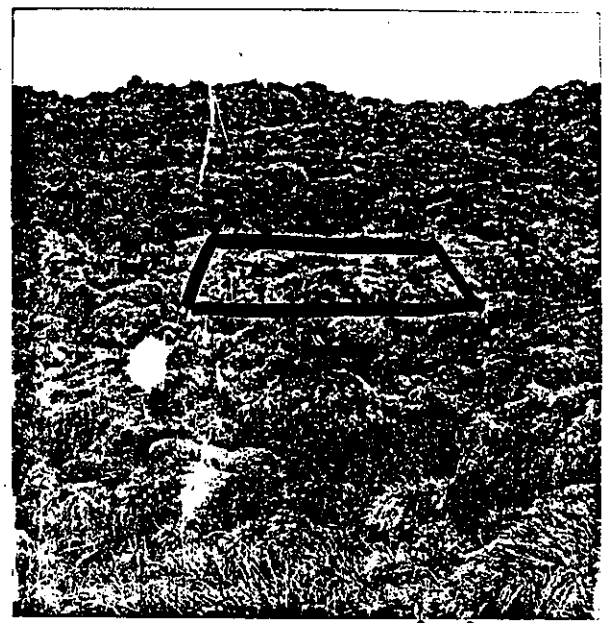


Figure 24. Polaroid Pictures of Surface Plots 1, 2 & 3 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

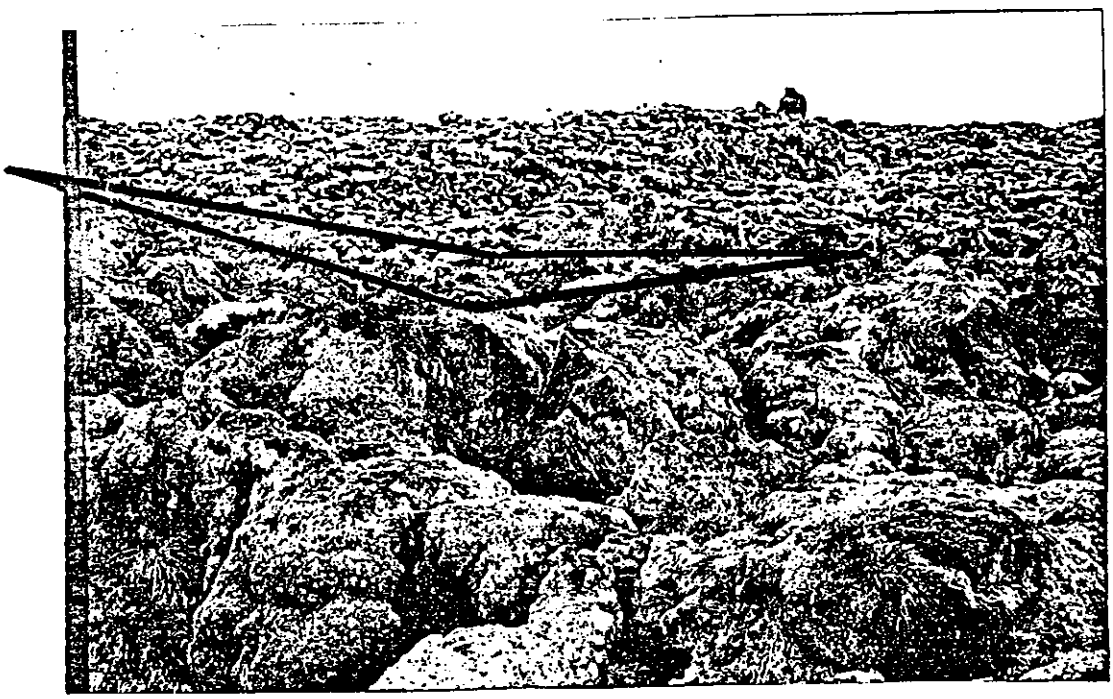


Figure 25. Surface Plot #4 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

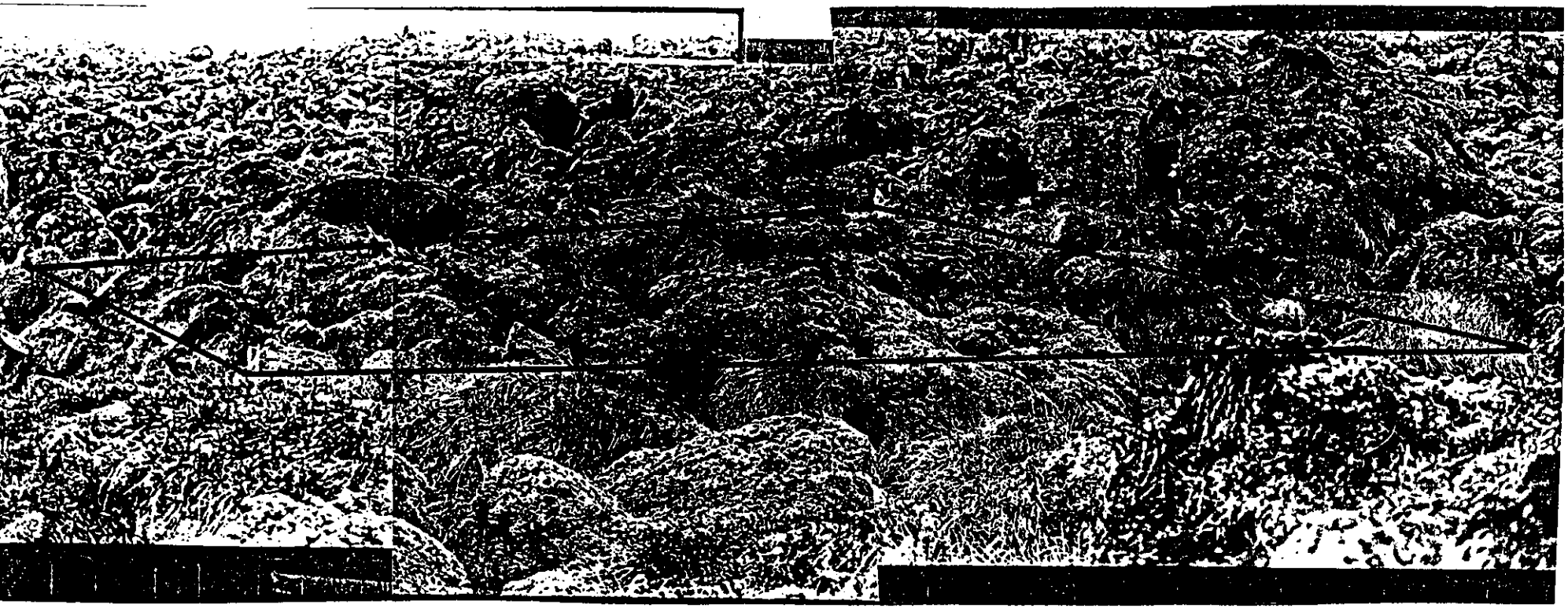


Figure 26. Surface Plot #5 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

Figure 27. Surface Plot #12 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

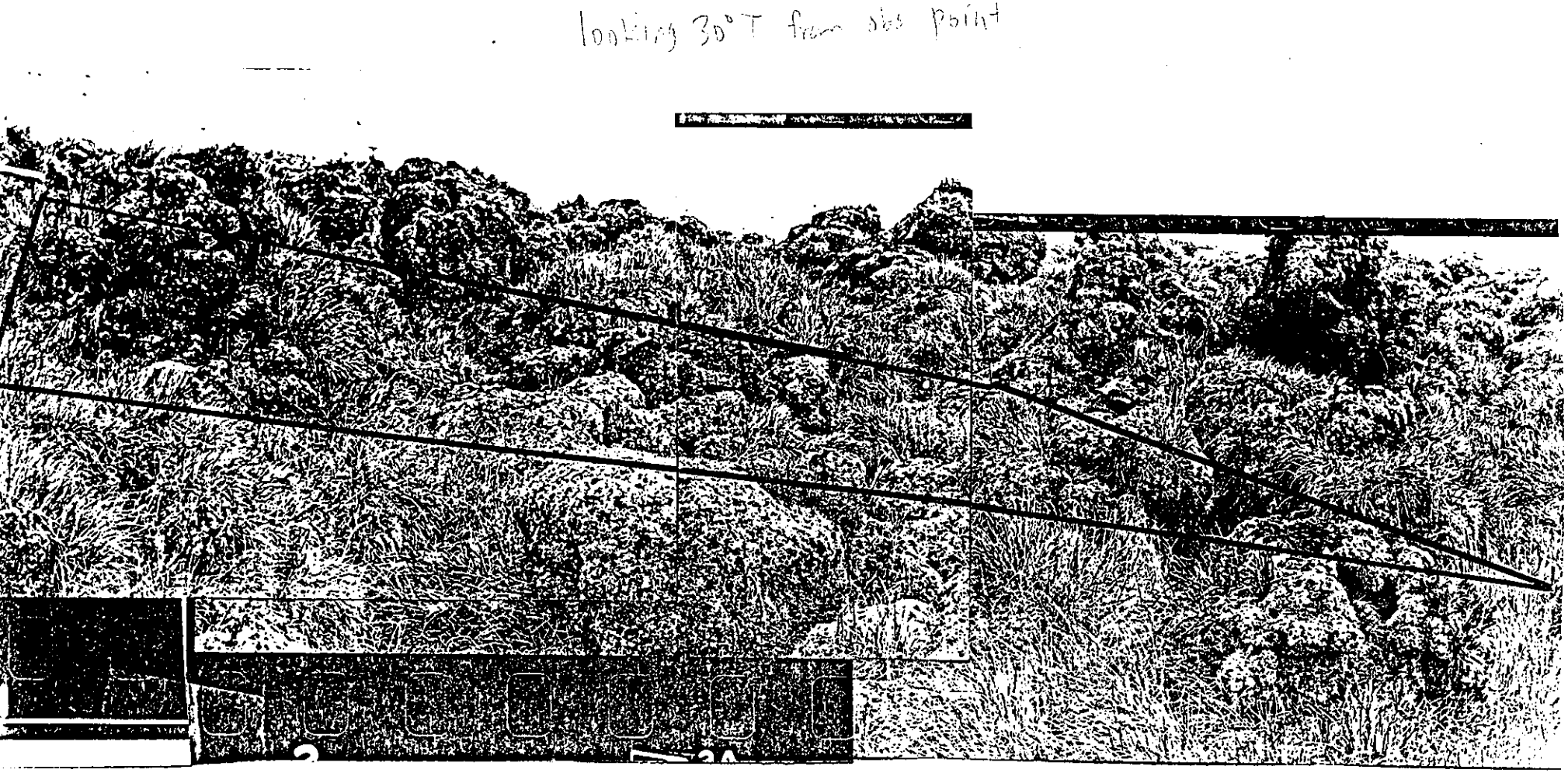


Figure 28. Surface Plot #6 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

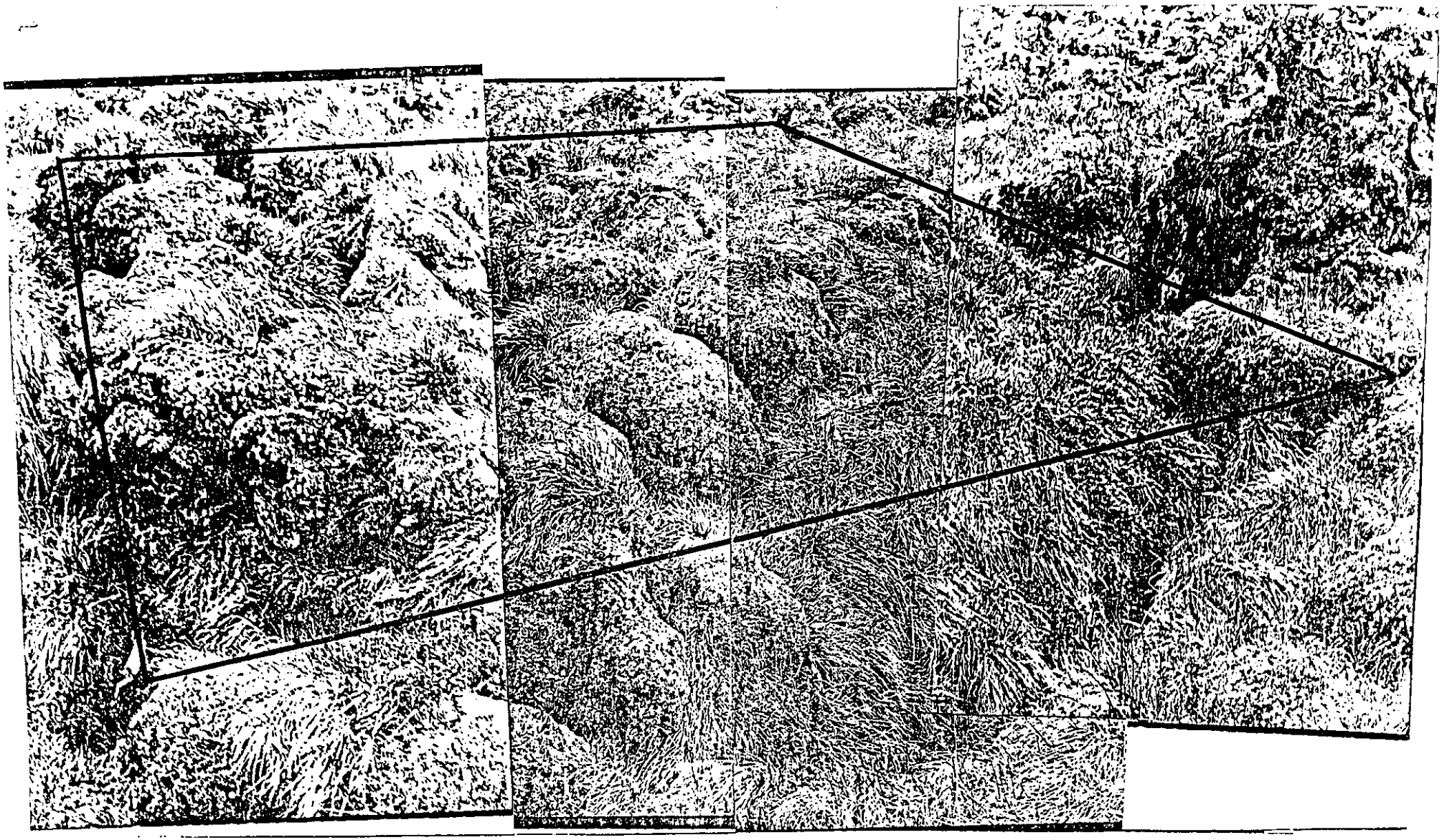


Figure 29. Surface Plot #7 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

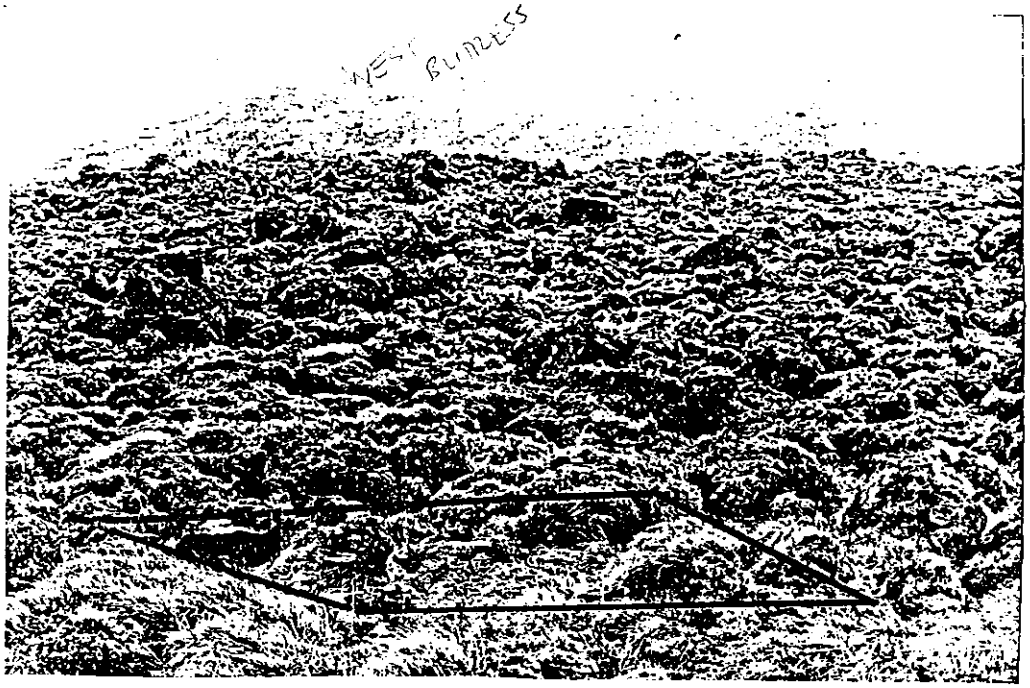


Figure 30. Surface Plot #8 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

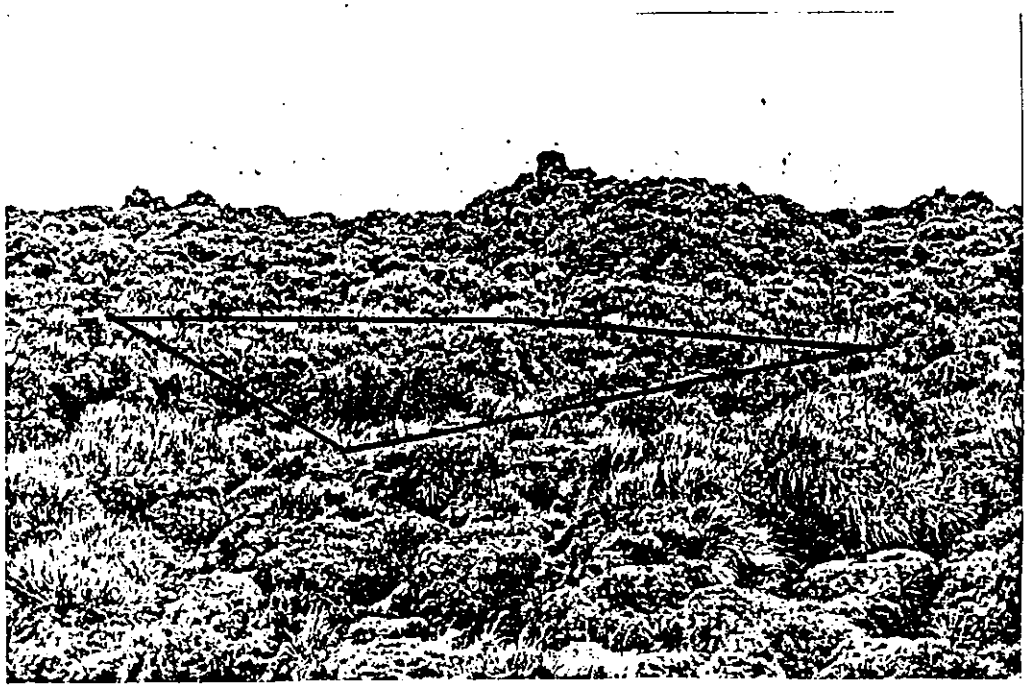


Figure 31. Surface Plot #9 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

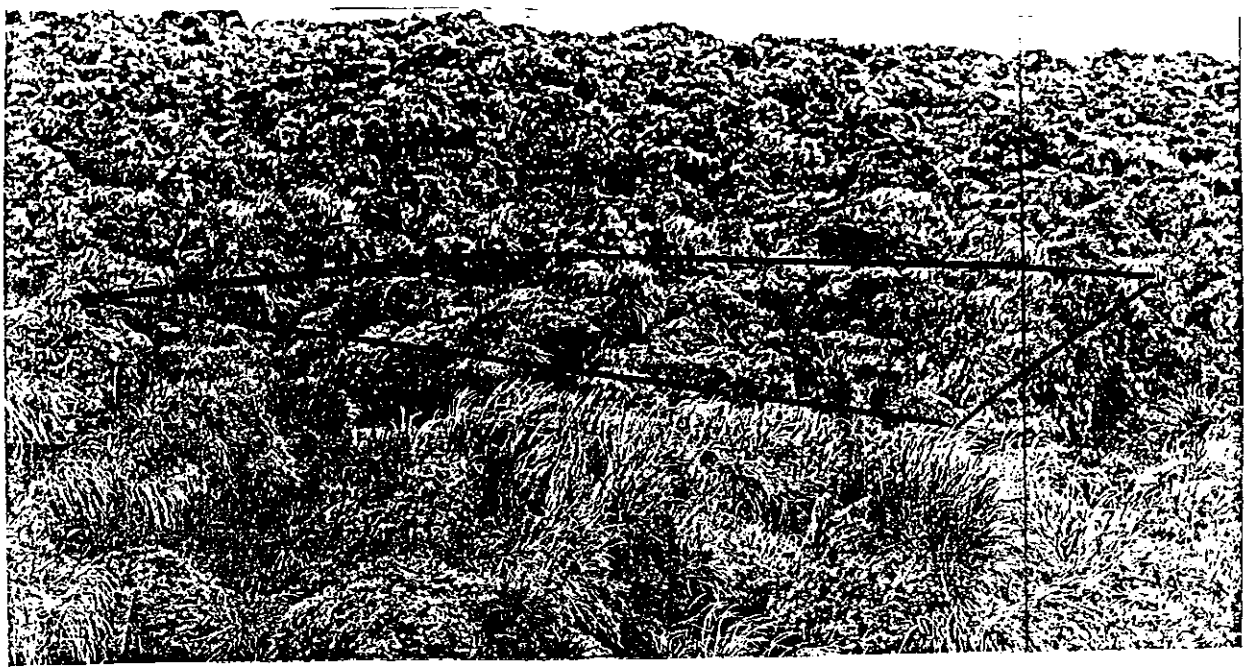


Figure 32. Surface Plot #10 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

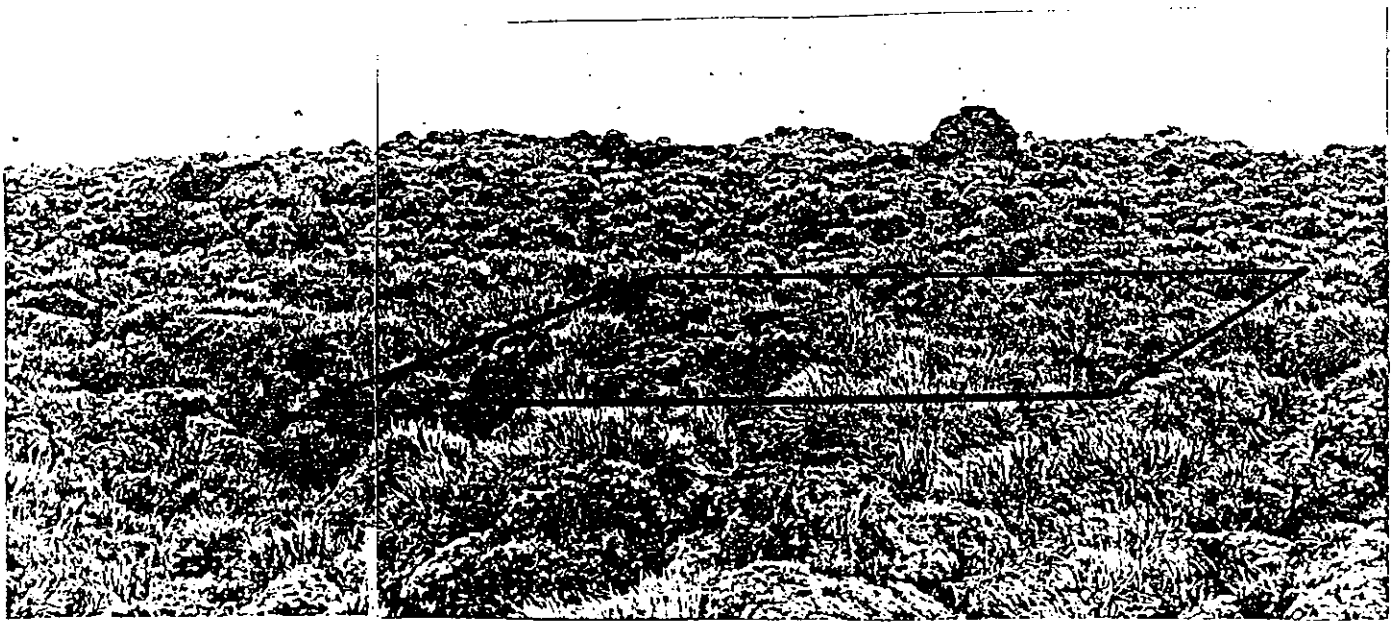
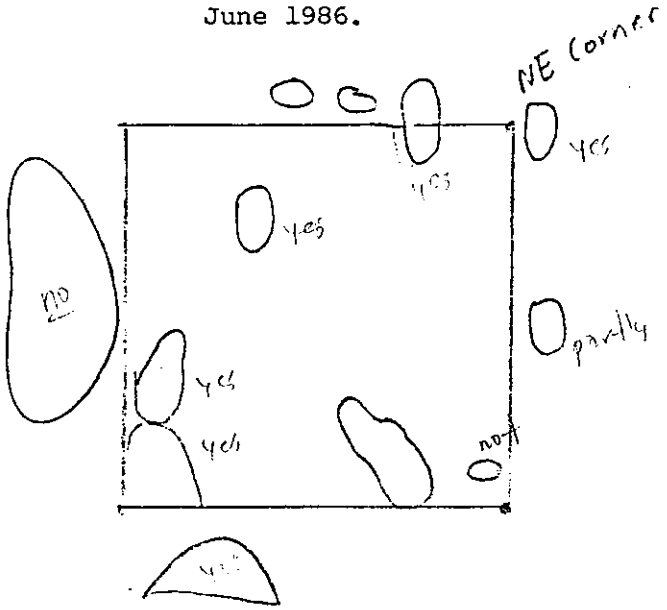
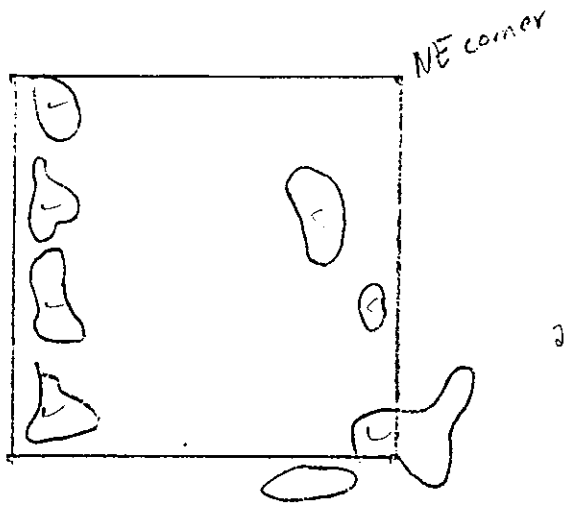


Figure 33. Surface Plot #11 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

Figure 34. Map of all Major Landing Rocks Within Surface Count Plots 1, 2 and 3 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.



Note: Portion of the landing rocks that cannot be seen from the observation point is not indicated for this plot group



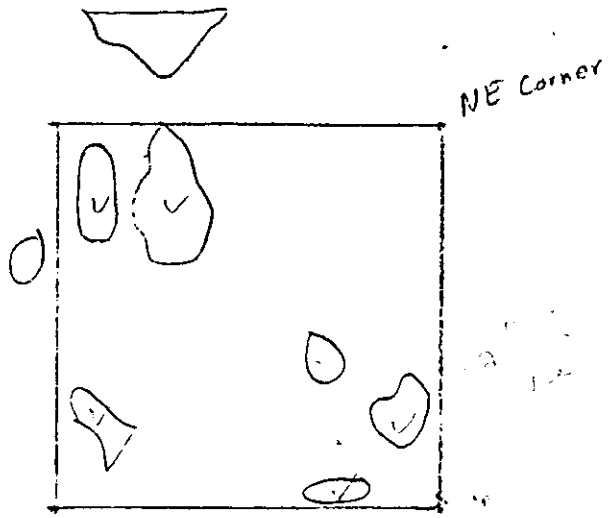
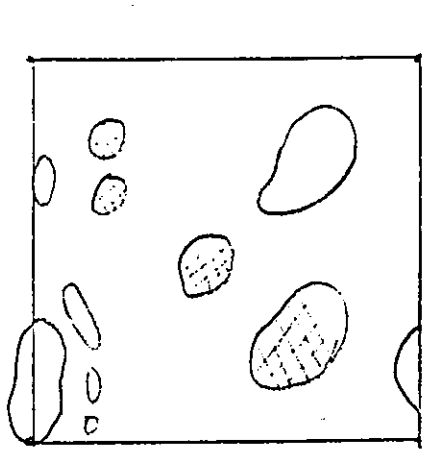
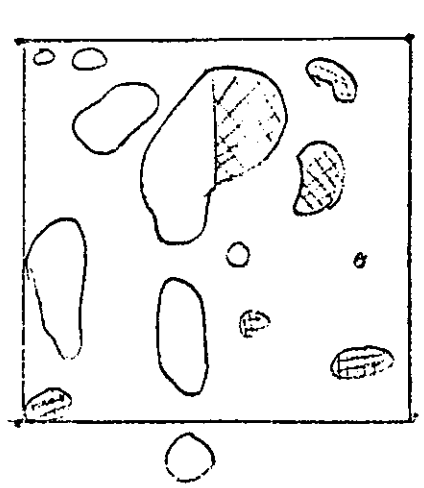


Figure 35. Map of all Major Landing Rocks Within Surface Count Plots 4, 5 and 12 in the Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986



Note: Shaded area indicates portion of landing rocks that can't be seen from observation point



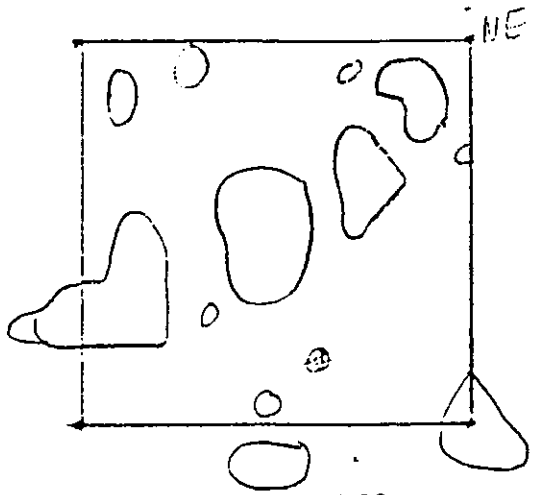
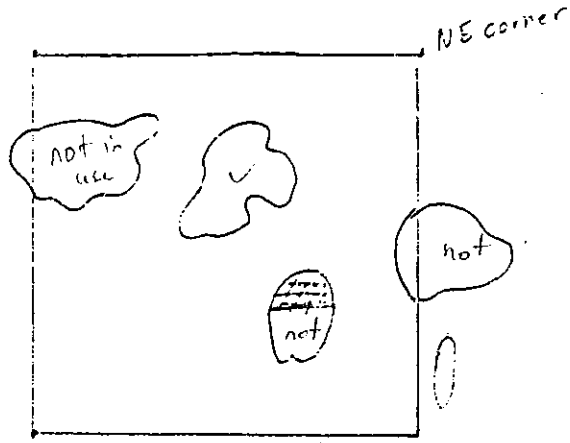
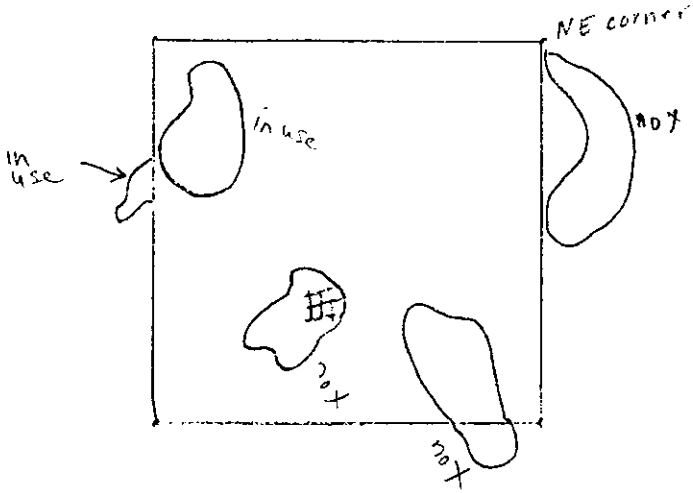


Figure 36. Map of all Major Landing Rocks Within Surface Count Plots 6, 7 and 8 in the Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986

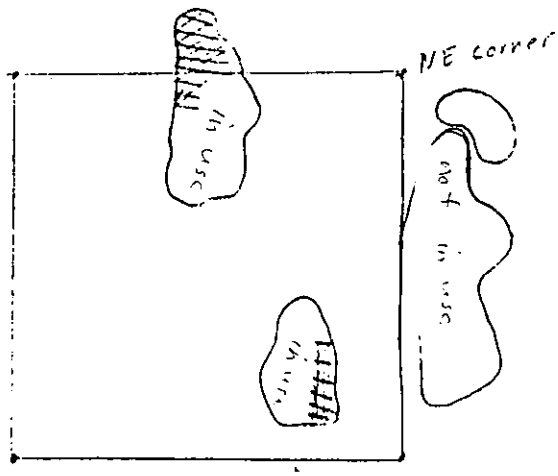


Plot #6

Note: Shaded area indicates portion of landing rocks that can't be seen from observation point

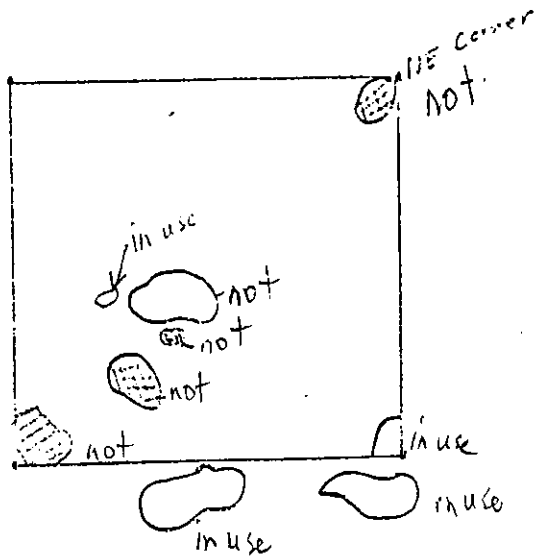


Plot #7

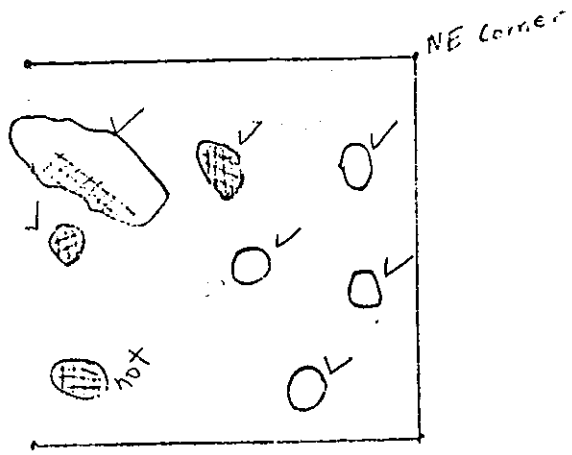


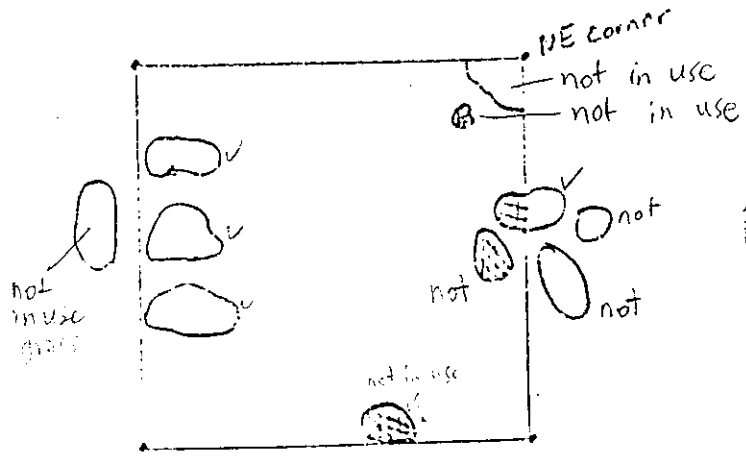
Plot 8

Figure 37. Map of all Major Landing Rocks Within Surface Count Plots 9, 10 and 11 in the Old Lava Dlow at Sirius Point Auklet Colony, Kiska Island, June 1986



Note: Shaded area indicates portion of landing rocks that can't be seen from observation point





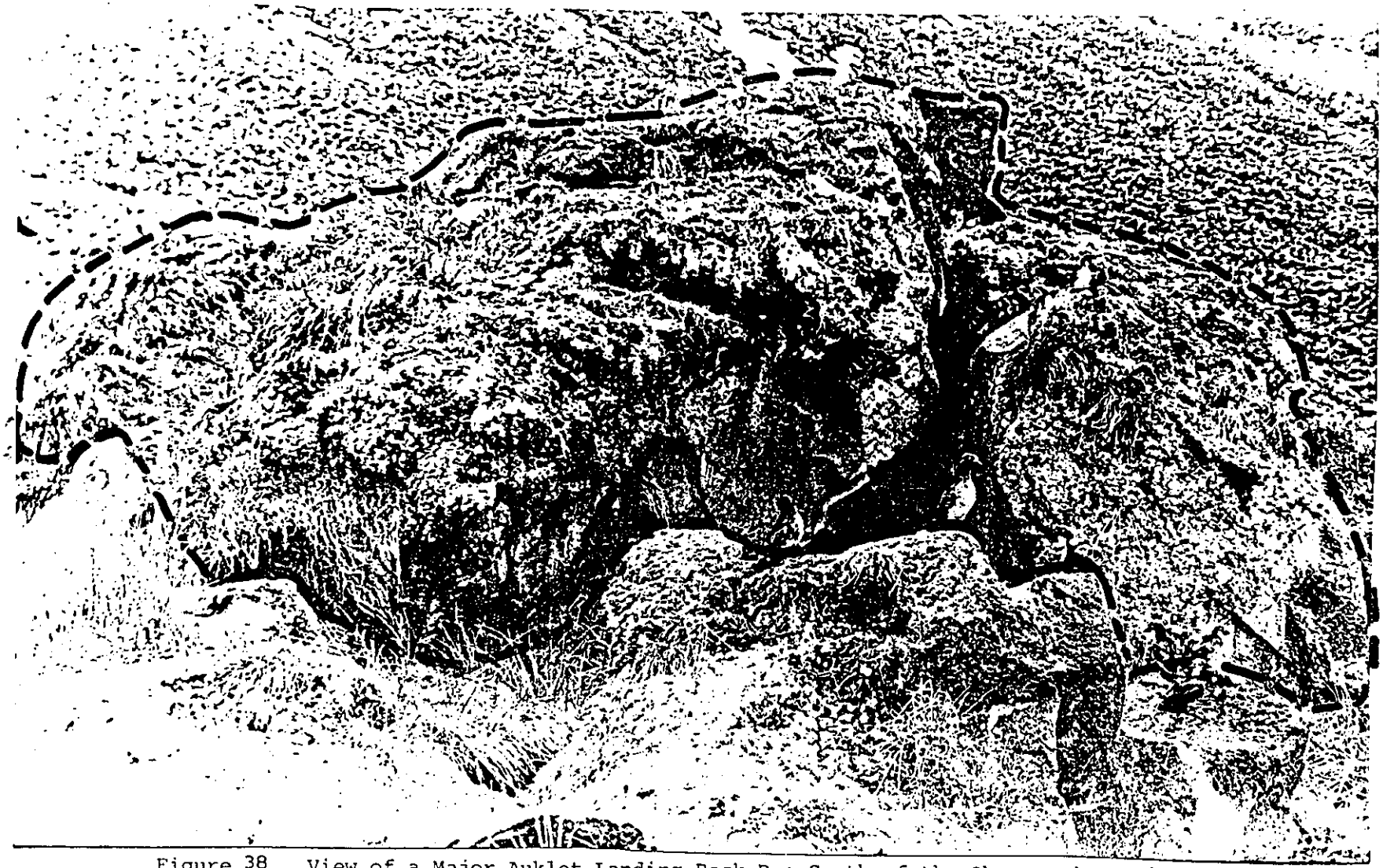


Figure 38. View of a Major Auklet Landing Rock Due South of the Observation Point for Plots 4, 5 & 12 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island, June 1986.

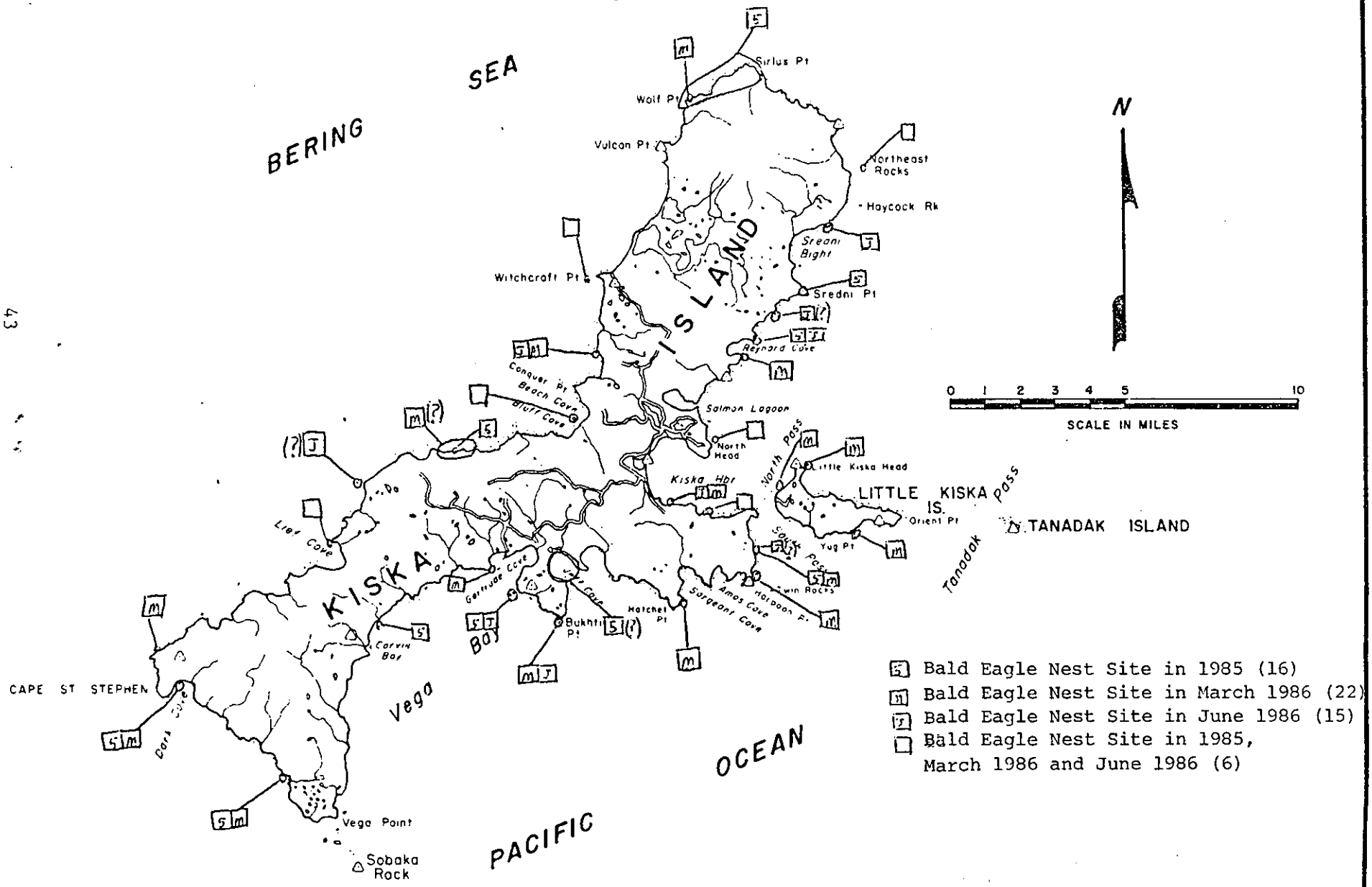
RESULTS AND DISCUSSION

Replicating the surveys established in June 1985 for selected birds and mammals on Kiska Island proved to be difficult once again. Although two separate crews were positioned on the island this year, they had to accomplish all of the basic surveys in less than half the time alloted in 1985. The extremely limited time was required due to budget restrictions. It proved to be an almost insurmountable problem to overcome. If it had not been for cooperation from the weather and considerable hard work, the surveys would not have been accomplished. As it was, the number of replications were minimal and little expansion of the survey effort was allowed. Expansion of surface plot counts into the new lava flow and establishment of net-movement plots in the old lava flow of the Sirius Point auklet colony as recommended in 1985 was not accomplished. Weather data was recorded on Kiska during the entire period of this project and that, along with weather reports from Adak, Naval Air Station, are contained in the Appendix.

Although fox eradication at Kiska was initiated in March 1986, the June 1986 surveys should just be considered additional baseline data as other wildlife had insufficient time to react to any changes in the fox population.

One complete circumnavigation of the 143.2 km (89.5 mile) shoreline of Kiska Island was completed on 18 and 19 June 1986 using the charter vessel. The circumnavigation began on the morning of the 18th in Kiska Harbor with the boat proceeding around North Head and continuing northward. With calm seas and wind on the 18th, a decision was made to break off the circumnavigation at Sirius Point and offload the Sirius Point camp. The circumnavigation survey was then completed on the 19th with the charter vessel again starting from Kiska Harbor. This time, however, it headed south through South Pass and continued clockwise around the island until it eventually reached Sirius Point in the early evening. The area covered during the previous day's effort on the northeast side was not resurveyed. A second complete circumnavigation planned for the end of the field work was not completed due to a lack of time. The one survey did, however, provide good information on raptors and their aerie locations. As shown in Figure 39, 12 bald eagle aeries and three possible aeries were located in June 1986. This compares favorably with the 16 aeries found during the June 1985 circumnavigation (Deines 1986). Eight of the 12 positive aeries located in 1986 were found in the same locations as in 1985. Nine of the 12 positive aeries located in June 1986 were active during the March/April 1986 surveys. Six of the positive aeries located in June 1986 were located in the same location in March/April 1986 and June 1985. Of the three possible aeries, two were based on observations of apparently territorial pairs of adult bald eagles. One pair was near the location of an aerie observed in 1985 and March/

FIGURE 39: Location of Bald Eagle Aeries Observed in 1985 and 1986 on Kiska and Little Kiska Islands.



Note: Aeries with question marks in parenthesis proabably exist but are not known for certain. Also, the larger the area of the circle for the nest site, the more uncertain we are about the exact location of the aerie.

April 1986 and the other pair was near an aerie observed in 1978. The aeries themselves, however, could not be specifically located during the June 1986 circumnavigation. The third possible aerie was on a sea stack located between Reynard Cove and Sredni Point. No aerie had been observed there in previous studies. Thirty-three adult bald eagles and one immature were observed during the June 1986 circumnavigation, which compares closely to the June 1985 observation of 34 adult and 8 immature bald eagles (Deines 1986). June 1986 results also compare favorably with the 38 adult bald eagle average recorded during helicopter surveys in March/April 1986 (Deines et al. 1986). The difference in the number of immature eagles is considered inconclusive due to the blending of immature eagles with the cliffs or tundra and their tendency not to readily fly upon the approach of a distant vessel.

Six peregrine falcons and one falcon aerie were observed during the June 1986 circumnavigation. The falcon aerie was located in the cove below the Sirius Point camp and was found while unloading the Sirius Point crew. A pair of peregrine falcons also had an aerie in the same cove in 1985 and 1978. The 6 peregrine falcons observed compares favorably to the average of 6 peregrine falcon observations recorded during the bald eagle helicopter surveys in March/April 1986 (Deines et al. 1986). Day et al. recorded a minimum of 10 peregrine falcons during their work in 1978. Peregrine falcons were not recorded during the June 1985 survey.

During the 1986 circumnavigation, incidental bird observations were not recorded as in the 1985 circumnavigation. There were only 4 observers in 1986 compared to 8 in 1985, so it was necessary to have the four observers concentrate on raptor observations.

Two nearshore boat surveys were accomplished on 24 and 28 June. The surveys were conducted using the same transects and methods established in June 1985. The one change in 1986 was the subdivision of the north survey into 5 distinct segments as discussed in the methods section. The results of the two nearshore boat surveys are shown in Tables 1 and 2.

The results obtained from the nearshore boat surveys for the three species of special interest (arctic fox, glaucous-winged gull, bald eagle) were encouraging. No live arctic fox were observed on either the north or south surveys in 1986 which was a very encouraging sign. Arctic fox were observed in significant numbers during June 1985 with an average of 8 fox on the north survey and 16.5 on the south survey (Deines 1986). Several sets of canine tracks were found, however, on the sandy beaches of Mutt and Jeff Cove during the south survey on 28 June. The tracks appeared to be larger than those made by an arctic fox (i.e., a fisherman's dog). On the north transects, 150 and 174 (average 162) glaucous-winged gulls were

Table 1. North Nearshore Boat Survey from Kiska Harbor to Northeast Rocks, Kiska Island, 24 and 28 June 1986

Wildlife Species	North Harbor to Start of N Beach Transect #Obs. 6/24	6/28	Start of N Beach Transect to and including Reynard Cove #Obs. 6/24	6/28	No. Side of Reynard Cove to First Gravel Beach in Sredni Bight * #Obs. 6/24	6/28	Sredni Bight #Obs. 6/24	6/28	Sredni Bight to Northeast Rocks #Obs. 6/24	6/28	Totals June 6/24	6/28
Pelagic Cormorant	-	23	2	6	1	32	-	1	1	129	3	191
Red-Faced Cormorant	-	5	-	-	-	9	1	3	-	4	1	21
Cormorant Species	9	1	18	5	26	-	10	-	14	-	77	6
Common Eider	-	-	-	-	4	1	-	13	-	-	4	14
Harlequin Duck	190	161	20	27	11	6	4	-	-	-	225	194
Red-breasted Merganser	-	-	7	-	-	-	-	-	-	-	7	-
Merganser Species	-	-	-	2	-	-	-	-	-	-	-	2
Bald Eagle	1	4	-	1	-	1	3	4	1	3	5	13
Peregrine Falcon	1	-	-	-	3	-	1	-	1	-	6	-
Black Oyster-Catcher	-	-	-	-	2	-	4	-	1	-	7	-
Glaucous-winged Gull	17	24	53	21	48	65	21	12	35	48	174	170
Common Murre	-	-	1	-	-	-	-	-	-	-	1	-
Pigeon Guillemot	1	5	6	1	22	4	7	4	6	1	42	15
Ancient Murrelet	31	28	16	67	14	2	10	-	13	17	84	114
Horned Puffin	-	-	4	6	45	101	-	7	3	5	52	119
Tufted Puffin	3	1	18	13	37	36	1	-	-	-	59	50
Common Raven	-	-	-	-	1	-	-	-	-	-	1	-
Rosy Finch	4	-	-	-	-	-	-	-	-	-	4	-
Harbor Seal	4	14	8	9	3	10	1	2	5	-	21	35
Sea Otter	12	7	28	17	15	5	8	3	18	34	81	66
N. Sea Lion	-	1	-	5	-	-	-	-	-	1	-	7
Total Birds	257	252	145	149	214	257	62	44	74	207	752	909
Mammals	16	22	36	31	18	15	9	5	23	35	102	108

(*) Possible flock of 30 Aleutian Canada geese over Transect #3 on 24 June 1986.

Table 2. South Nearshore Boat Survey from Kiska Harbor to the West Side of Jeff Cove, Kiska Island, 24 and 28 June 1986.

Wildlife Species	SEGMENT NAME: Pier to S. Head #Obs. 6/24	6/28	S Head to Harpoon P. #Obs. 6/24	6/28	Harpoon P. Pinnacle P. #Obs. 6/24	6/28	Pinnacle P. to Jeff Cove #Obs. 6/24	6/28	TOTALS June 6/24	6/28
Pelagic Cormorant	33	8	6	-	42	-	13	-	94	8
Cormorant Species	-	45	-	21	-	43	-	38	0	147
Mallard	-	-	-	-	-	1	-	4	0	5
Aleutian Green-winged Teal	-	1	-	1	-	-	-	-	0	2
Common Eider	45	29	-	-	-	-	-	-	45	29
Harlequin Duck	14	165	-	4	-	-	-	21	14	190
Common Merganser	10	-	-	-	-	-	-	-	10	0
Bald Eagle	3	-	1	1	4	4	-	1	8	6
Peregrine Falcon	-	-	1	-	-	-	-	-	1	0
Rock Sandpiper	1	-	-	-	-	-	-	-	1	0
Parasitic Jaeger	-	-	-	-	-	2	-	-	0	2
Glaucous-winged Gull	54	7	21	31	35	62	7	52	117	152
Pigeon Guillemot	10	4	-	3	2	1	2	7	14	15
Ancient Murrelet	57	38	9	6	31	58	39	141	136	243
Crested Auklet	1	-	-	-	11	-	-	-	12	0
Least Auklet	-	-	-	-	-	-	6	-	6	0
Horned Puffin	-	-	-	-	3	-	20	32	23	32
Tufted Puffin	-	-	-	3	5	-	-	4	5	7
Winter Wren	-	3	-	-	-	-	-	-	0	3
Snow Bunting	1	1	-	-	-	1	-	2	1	4
Rosy Finch	1	4	-	-	-	-	-	2	1	6
Harbor Seal	7	7	2	9	6	7	-	8	15	31
Sea Otter	60	22	27	24	23	12	5	19	115	77
Total Birds	230	305	38	70	133	172	87	304	488	851
Mammals	67	29	29	33	29	19	5	27	130	108

observed in 1986 compared to 151 and 172 (average 161.5) in 1985 (Deines 1986). Almost no variation was detected in gull observations between 1985 and 1986. Only 182 and 117 (average 149.5) glaucous-winged gulls were observed on the south nearshore boat survey in 1986 compared to 501 and 514 (average 507.5) glaucous-winged gulls in 1985 (Deines 1986). The results obtained in 1986 on the south survey and in total show a marked decrease. The decrease of gulls could represent some secondary poisoning problems, but if that were the case, the decrease should have occurred on the north transect also. The actual reason for the discrepancy is unknown. The bald eagle observations on the nearshore boat surveys were also slightly lower in 1986 than in 1985. On the south survey, only 8 and 6 (average 7) eagles were observed in 1986 compared to 10 and 12 (average 11) in 1985 (Deines 1986). On the north survey 5 and 13 (average 9) eagles were observed in 1986 compared to 10 and 10 (average 10) in 1985. The total number of aeries and eagles observed on the island wide circumnavigation in 1986 was not down significantly from 1985.

Some variablity also occurred with other wildlife species observed during the nearshore boat surveys in 1985 and 1986. In 1986, only four different waterfowl species were observed, compared to a total of nine waterfowl species in 1985 (Deines 1986). No loons were observed in 1986, compared to three common loons and one pacific (formerly arctic) loon in 1985 (Deines 1986). Ancient murrelets and both species of puffins were observed in larger numbers in 1986 than in 1985. A total of 577 ancient murrelet observations were recorded in 1986, compared to only 121 in 1985 (Deines 1986). Both puffin species also showed an increase in observations with a total of 347 recorded in 1986 compared to only 79 in 1985 (Deines 1986). On the south survey, harbor seals, sea otters and passerine bird species showed a decrease in the number of observations recorded in 1986 compared to 1985. The results on the north survey, however, were comparable for harbor seals, sea otters and passerine bird species between the two years.

Two beach surveys were accomplished on 21 and 23 June. The surveys were conducted on the same transects with the same methods established in June 1985. The results of the beach surveys are shown in Table 3 and 4.

As was the case with the nearshore boat surveys, the results obtained from the beach surveys included no live arctic fox. An average of 8 fox on the north survey and 2.5 on the south survey were observed in 1985 (Deines 1986). One fox carcass composed of just the hide and bones was found on the north survey. The absence of fox on both the nearshore boat and beach surveys was an encouraging sign. One set of canine tracks was found in the WWII Japanese sub pen area inland from one segment of the south survey. As was the case with the tracks found during a south nearshore boat survey, the tracks appeared to be larger than those made by an arctic fox.

Table 3. North Beach Surveys Conducted on Kiska Island, 21 and 23 June 1986.

Wildlife Species	Sandy beach to mouth of Salmon Lagoon #Obs.		Salmon Log. North & South #Obs.		Mouth of Salmon Lagoon to rocky point #Obs.		Rocky Point to end large sea stack #Obs.		Totals #Obs.	
	6/21	6/23	6/21	6/23	6/21	6/23	6/21	6/23	6/21	6/23
Pelagic Cormorant	-	-	-	-	2	-	1	3	3	3
Cormorant Species	-	-	-	-	4	-	1	-	5	-
Mallard	-	-	-	1	-	-	-	-	-	1
Aleutian Green-winged Teal	-	-	-	3	3	-	-	3	3	6
Common Eider	-	-	-	-	1	-	-	-	1	-
Harlequin	-	-	-	-	62	2	-	14	62	16
Red-breasted Merganser	-	-	-	-	6	-	8	-	14	-
Bald Eagle	-	-	-	-	2	2	-	-	2	2
Black Oyster-catcher	-	-	-	-	1	-	-	-	1	-
Rock Sandpiper	-	-	1	1	1	1	-	-	2	2
Glaucous-winged Gull	2	2	5	8	11	2	4	6	22	18
Ancient Murrelet	-	-	-	-	48	-	-	-	48	-
Horned Puffin	-	-	-	-	-	-	-	1	-	1
Winter Wren	1	1	2	5	9	4	3	18	15	28
Lapland Longspur	1	-	3	4	-	-	-	5	4	9
Snow bunting	3	1	-	4	4	3	-	3	7	11
Rosy finch	1	2	2	5	33	5	12	28	48	40
Sea Otter	1	-	-	-	7	1	3	2	11	3
Harbor Seal	-	-	-	-	2	-	-	2	2	2
Carcasses										
Arctic fox	-	-	-	-	1	-	-	-	1	-
Totals										
Birds	8	6	13	31	187	19	29	81	237	137
Mammals	1	-	-	-	9	1	3	4	13	5

Table 4. South Beach Surveys Conducted on Kiska Island 21 and 23 June 1986.

Wildlife Species	Stream mouth to Trout Lagoon # Obs.		Trout Lagoon # Obs.		Trout Lagoon to end of sand # Obs.		Rocky Beach to eagle nest # Obs.		Totals # Obs.	
	6/21	6/23	6/21	6/23	6/21	6/23	6/21	6/23	6/21	6/23
Pelagic cormorant	-	1	-	-	-	6	4	-	4	7
Cormorant Species	3	4	-	-	-	5	-	4	3	13
Mallard	-	-	2	-	-	-	-	-	2	-
Aleutian Green-winged Teal	-	-	-	4	-	-	-	-	-	4
Common Eider	42	23	-	-	-	-	-	1	42	24
Bald Eagle	2	2	-	-	-	-	1	3	3	5
Peregrine Falcon	-	-	-	-	-	-	1	1	1	1
Harlequin Duck	-	-	-	-	40	-	26	-	66	-
Rock Sandpiper	-	-	-	-	1	-	-	-	1	-
Glaucous-winged Gull	11	5	1	2	11	3	51	60	74	70
Ancient Murrelet	-	-	-	-	-	3	-	-	-	3
Siberian Rubythroat	-	-	-	-	2	-	-	-	2	-
Winter Wren	6	1	-	-	-	-	25	12	31	13
Lapland Longspur	1	4	3	1	1	1	-	-	5	6
Snow Bunting	1	-	-	-	-	-	1	3	2	3
Rosy Finch	2	2	-	-	-	2	6	17	8	21
Harbor Seal	-	-	-	-	-	-	16	15	16	15
Sea Otter	-	-	-	-	3	1	3	7	6	8
King Crab	-	1	-	-	-	-	-	-	-	1
Carcasses										
Northern Fulmar	-	-	-	-	-	1	-	-	-	1
Glaucous-winged Gull	-	-	-	-	1	-	-	-	1	-
Pigeon Guillemot	-	-	-	-	1	-	-	-	1	-
Sea Otter	-	-	-	-	-	1	-	1	-	2
Jelly Fish	-	32	-	91	-	11	-	3	-	137
King Crab	-	Parts	-	-	-	Parts	-	1	-	1
Totals										
Birds	68	42	6	7	55	20	115	101	244	170
Mammals	-	-	-	-	3	1	19	22	22	23
Others	-	1	-	-	-	-	-	-	-	1

Glaucous-winged gull observations on the beach surveys were less variable in 1986 than in 1985. In 1986 only 22 and 18 (average 20) gull observations were recorded on the north survey and only 74 and 70 (average 72) on the south survey. Larger numbers were observed in 1985 with 38 and 75 (average 56.5) gulls observed on the north and 209 and 24 (average 116.5) on the south survey (Deines 1986).

One glaucous-winged gull carcass was observed during the 1986 beach and nearshore boat surveys. As was the case in the nearshore boat surveys, the glaucous-winged gull observations showed a marked decline in 1986 compared with 1985. It would appear that either the glaucous-winged gull population of Kiska may have been impacted by the March 1986 baiting with Compound 1080 or that gull use patterns have changed on Kiska as a result of changes in fox competition. The decline in numbers observed on the nearshore boat and beach surveys indicate some possible negative impact. The gulls, however, could have been at some other part of the island in 1986 in reaction to the absence of fox. The actual cause of the decline in gull observations is unknown, but could be speculated to be the Compound 1080 baiting.

Bald eagle observations showed similar, but also opposite, results when comparing 1986 to 1985. In 1986, 2 and 2 (average 2) bald eagles were observed on the north and 3 and 5 (average 4) on the south survey. 1985's observations showed very similar results, but for the opposite beaches. In 1985, 7 and 0 (average 3.5) bald eagles were observed on the north and 2 and 2 (average 2) on the south survey. A more accurate picture of the bald eagle population will be determined during the March/April 1987 surveys. Observing bald eagle numbers and aeries from a helicopter is more complete and accurate than from a charter vessel 0.25 to 0.75 mi offshore, or from a bouncing inflatable boat.

Other wildlife species also showed some variability between the 1986 and 1985 beach surveys. As was also the case in the nearshore boat surveys, total waterfowl numbers and numbers of species were reduced in 1986. Only five waterfowl species were recorded in 1986 compared to six in 1985 (Deines 1986). In 1986, only 66 harlequin ducks were observed on the south survey compared to 606 in 1985 (Deines 1986), while on the north survey results were more similar with 78 observed in 1986 and 50 in 1985 (Deines 1986). As was also the case on the nearshore boat surveys, ancient murrelets were more numerous in 1986 than 1985. Three ancient murrelets were observed on the south survey in 1986 compared to zero in 1985 (Deines 1986), and on the north survey 48 were observed in 1986 compared to only 7 in 1985 (Deines 1986). Winter wrens showed a marked increase in observations in 1986 over 1985. Thirty-one and 13 (average 22) winter wrens were observed on the south beach survey in 1986 compared to only 7 and 6 (average 6.5) in 1985 (Deines 1986). The north beach survey also showed similar

results with 15 and 28 (average 21.5) observed in 1986 compared to only 13 and 4 (average 8.5) in 1985 (Deines 1985). The winter wrens may have returned to their preferred habitat of beaches, talus slopes and sea cliffs in response to the absence of fox or other variables might explain the differences. Only long term monitoring will provide better data. A pair of Siberian ruby-throats were observed on the south beach survey in 1986.

As with the other surveys, the weather and limited time impacted the results of the passerine surveys. The passerine transects were again conducted this year when the weather would not allow other work to be accomplished. The results, therefore, show some of the greatest variability of all the survey (raw data is contained in appendix). As indicated in Table 6, transects 4, 5, and 6 were conducted four times each; transects 1 and 2 were conducted three times each. Because of confusion on the layout and marking of transect #3, it was not conducted at all. Transect #3 is on the top of a bare ridge and it is not unusual for the ridge and the transect to be completely or partially fogged over making observation conditions difficult. Only the starting posts for transect #3 could be found. Transect #3 was subsequently re-posted with Carsonite posts every 150 meters or less depending on the visability of the previous post. The beginning post was also marked with the compass bearing 290° for the transect. Transect #6 was also re-posted with Carsointe posts to further define the transect route. Both ending poles of transect #6 were labled with their respective compass bearings (60°, 240°).

As shown in Table 5, passerine transect #1 yielded 6 different bird species which was a big change from 1985 when the lapland longspur was the only species recorded (Deines, 1986). Transect #1 again had the distinction of having the highest number of lapland longspurs observed of all the transects, plus the highest estimated mean density with 28 LaLo and 473.1 LaLo/100 ha compared to last years results of 30 LaLo and 178.7 LaLo/100 ha (Deines 1986).

The two transects in the disturbed upland habitat yielded 5 and 7 different bird species respectively. Transect #4 included lapland longspurs, rosy finches, rock ptarmigan, rock sandpipers, and snow buntings. Transect #5 which had the high of 7 different species recorded, also included the glaucous-winged gull and bald eagle. The rosy finch was the most abundant species observed this year on transect #4, while the lapland longspur, last year's most abundant species, was only the fourth most abundant species observed in 1986. On transect #5, the snow bunting and lapland longspur were again the most abundant species observed with estimated mean densities of 180 SnBu/100 ha and 84 LaLo/100 ha compared to last years figures of 164 SnBu/100 ha and 69.7 LaLo/100 ha (Deines 1986). Both transects showed a significant increase in observations over 1985.

Table 5. Summary and Mean Estimated Passerine Bird Densities by Habitat Type Base on Survey Results in Kiska Harbor Area, June 1986.

Transect #	Habitat Type	Date survey conducted and estimated bird densities/100 ha					
		6/20	6/22	6/25	6/27	100 ha	
1	Lowland	LaLo 662.3	LaLo 346.9	LaLo 410		473.1	LaLo
		GWGu 8.1				8.1	GWGu
		AGWT 157.7		157.7		157.7	AGWT
		RoFi		15.8		15.8	RoFi
		RoPt		3.8		3.8	RoPt
		RoSa	8.1	94.6		51.4	RoSa
2	Undisturbed Upland						
		LaLo 311.0	28.3	339.3	-	226.2	LaLo
		RoFi 56.6			-	56.6	RoFi
		RoPt 28.3			-	28.3	RoPt
		RoSa	28.3		-	28.3	RoSa
		GWGu		28.3	-	28.3	GWGu
6	Undisturbed Upland						
		LaLo 172.6	Lalo 43.2	LaLo 172.6	LaLo 86.3	118.7	LaLo
		RoFi 43.2				43.2	RoFi
4	Disturbed Upland						
		LaLo 6.45	LaLo 79.4	LaLo 211.5	LaLo 6.8	76.1	LaLo
		RoFi 211.6	RoFi 238.1	RoFi 79.4	RoFi 105.8	158.7	RoFi
		RoPt	26.5		185.2	105.9	RoPt
		RoSa 26.5	52.9	132.3		70.6	RoSa
		SnBu 105.8	105.8	26.5	132.3	92.6	SnBu
5	Disturbed Upland						
		LaLo 32.8	LaLo 164	LaLo 8.4	LaLo 131.2	84.1	LaLo
		RoFi 32.8	RoFi 131.2	RoFi 82.0		32	RoFi
		RoPt			65.6	65.6	RoPt
		RoSa	32.8	131.2		82	RoSa
		SnBu 65.6	262.4	196.8	196.8	180.4	SnBu
		GWGu	4			4	GWGu
		BaEa			32.8	32.8	BaEa

The final two transects were in the undisturbed upland habitat near Trout and Salmon Lagoons. The lapland longspur was again the most abundant species observed on both transects. Transect #2 showed a marked increase in lapland longspur observations, with an estimated mean density of 226.2 LaLo/100 ha compared to last years figure of 141.5 LaLo/100 ha (Deines 1986). Transect #6 yielded the fewest number of bird species recorded in 1986, with only the lapland longspur and the rosy finch observed. Transect #6 showed a slight decrease in the number of lapland longspurs from 1985 to 1986, but it also showed a slight increase in the number of rosy finches.

The lapland longspur and rosy finch were the only two species observed on all 5 transects. Two species were recorded on only one transect with the Aleutian green-winged teal recorded on transect #1 and the bald eagle recorded on transect #5. The Aleutian green-winged teal, bald eagle and glaucous-winged gull were new species recorded on the transects in 1986. The winter wren and semipalmated plover were the only species observed in 1985 but not observed in 1986. Winter wrens were very abundant, however, along the two beach transects. The change could be the result of the removal of foxes from the coastal scene (or entire island) which has enabled the winter wren to return to its preferred habitat of beach rocks, cliffs and talus slopes (summary of wildlife observations contained in appendix).

Two instances of fresh canine sign were found during passerine transects in the Kiska Harbor area. Two different fresh scat sets were found on an old WWII road within passerine transect #2. As was the case with the tracks found during the south nearshore boat and south beach survey, the scat appeared to be larger than those made by arctic fox. At least one crab boat, known to have a dog aboard, was at the Kiska Harbor area and around the island prior to and during the survey period. All signs were assumed to be from that dog, but Compound 1080 baits were placed around each set of sign as a precautionary measure. As shown in Figure 40, a total of 130 Compound 1080 SDB's were placed around the three sets of canine signs along the WWII road and around the Japanese sub pen area. A total of 140 SDB's were placed on the beaches along Mutt and Jeff Cove near the canine tracks.

A fox carcass was found in a tunnel by North Head near the Kiska Harbor camp. The carcass was starting to decay, but it had not been scavenged on.

Three bait weathering stations (with 24 SDB's in each station) were established in the Kiska Harbor area in March/April 1986. One station was placed in a sandy Elymus-grass habitat about 20 m above the outflow of the stream at the north end of Kiska Harbor. The other two bait weathering stations were placed about 60 m west and northwest of the northwest corner of the WWII "Rusty Arch" quonset hut used in the 1985 summer field

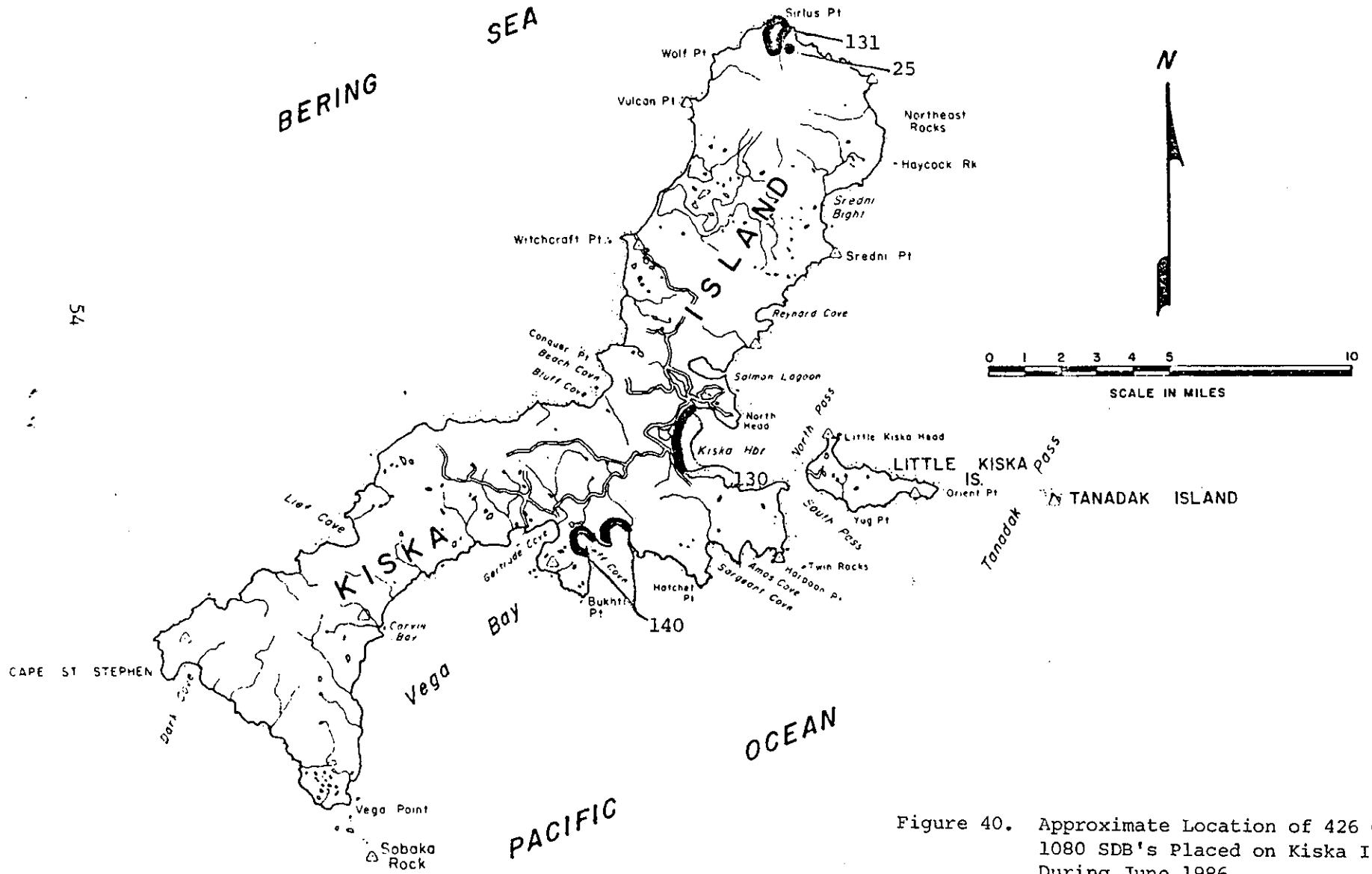


Figure 40. Approximate Location of 426 Compound 1080 SDB's Placed on Kiska Island During June 1986

study. One was placed on bare rocky soil and the other one was placed on a bed of mosses and lichens. Each station was constructed of wood and 1/2 inch welded wire and anchored to the ground with 1/4 inch polyrope and trap stakes. Six SDB's were taken from each station leaving 18 SDB's in each station to be picked up over the following months. The sample baits will be sent to DWRC for analysis. Each bait weathering station was marked with a Carsonite post and Compound 1080 poison warning sign. Poison warning signs were also located at the "Rusty Arch," fox burial site and on the main Kiska pier.

Setting up the camp near the Sirius Point auklet colony was considerably easier this year because of last year's experience (better prepared for the conditions encountered) and twice the number of people (8) assisting with setting up the camp. A 16 ft 2 x 6" "lumber crane" was erected atop the cliff. A single pulley and 1/4" poly rope were used to lift all gear to the top of the cliff. A quarter inch fish net with a draw string around the perimeter was used to encapsule all gear prior to lifting it to the top with the "crane." The net eliminated the need to tie all boxes and gear together before hauling them up the cliff. Wooden 4 x 4" stakes were used to anchor the "crane." The crane was disassembled after all the gear was lowered from the cliff following completion of work at Sirius Point. The material was staked down and left for the planned camp in June 1987.

Additional gear and storage space was required this year because four biologists stayed at Sirius Point (instead of on the vessel) during the two weeks on island. Additional tents were necessary to accommodate the additional gear. Five Omnipotents and one large dome tent were used. The dome tent and one Omnipotent were used solely for equipment storage and as a cook tent. The tents were placed in the same site as last year. Being better prepared, having additional assistance and experiencing good weather really made the camp set up much easier this year, but still required most of two days. The good weather and long hours allowed the auklet surveys to be duplicated this year even with the extremely condensed schedule.

Initial efforts in the Sirius Point auklet colony included setting up time-lapse cameras; relocating and marking surface count plots, and establishing a better trail marking system through the colony (for safety). On 20 June, two time-lapse cameras were set up in the old lava flow at the same location as in June 1985.

The two time-lapse (T/L) camera systems were the same type of equipment used last year (8 mm movie camera with batteries, intervalometer,, housed in a waterproof box with a solar panel on top). Unlike last year, the intervalometers were set for one frame every two minutes, instead of one every five minutes. This was possible due to the presence of an observer this year

to change film while conducting the surface count plots. This allowed an increase in the amount of data recorded by the camera. Film was initially installed in the two cameras on 6/20 and was changed about every two and one half days. The two cameras each used three rolls of film, with the last roll being completed on 29 June when the cameras were picked up.

This year, two additional T/L cameras were placed at new survey sites on the fringe of the new lava flow. T/L camera C3 was set and operated in the same manner as the original two in the old lava flow (2 frames/minute). The T/L camera system for survey site C4, however, did not function properly. The external intervalometer did not work and the clock's minute hand broke off. This camera was, therefore, set to take photographs each minute with its internal intervalometer. When it came time to change the film for these two camera systems on 28 June it was only placed in camera system C3, which had a good intervalometer and clock. Camera system C3 used two rolls of film with the last roll being completed on 29 June when the cameras were picked up. All of the T/L equipment was generously loaned to us by the Regional Office this year (as it was in 1985).

The results of the T/L camera photography for least and crested auklets on plots X-C1 and X1-C2 in the old lava flow are shown in Figures 41, 42, 43, and 44 and for least auklets on plot C3 in the new lava flow in Figure 45 (raw data contained in appendix). Analysis of the data from T/L camera C4 was not possible due to the broken clock. The auklet numbers from plot C4, however, did appear to be larger than on any of the other three T/L camera plots. The attendance pattern for both species of auklets was generally the same as in 1985 with three peak activity periods. The first major activity period was from sunrise to approximately 1000 and consisted almost solely of birds leaving the colony. The second peak period was from 1300 to 1600 with birds entering and leaving the colony. The third and final period was from 2300 to 2400 in the evening. The mean number of least and crested auklets recorded per 5 minute interval during the peak hour of the main afternoon activity period on T/L camera plot X-C1 was 2.86 and 0.12 birds respectively. This is the first year's data for this plot since the camera and clock malfunctioned in 1985. The mean number of least and crested auklets on T/L camera plot X1-C2 in June 1986 was 1.87 and 0.24 birds respectively recorded per 5 minute interval during the peak hour of the main afternoon activity period. This compares with 3.30 least auklets and 1.6 crested auklets recorded on this plot in 1985. T/L camera plot C3 established this year in the new lava flows recorded a higher mean number of least auklets per 5 minute interval during the peak hour of the main afternoon activity period than all other plots with 3.35 birds. It was not possible to analyze the data from T/L camera C4 in the new lava flow because the minute hand on the clock was broken. Cursory review of the film, however, appeared to show greater numbers

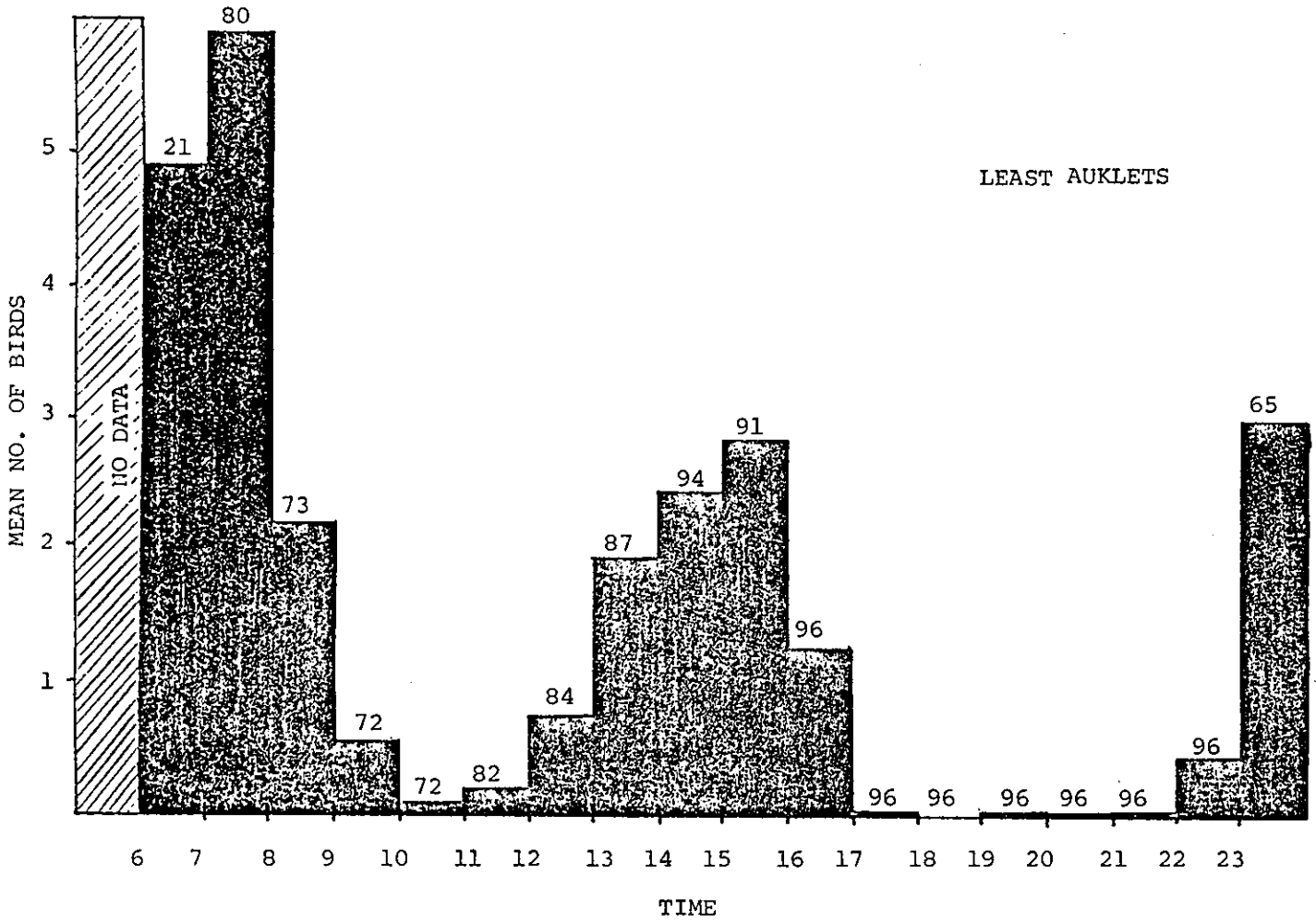


Figure 41. Daily attendance pattern of birds at Kiska Island from time-lapse photography on Plot X-C1, June 20 - 23, 23 - 25, and 25 - 29. Total number of 5-minute intervals per hour during which counts were made is indicated above each bar.

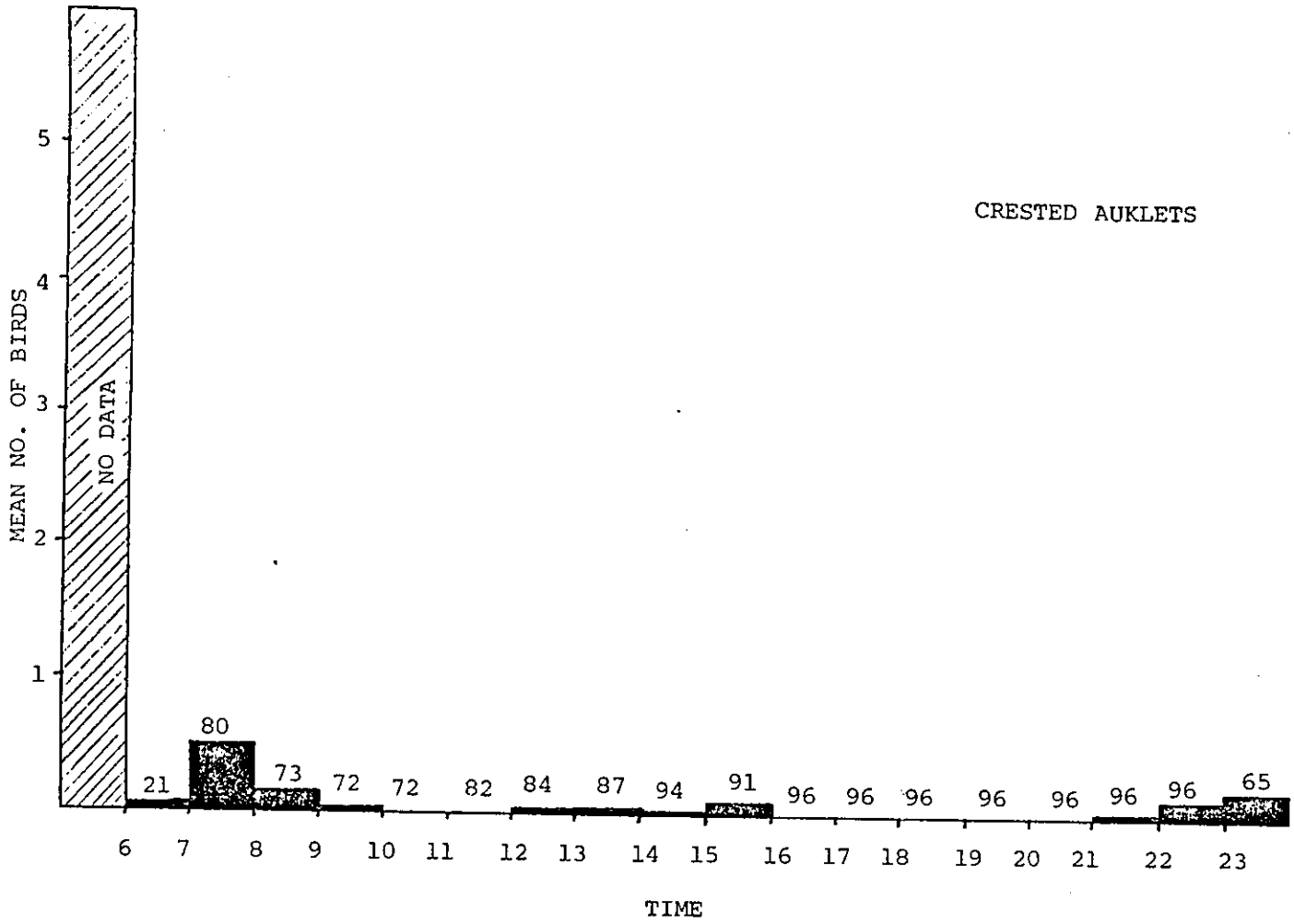


Figure 42. Daily attendance pattern of birds at Kiska Island from time-lapse photography on Plot X-C1, June 20 - 23, 23 - 25, and 25 - 29 Total number of 5-minute intervals per hour during which counts were made is indicated above each bar.

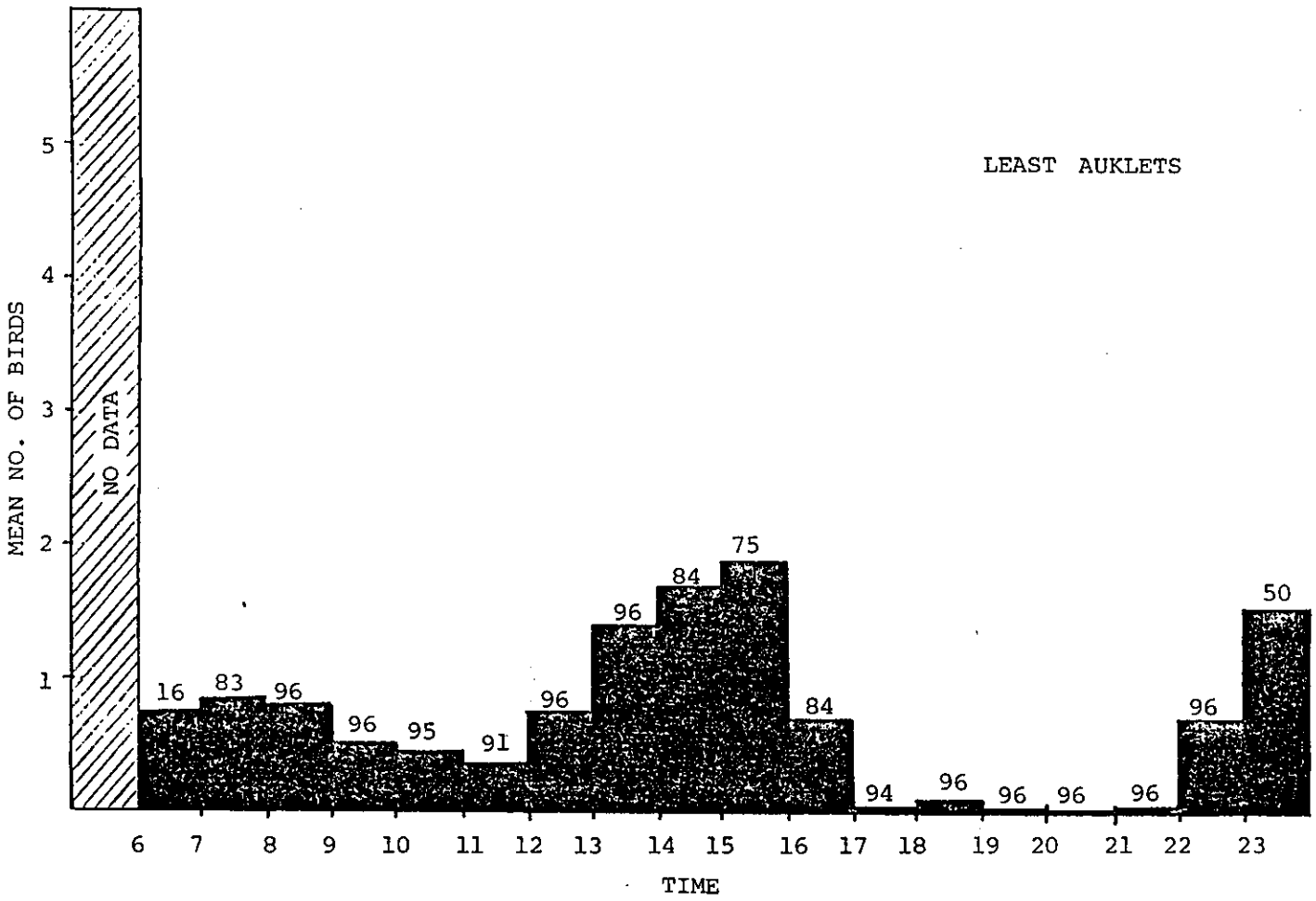


Figure 43. Daily attendance pattern of birds at Kiska Island from time-lapse photography on Plot X1-C2, June 20 - 23, 23 - 25, and 25 - 29. Total number of 5-minute intervals per hour during which counts were made is indicated above each bar.

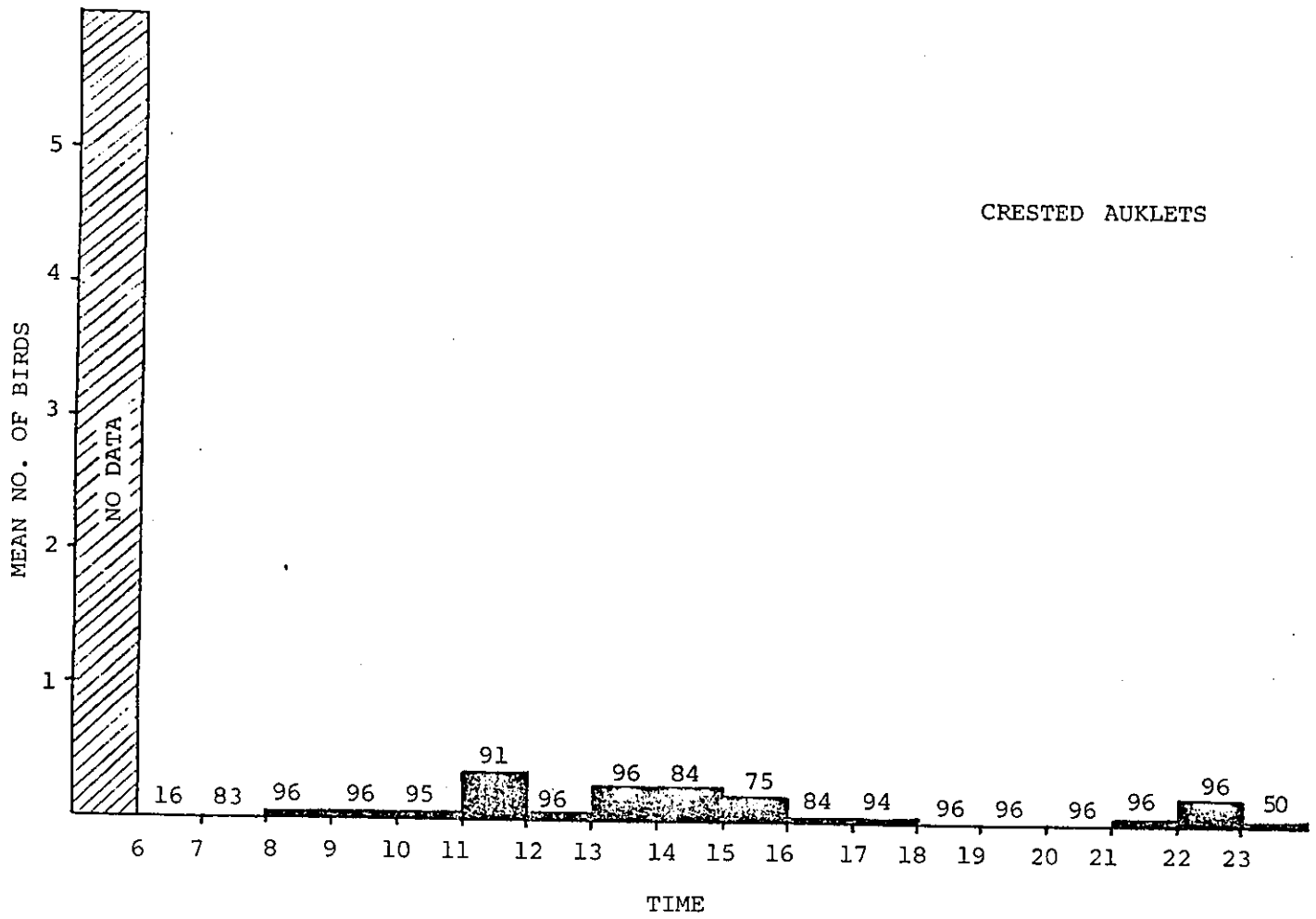


Figure 44. Daily attendance pattern of birds at Kiska Island from time-lapse photography on Plot X1-C2, June 20 - 23, 23 - 25, and 25 - 29. Total number of 5-minute intervals per hour during which counts were made is indicated above each bar.

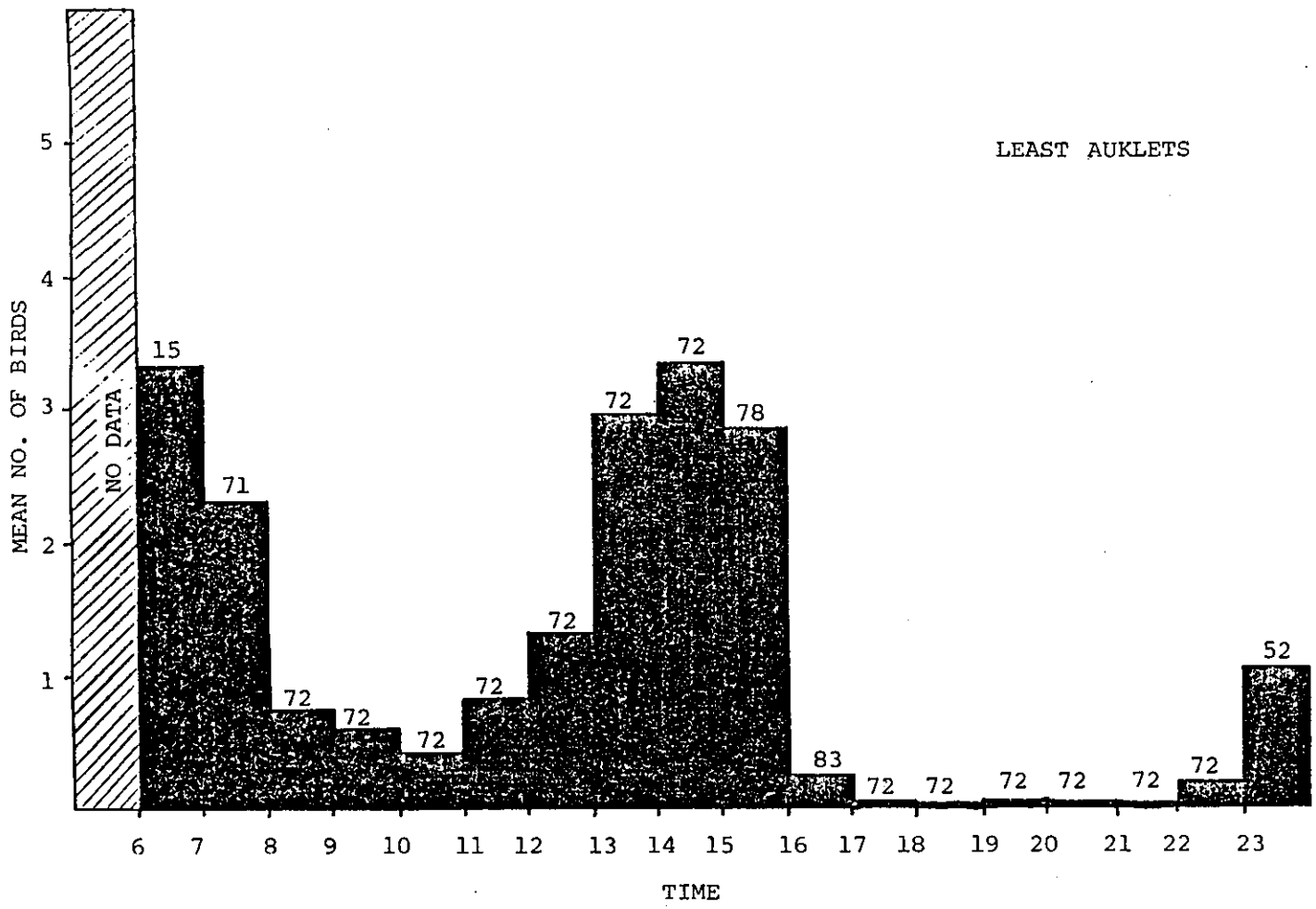


Figure 45. Daily attendance pattern of birds at Kiska Island from time-lapse photography on Plot C3, June 23-29. Total number of 5-minute intervals per hour during which counts were made is indicated above each bar.

of least auklets than was even recorded on plot C3. There were no measurable numbers of crested auklets recorded by either of T/L cameras in the new lava flow.

Each of the eleven surface count plots established in June 1985 were relocated and remarked. All existing poles within the plots and along the upper access trail were repainted with blaze orange paint. Several flagging ribbons were also attached to facilitate relocation of posts in the fog. In addition, all surface plot corners which were marked on rocks or vegetation in 1985 were remarked this year with either a half length or full post as needed to allow viewing from the observation point. Also, at least two new posts were installed along all trails between the surface plot groups. The routes were also marked with temporary surveyor's flags between the posts. In addition, a new trail from the ridge above camp to the lower plot group and on to the new lava flow was established and marked with posts and surveyor's flags.

Establishing the new trail from camp to the lower plot group resulted in shorter and safer access for biologists working the two lower plot groups. The use of additional posts and temporary surveyor's flags along all trails increased safe travel by biologists, especially in times of foul weather. The increased marking should also aid in relocation of the trails and plots in future years.

In 1985, three days of surface counts in the old lava flow were conducted on 27, 28, and 29 June. In 1986, six days of counts on the plots were conducted on 24, 25, 26, 28, 29, and 30 June. No counts were conducted on 27 June, as it was a weather day. All 1985 survey techniques were duplicated in 1986 (see appendix). The first day of surface plot counts concentrated on the eleven plots surveyed in 1985. On 25 June, one additional plot (#12) was established near plot #'s 4 and 5. The boundary for plot #12 was readjusted on 26 June, after the first count because one corner of the plot was too close to the observation point and almost a quarter of the plot could not be viewed by the observer.

As occurred last year from 0800 to 1000, there was a constant out-migration of both species of auklets from the colony. From 1000 to 1100; there were still constant flights of auklets, but in both directions. As shown in Tables 6 and 7, the earliest auklet landing in the plots was 1100 for least auklets on 28 June and 1115 for crested auklets on 30 June. This compares with 1115 for least and 1130 for crested auklets in 1985. The peak of activity for least auklets generally ranged from 1315 to 1545. The peak activity range for the crested auklet was more compressed and occurred later than for least auklets (from 1400 to 1530). These ranges of peak activity compare favorably to that recorded in 1985. The range for the five highest counts taken each day for least auklets in 1986 had a low of 0-10 in lot #9 on 25 June and a high of 22-45 on plot #1 on

Table 6. Surface auklet counts in old lava flow at Sirius Point, Kiska, including the range of beginning and ending times of auklets in plots, peak auklet activity in plots, highest auklet counts each day and the average of the five highest counts on 24, 25, 26, 28, 29 and 30 June 1986.

LEAST AUKLETS

Observers	Plots from Low to Hi Elevation	Range begin & end time auklet plot in June						Range Peak Activity in the Plots in June						Range Five Highest Count/Day in June						Average Five Highest Counts/Day in June					
		24	25	26	28	29	30	24	25	26	28	29	30	24	25	26	28	29	30	24	25	26	28	29	30
Joe McGrody	11	1300	1215	1115	1145	1115	1115	1500	1300	1315	1300	1245	1245	4-12	13-21	14-25	10-32	18-28	14-24	6.4	15.6	19.4	17.6	23.2	17.8
		1630	1600	1545	1630	1545	1615	1615	1600	1545	1530	1545	1545												
	10	1345	1330	1315	1300	1115	1115	1400	1330	1330	1300	1315	1330	9-17	8-15	7-23	13-23	8-24	12-27	13.2	11.6	14.4	18.6	17.0	18.0
		1615	1600	1545	1630	1600	1615	1615	1600	1545	1545	1545	1615												
	9	1345	1300	1330	1315	1245	1215	1345	1500	1415	1315	1315	1300	5-18	0-10	5-8	1-6	4-17	1-5	11.2	4.2	6.8	2.6	8.4	3.4
		1615	1600	1530	1430	1530	1615	1545	1600	1515	1430	1500	1400												
James Fuller	8	1230	1245	1145	1330	1315	1100	1300	1315	1315	1400	1400	1430	14-21	11-14	10-13	7-18	7-16	6-12	16.4	12.6	10.6	13.2	12.0	9.2
		1630	1615	1545	1515	1615	1645	1630	1515	1545	1500	1600	1615												
	7	1315	1330	1245	1345	1300	1315	1430	1400	1400	1345	1315	1430	6-16	2-10	2-10	3-8	4-9	4-12	11.0	4.4	5.8	5.2	6.0	7.6
		1630	1530	1530	1630	1630	1630	1600	1530	1500	1500	1545	1530												
	6	1300	1200	1130	1230	1130	1115	1500	1445	1415	1415	1315	1315	7-18	6-12	2-5	5-21	11-18	6-12	13.0	8.2	3.2	10.4	12.2	8.2
		1600	1600	1530	1645	1630	1630	1600	1530	1530	1500	1545	1515												
Fred Deines	5	1145	1130	1145	1100	1130	1030	1315	1245	1345	1215	1330	1245	24-41	17-27	18-31	18-24	20-29	19-31	34.8	22.0	25.8	20.6	22.4	23.6
		1645	1600	1600	1645	1700	1645	1630	1530	1545	1615	1645	1615												
	4	1115	1100	1115	1100	1145	1030	1300	1245	1330	1330	1415	1245	15-20	8-14	10-14	7-14	10-13	10-18	17.2	10.0	11.2	10.2	10.8	13.2
		1645	1545	1545	1630	1700	1645	1630	1530	1545	1615	1645	1645												
	12	*	1115	1115	1100	1200	1030	*	1245	1345	1315	1330	1245	*	25-39	12-21	16-20	18-20	21-29	*	31.4	16.0	17.4	18.6	23.8
		*	1545	1545	1645	1700	1630	*	1530	1545	1615	1700	1615												
Davey Adams	3	1230	1145	1130	1115	1145	1100	1345	1215	1430	1330	1300	1115	15-20	17-31	4-27	22-27	15-30	17-23	17.8	20.6	10.8	24.4	22.0	20.2
		1645	1515	1500	1615	1630	1600	1630	1430	1500	1530	1530	1445												
	2	1230	1145	1130	1115	1130	1100	1430	1245	1345	1130	1200	1130	18-23	22-37	9-16	24-30	18-40	21-34	20.6	31.4	11.0	27.0	28.0	27.2
		1645	1530	1530	1615	1630	1615	1645	1515	1500	1515	1530	1500												
	1	1230	1145	1230	1115	1130	1100	1430	1200	1415	1230	1200	1100	28-36	23-30	4-18	26-37	22-45	31-39	31.8	26.2	10.2	29.2	31.2	34.6
		1700	1530	1500	1615	1615	1600	1645	1515	1430	1615	1530	1500												

* Plot #12 was not established until June 25th 1986.

Table 7. Surface auklet counts in old lava flow at Sirius Point, Kiska, including the range of beginning and ending times of auklets in plots, peak auklet activity in plots, highest auklet counts each day and the average of the five highest counts on 24, 25, 26, 28, 29 and 30 June 1986.

CRESTED AUKLETS

Observers	Plot from Low to Hi elevation	Range Begin & End Time auklet plot in June						Range peak activity in the plots in June						Range Five Highest Counts/Day in June						Average Five Highest Counts/Day in June					
		24	25	26	28	29	30	24	25	26	28	29	30	24	25	26	28	29	30	24	25	26	28	29	30
Joe McGrady	11	1515	1315	----	1230	1400	1400	1515	1315	----	1230	1400	1400	0-1	0-1	0	0-5	0-1	0-3	.2	.2	0	1.8	.6	.6
		1515	1315	----	1500	1500	1400	1515	1315	----	1500	1415													
	10	----	1430	----	1500	1400	----	----	1430	----	1500	1400	----	0	0-1	0	0-1	0-1	0	0	.2	0	.2	.2	0
			1430		1500	1400																			
	9	----	----	----	----	----	1215	----	----	----	----	----	1215	0	0	0	0	0	0-1	0	0	0	0	0	.2
							1215																		
James Fuller	8	1330	----	----	----	----	----	1330	----	----	----	----	----	0-1	0	0	0	0	0	.2	0	0	0	0	0
		1330																							
	7	----	----	----	----	----	----	----	----	----	----	----	----	0	0	0	0	0	0	0	0	0	0	0	0
	6	----	----	----	----	----	----	----	----	----	----	----	----	0	0	0	0	0	0	0	0	0	0	0	0
Fred Deines	5	1415	----	1345	----	1500	----	1500	----	1345	----	1500	----	0-2	0-4	0	0	0-3	0	1	0	.2	0	.4	0
		1600		1345		1500		1600																	
	4	1215	1345	1500	1415	1300	1130	1430	1345		1415			3-5	0	0-1	0-1	0-2	0-1	3.8	1.6	.8	.4	.8	.6
		1600	1545	1545	1500	1545	1500	1600	1430	1515	1500	1300	1130	*	0	0-3	0-1	0	0-2	*	0	0	.2	0	.8
	12	*	----	----	1500	----	1315	*	----	----	1500	----	1315												
					1500		1530						1330												
Davey Adams	3	1530	1200	1500	1200	1300	1115		1200		1600	1400	1415	0-1	0-1	0-1	1-7	1-4	3-7	.4	.6	.2	2.2	2.2	4.6
		1545	1415	1500	1615	1615	1530	1530	1315	1500	1615	1615	1530												
	2	1545	1315	----	1300	----	1130				1415		1200	0-3	0-2	0	1-4	0	2-7	.6	.4	0	2.2	0	3.4
		1545	1315		1545		1600	1545	1315	----	1445	----	1245												
	1	----	1345	----	1345	1415	----	----	1345	----	1345		----	0	0-2	0	0-1	0-1	0	0	.4	0	.4	.2	0
			1345		1345	1415					1600	1415													

* Plot #12 was not established until June 25, 1986.

29 June. In 1985 the low count was 0-5 on plot #11 and the high count was 55-83 on plot #4. Although occurring on different specific plots in 1985, the higher number ranges of least auklets occurred in the upper two plot groups and the lower number ranges on the lower two plot groups for both 1985 and 1986. The crested auklets' range in 1986 for the five highest counts taken each day is considerably lower than for least auklets, with a low of 0-1 recorded on all plots at least once and a high of only 3-7 and 3-5 recorded on plots 3 and 4 on 30 June and 24 June, respectively. The range of the five highest count days for least auklets in 1986 is lower than in 1985 and about the same in both years for crested auklets. The average for the five highest counts for both least and crested auklets is down slightly in all plots from 1985. This difference in numbers is most likely due to some slight difference in the nesting phenology between the two years and just normal variation in colony attendance.

The average for the five highest counts for each day on least and crested auklets in each plot is shown in Table 8. Those figures will serve as the basic population index for both species of auklets and will be used to compare with future years after arctic fox are removed from Kiska. The average for all the plots censused each of the six days for least auklets was 17.5, 16.5, 12.1, 16.4, 17.6, and 17.2 birds, respectively, and for crested auklets was .6, .3, .1, .6, .4, and .85 birds, respectively. The 1986 averages for all the plots is considerably lower than the three days of surveys in 1985 (23.4, 34.2, and 32.5 for least auklets and .7, 1.0, and 1.1 for crested auklets). The differences in numbers, although significant, probably represent nothing more than annual variation. With only two years of survey data, it is difficult to determine if either year is unusually high or low.

It is interesting that the number of crested auklets was low again this year. As was noted in 1985, there are few large landing rocks within the plots. The extreme low number of crested auklets, however, becomes interesting when compared with data from the 1978 surveys when crested auklets out numbered least auklets by a five to one ratio in the old lava flow (Day et al. 1979). The later timing of the 1978 survey may explain the difference since least auklets fledge slightly earlier than crested auklets.

Two other things should be noted in the raw data for the 1986 surface counts in the old lava flow (see appendix): 1) the presence of natural avain predators (glaucous-winged gulls, bald eagles and peregrine falcons), and 2) the absence of introduced arctic fox this year. The presence of any or all of these predators in or near a plot affects the number of birds counted. A simple fly over by any of the three avain predators causes all the auklets within the general area to leave.

Table 8. Highest five daily surface counts of least and crested auklets and average index figure for each plot in the old lava flow at Sirius Point auklet colony, Kiska Island, 24-30 June 1986.

		Day 1 (6-24-86)		Day 2 (6-25-86)		Day 3 (6-26-86)		Day 4 (6-28-86)		Day 5 (6-29-86)		Day 6 (6-30-86)		Summary Average Index for 6 Days	
		5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts	5 Hi Counts		
Observers	Plot #	Least Auk	Crest Auk	Least Auk	Crest Auk	Least Auk	Crest Auk	Least Auk	Crest Auk	Least Auk	Crest Auk	Least Auk	Crest Auk	Least Auk	Crest Auk
Joe McGrody	11	12,7,5,4,4	1,0,0,0,0	21,16,15,13,13	1,0,0,0,0	25,21,20,17,14	0,0,0,0,0	32,20,13,13,10	5,3,1,0,0	28,26,24,20,18	1,1,1,0,0	24,16,16,16,14	3,0,0,0,0	16.33	0.57
Joe McGrody	10	17,15,13,12,9	0,0,0,0,0	15,13,12,10,8	1,0,0,0,0	23,18,14,10,7	0,0,0,0,0	23,20,20,17,13	1,0,0,0,0	24,21,17,15,8	1,0,0,0,0	27,23,15,13,12	0,0,0,0,0	15.47	0.10
Joe McGrody	9	18,14,13,6,5	0,0,0,0,0	10,9,2,0,0	0,0,0,0,0	8,7,7,7,5	0,0,0,0,0	6,3,2,1,1	0,0,0,0,0	17,8,8,5,4	0,0,0,0,0	5,5,3,3,1	1,0,0,0,0	6.10	0.03
Jim Fuller	8	21,17,16,14,14	1,0,0,0,0	14,13,13,12,11	0,0,0,0,0	13,10,10,10,10	0,0,0,0,0	18,15,13,13,7	0,0,0,0,0	16,15,12,10,7	0,0,0,0,0	12,10,9,9,6	0,0,0,0,0	12.30	0.03
Jim Fuller	7	16,14,10,9,6	0,0,0,0,0	10,4,3,3,2	0,0,0,0,0	10,8,5,4,2	0,0,0,0,0	8,7,4,4,3	0,0,0,0,0	9,7,6,4,4	0,0,0,0,0	12,9,8,5,4	0,0,0,0,0	6.67	0.00
Jim Fuller	6	18,16,14,10,7	0,0,0,0,0	12,10,7,6,6	0,0,0,0,0	5,3,3,3,2	0,0,0,0,0	21,11,8,7,5	0,0,0,0,0	14,12,12,12,11	0,0,0,0,0	12,9,8,6,6	0,0,0,0,0	9.20	0.00
Fred Deines	12	*	*	39,35,31,27,25	0,0,0,0,0	21,17,16,14,12	0,0,0,0,0	20,19,16,16,16	1,0,0,0,0	20,19,18,18,18	0,0,0,0,0	29,24,23,22,21	2,1,1,0,0	21.44	0.20
Fred Deines	5	41,39,36,34,24	2,1,1,1,0	27,24,22,20,17	0,0,0,0,0	31,30,25,25,18	1,0,0,0,0	24,21,20,20,18	0,0,0,0,0	29,21,21,21,20	2,0,0,0,0	31,26,22,20,19	0,0,0,0,0	24.87	0.27
Fred Deines	4	20,18,17,16,15	5,4,4,3,3	14,10,10,8,8	4,2,1,1,0	14,11,11,10,10	3,1,0,0,0	14,12,10,8,7	1,1,0,0,0	13,11,10,10,10	2,1,1,0,0	18,14,13,11,10	1,1,1,0,0	12.10	1.33
Davey Adams	3	20,19,18,17,15	1,1,0,0,0	31,19,19,17,17	1,1,1,0,0	27,10,8,5,4	1,0,0,0,0	27,26,24,23,22	7,1,1,1,1	30,26,20,19,15	4,2,2,2,1	23,23,20,18,17	7,5,4,4,3	19.30	1.70
Davey Adams	2	23,22,20,20,18	3,0,0,0,0	37,36,32,30,22	2,0,0,0,0	16,11,10,9,9	0,0,0,0,0	30,29,26,26,24	4,2,2,2,1	40,32,29,21,18	0,0,0,0,0	34,32,27,22,21	7,3,3,2,2	24.20	1.10
Davey Adams	1	36,33,32,30,28	0,0,0,0,0	30,29,25,24,23	2,0,0,0,0	18,16,8,5,4	0,0,0,0,0	37,31,26,26,26	1,1,0,0,0	45,32,31,26,22	1,0,0,0,0	39,36,35,32,31	0,0,0,0,0	27.20	0.17

* Plot #12 was not established until June 25, 1986.

In 1986 a total of 254 disturbances to the auklets were observed in the colony at Sirius Point. The two most common disturbances came from glaucous-winged gulls and unknown disturbances, which accounted for 95 and 123 disturbances, respectively (Table 9). Bald eagles were the next most prevalent cause of disturbance with 34 occasions, followed by peregrine falcons with two disturbances. All three avian predators were observed taking auklets out of the air while observers counted plots (Figure 46).

Table 9. Summary of predator disturbance to least and crested auklets during six days of survey in surface plots in Old Lava Flow, Sirius Point, Kiska Island on 24, 25, 26, 28, 29, and 30 June 1986.

	PREDATORS						
Plot #'s	Glaucous-winged gulls	Peregrine Falcon	Bald Eagle	Arctic Fox	Unknown Dist.*		Totals
1, 2, 3	15	0	12	0	11	=	38
4, 5, 12	23	2	13	0	69	=	107
6, 7, 8	20	0	5	0	17	=	42
9, 10, 11	37	0	4	0	26	=	67
TOTAL	95	2	34	0	123	=	254

* something caused the birds to fly.

In 1985 the most common known disturbance was also from glaucous-winged gulls. The gull accounted for 46% of the observed disturbances over the plots in 1985 and 37% in 1986. Bald eagles caused a disturbance 8% of the time in 1985 and 13% in 1986. The most important difference between 1985, when fox were present, and 1986, with a total absence of fox, was the loss of the 37% fox disturbance factor recorded in 1985. If the surrounding areas were also considered, the arctic fox was the most prevalent predator observed in the colony in 1985, accounting for 65% of all disturbances. The complete absence of fox, fresh sign, or dens speaks well of the potential success of the Kiska Compound 1080 baiting in March 1986.

As in 1985 the ratio of juvenile (1 or 2 years old) to adult least auklets (Figure 47) was observed at least once an hour during the surface counts using plumage characteristics (Bedard and Sealy 1983). This was not done on all of the plots due to observation conditions or the experience of the observer in separating the birds by age class. This data was not collected for crested auklets because of their low numbers within the plots. The counts for the juvenile/adult ratio for least auklets produced the results indicated in Table 10.

Figure 46. Least Auklet in Old Lava Flow at Sirius Point Auklet Colony Keeping a Watchfull Eye Out For Avian Predators

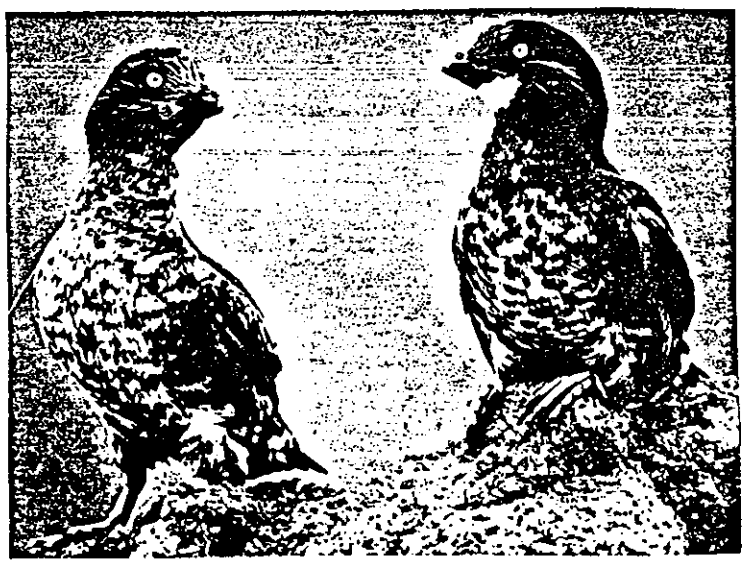


Figure 47. Two Year Old Juvenile (Left) and Adult (Right) Least Auklet Observed in Old Lava Flow of Sirius Point Auklet Colony

Table 10. Average juvenile/adult ratio for least auklets within the surface plots of the Old Lava Flow on the Sirius Point auklet colony, Kiska, June 1986.

Plot#	June 24	June 25	June 26	June 28	June 29	June 30	Avg. ratio per plot
1	2.88/ (.404)* /4.25	3.33/ (.435) /4.33	4.33/ (.722) /1.67	2.83/ (.265) /7.83	3.55/ (.310) /7.91	3.93/ (.362) /6.93	3.47/5.49
2	2.8/ (.264) /7.8	4.33/ (.382) /7.0	5.0/ (.833) /1.0	3.0/ (.429) /4.0	4.0/ (.571) /3.0	----------	3.83/4.56
3	3.0/ (.329) /6.11	3.63/ (.358) /6.5	4.0/ (.500) /4.0	3.57/ (.338) /7.0	3.0/ (.293) /7.25	3.67/ (.380) /6.0	3.48/6.14
4	2.5/ (.174) /11.9	3.4/ (.227) /11.6	2.0/ (.142) /12.1	3.0/ (.218) /10.75	2.8/ (.196) /11.5	3.0/ (.191) /12.7	2.78/11.76
5	3.0/ (.196) /12.3	----------	4.5/ (.243) /14.0	3.7/ (.298) /8.7	1.0/ (.877) /.14	2.2/ (.157) /11.8	2.88/9.39
12	NOT AVAILABLE	----------	3.0/ (.214) /11.0	----------	----------	2.8/ (.183) /12.5	2.9/11.75
6	2.3/ (.479) /2.5	1.3/ (.391) /2.2	0/ (0.0) /2.0	.6/ (.194) /2.5	2.2/ (.400) /3.3	2.3/ (.455) /2.75	1.45/2.54
7	----------	2.5/ (.500) /2.5	.7/ (.130) /4.7	1.75/ (.318) /3.75	2.5/ (.500) /2.5	1.5/ (.375) /2.5	1.79/3.19
8	2.0/ (.533) /1.75	3.2/ (.471) /3.6	2.7/ (.365) /4.7	4.0/ (.400) /6.0	5.0/ (.417) /7.0	1.8/ (.310) /4.0	3.12/4.51
9	0/ (0.00) /3.5	----------	----------	----------	----------	----------	0/3.5
10	.4/ (.061) /6.2	----------	----------	----------	----------	----------	.4/6.2
1	1.0/ (.374) /1.67	2.8/ (.241) /8.8	2.4/ (.222) /8.4	3.83/ (.451) /4.67	6.75/ (.675) /3.25	9.2/ (.754) /3.0	4.33/4.96
Avg. ratio per day	1.99/ (.255) /5.8	3.06/ (.345) /5.82	2.86/ (.310) /6.36	2.92/ (.323) /6.13	3.42/ (.402) /5.09	3.38/ (.328) /6.91	2.53/6.16

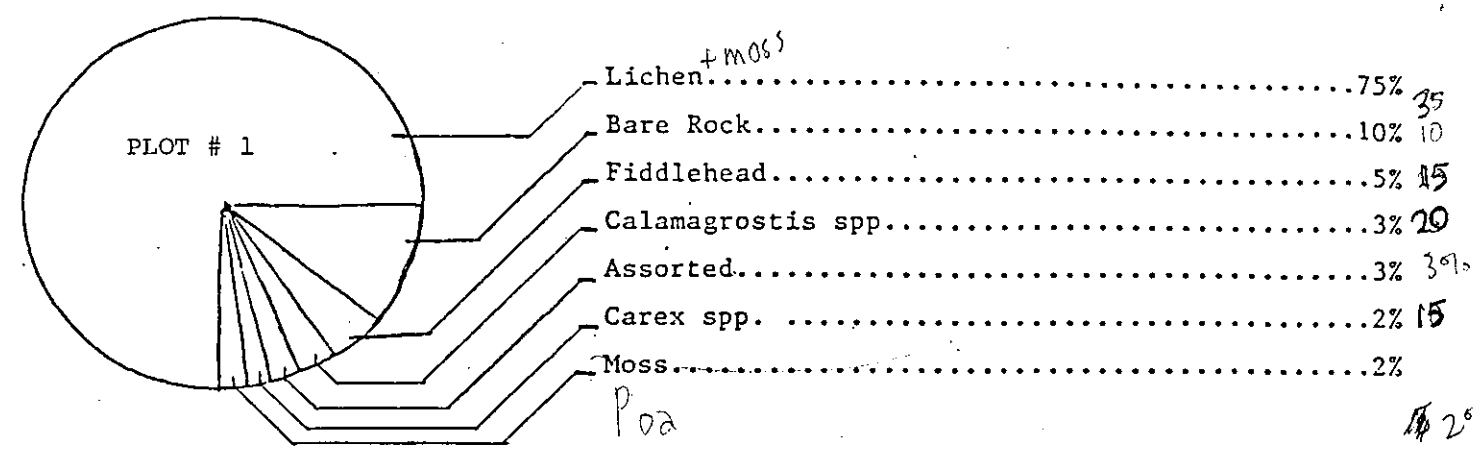
* Percent juvenile

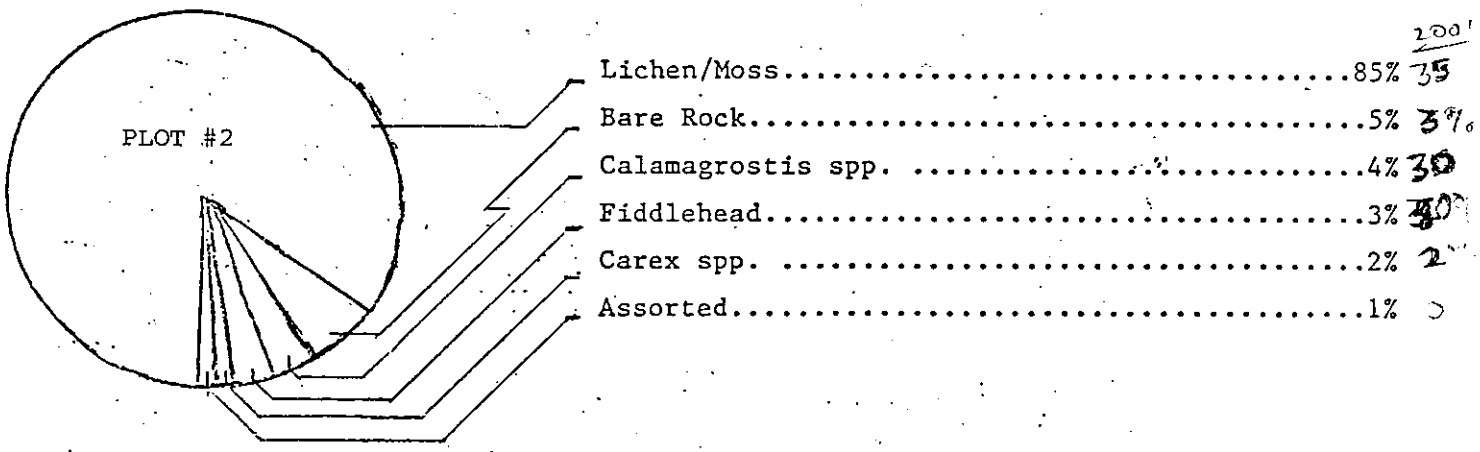
The percentage of juvenile least auklets on the surface plots ranged from a low of zero percent to a high of about 87 percent. The average for all of the plots censused during each of the six days was 25%, 34%, 31%, 32%, 40% and 32% juveniles/adult least auklets. The average for all six days was 32%. In 1985 the average of all the plots surveyed during each of the three days was 12.9%, 9.4%, and 14.2% juveniles/adult least auklets. The average for all three days was 12.2%. The 1986 juveniles/adult ratio of least auklets was considerably higher than in 1985. This particular survey, however, was the most difficult one attempted in the auklet colony. There was again great variablility in the ability or perceived ability to recognize the age classes of least auklets. The results, therefore, should be considered somewhat skeptically.

The major vegetational components of all the surface plots were identified and their extent of coverage of each plot was visually estimated (Figures 48, 49, 50, 51). Lichens or lichens and moss are the two dominant vegetation types in the upper two plot groups. Calamagrostis grass is the dominant species on the lower two plot groups. The grass would suggest that these two plot groups are in a more mature area of the lava flow (better soil). The lower numbers of auklets observed in the two lower plot groups would also suggest this. The limited time available in June 1986 precluded a more detailed evaluation of the vegetation within the surface count plots.

While conducting surface counts on plots 4, 5, and 12 in the old lava flow, a 35mm camera equipped with B&W film ASA 125 pushed to 400 and a 80-200 zoom lens was used to document the number of auklets on a major landing rock due south of the observation point. Photo's were taken of the rock every 5 minutes, functioning similar to the T/L camera program (data in appendix). The photographs were evaluated for least auklets only since the numbers of crested auklets on the rocks were too low to allow meaningful analysis. Least auklet attendance began on the target rock at 1100, averaging 2.3 birds/hr observed, with a dramatic increase at 1300 to more than 6 birds observed/hr, and peaked at 1600 with 7.4 birds observed/hr (Figure 52). A similar attempt to survey plot number 5 using this method failed because of the distance and small size of the subjects. When the film was enlarged, it was impossible to accurately discern the difference between birds and rocks.

After disassembling the Sirius Point camp and loading it aboard the charter vessel, a stop was made at Sredni Bight to investigate the mature lava flow there (Figure 53) and check for auklet and/or fox activity. The lava flow was documented and mapped from the helicopter during the work on Kiska in March and April 1986, but no ground search was conducted at that time. During the June 1986 work, several rafts of auklets were thought to have been observed flying over that area during their afternoon and evening activity periods. On 02 July, all





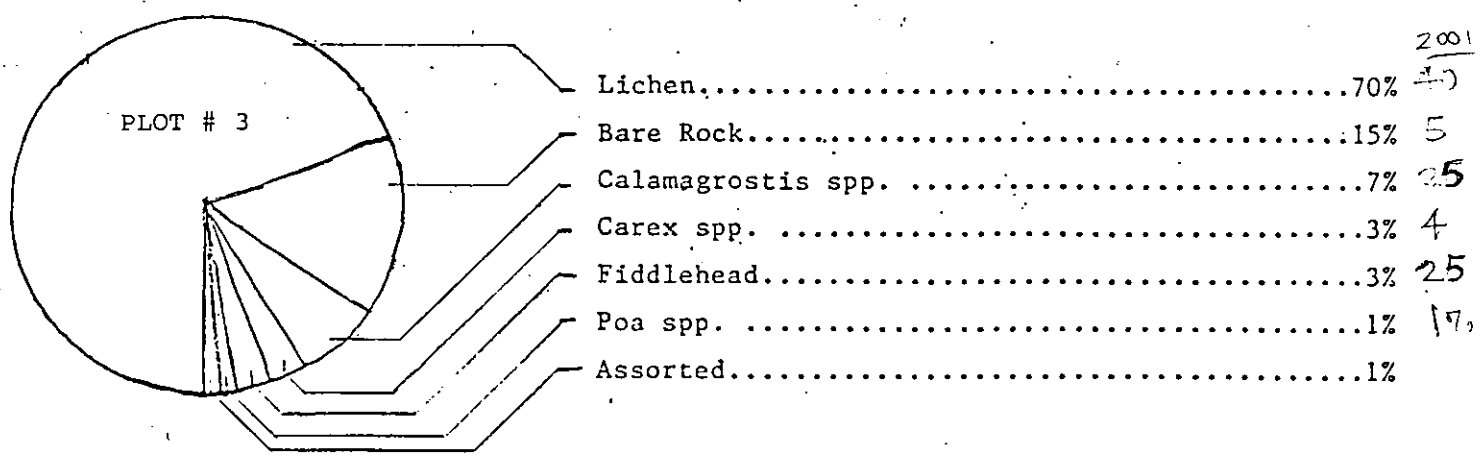
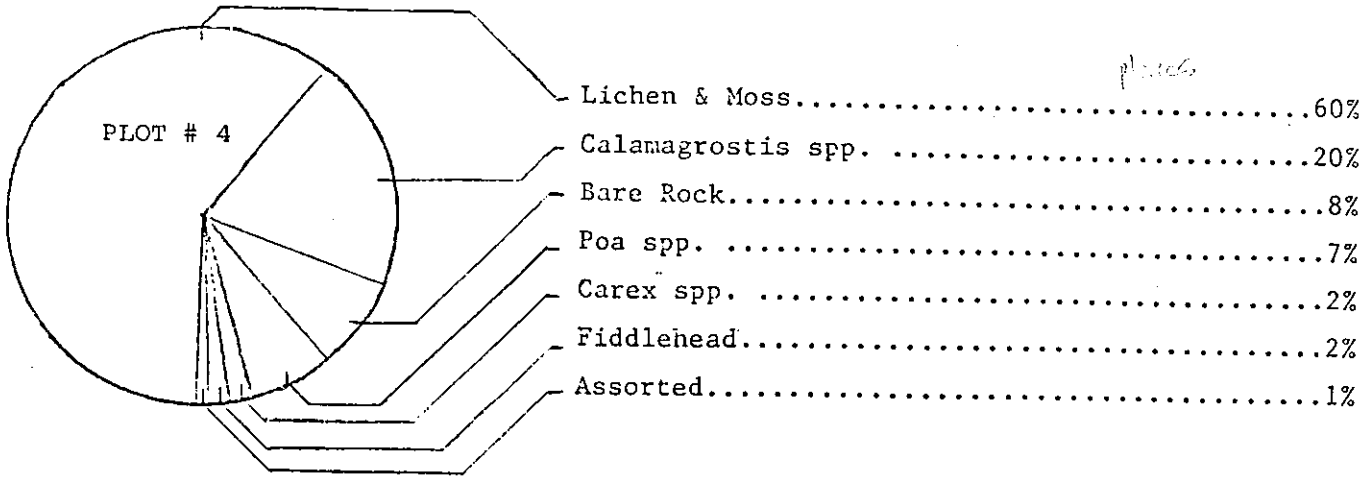
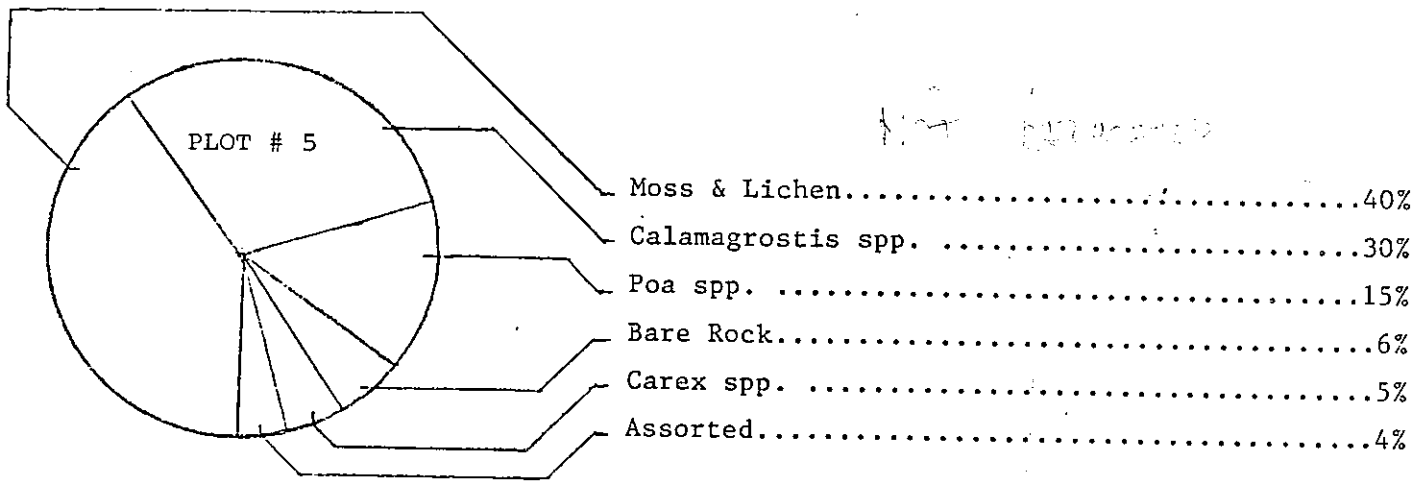


Figure 48. Major Vegetation Components Within Surface Count Plots 1,2 and 3 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island (Visual Estimates) June 1986





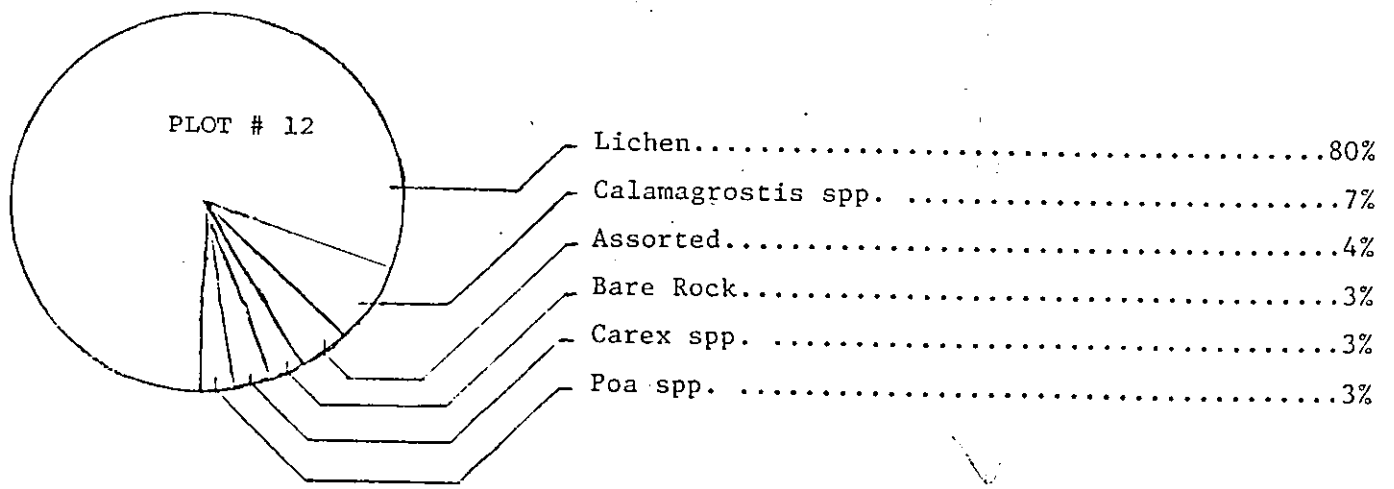


Figure 49. Major Vegetation Components Within Surface Count Plots 4, 5, and 12 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island (Visual Estimates) June 1986

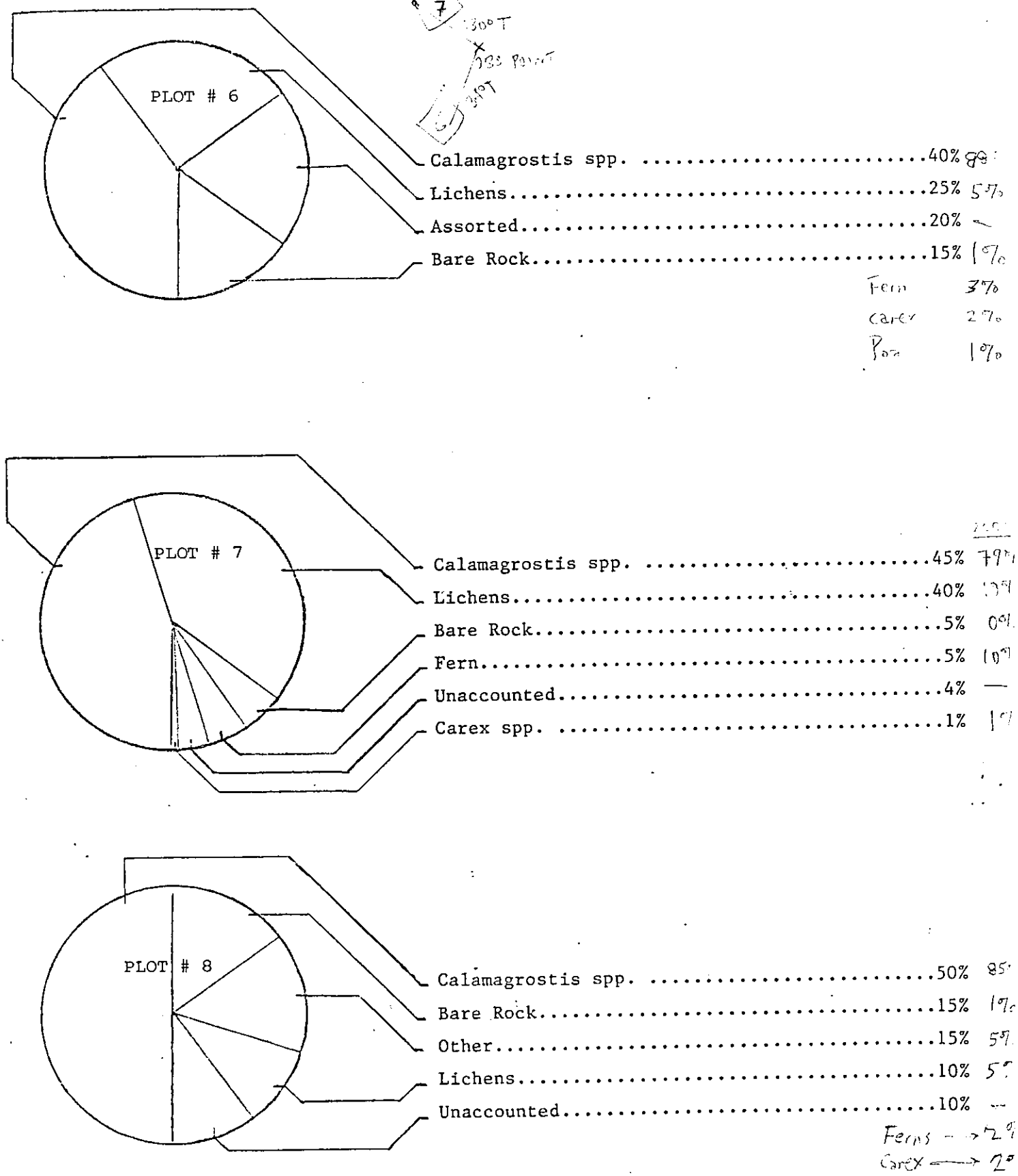


Figure 50. Major Vegetation Components Witnin Surface Count Plots 6, 7 and 8 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island (Visual Estimates) June1986

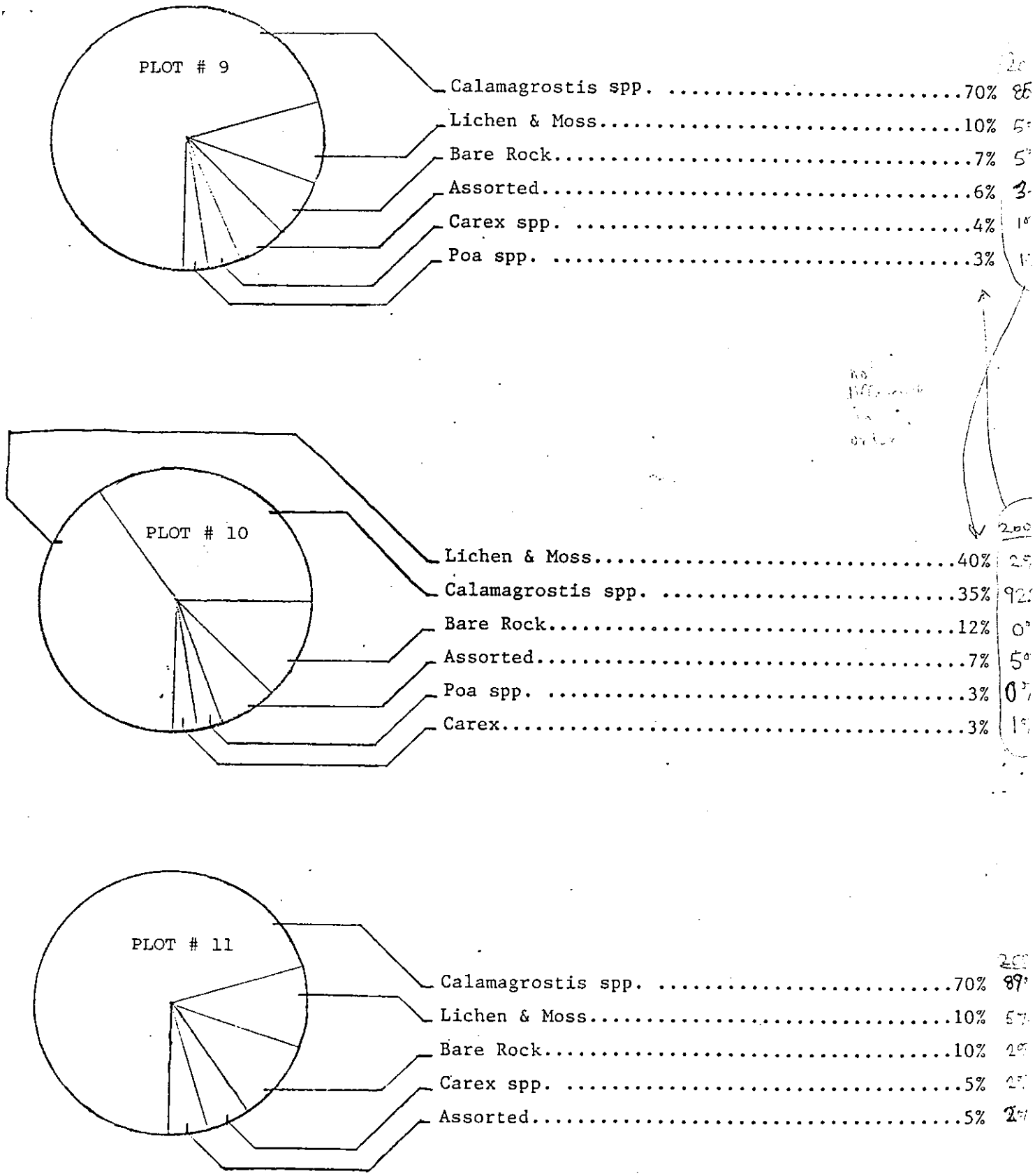


Figure 51. Major Vegetation Components Within Surface Count Plots 9, 10 and 11 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island (Visual Estimates) June1986

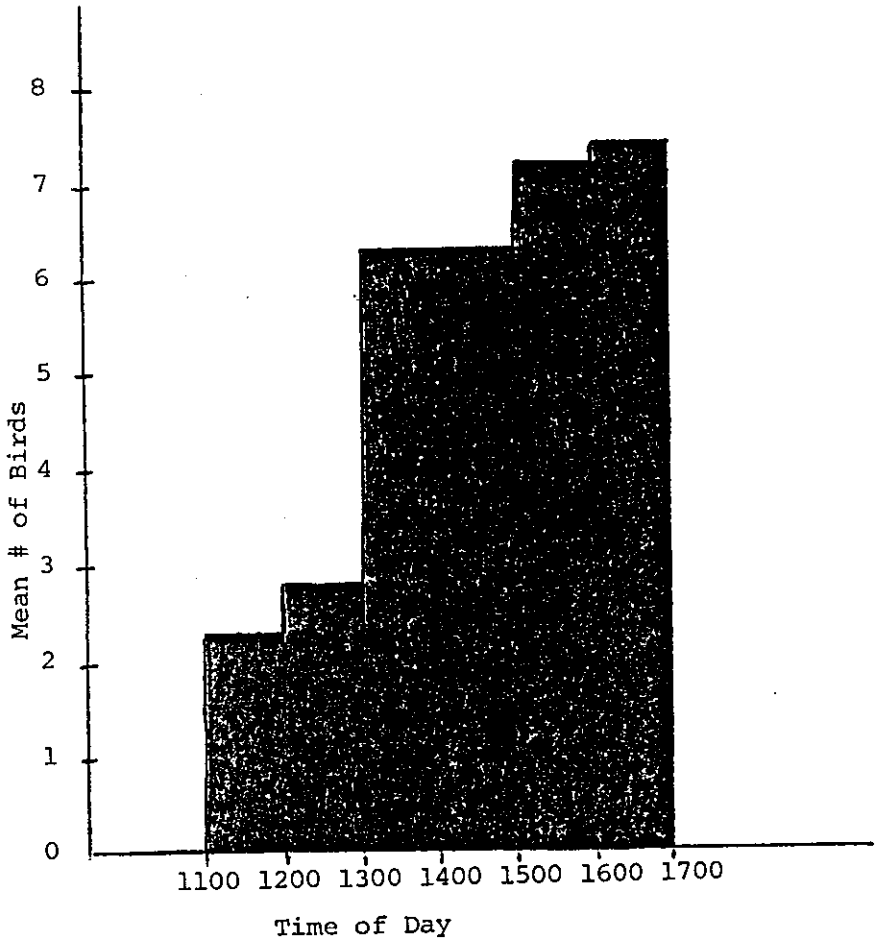


Figure 52. Daily Attendance Pattern of Least Auklets on Major Landing Rock Due South of Observation Point for Plots 4, 5 and 12 in Old Lava Flow at Sirius Point Auklet Colony, Kiska Island From 35mm Photography, June 29 and 30, 1986

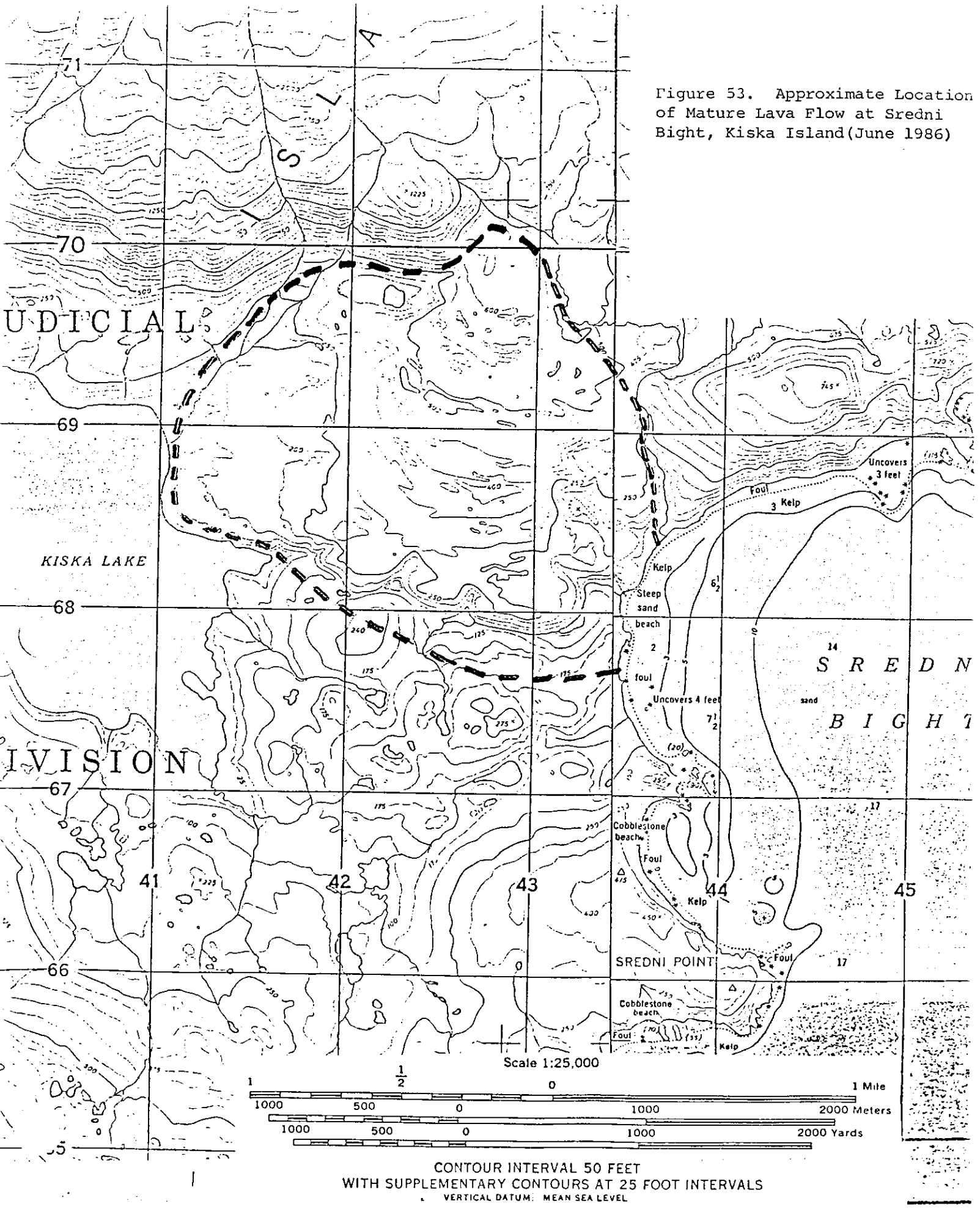


Figure 53. Approximate Location of Mature Lava Flow at Sredni Bight, Kiska Island(June 1986)

crew members landed on the shore and split into two groups of four each. The Sirius Point crew searched the northside of the lava flow up to the base of Kiska Volcano. The Kiska Harbor crew searched the southside of the lava flow and the west end to East Kiska Lake. The lava flow was overgrown with a thick mat of vegetation and most of the crevices were also overgrown with vegetation. No sign of fresh or recent auklet or fox activities were found. Very little old auklet or fox sign was even found. Several baits from the drop in March and April 1986 were found in the mature lava flow. It is thought that it has been many years since that lava flow has had any major auklet activity.

RECOMMENDATIONS

1. That survey work on Kiska Island encompass the entire month of June as initially planned to allow maximum replication of surveys at times similar to the schedule when established in 1985.

2. That the charter vessel schedule be flexible enough to allow for additional time at Kiska for camp setup, disassembly and additional survey time. Additional time would also allow scheduling adjustments for weather.

3. That eight observers again work the Kiska surveys in the summer of 1987 and be divided into camps of four observers located at Kiska Harbor and four observers located at the Sirius Point auklet colony.

4. That all surveys established in 1985 be replicated in 1987 to the maximum extent permissible.

5. That the data collected for each type of survey be recorded into formatted field logs, provided exclusively for that survey (not into individual's field notes).

6. That additional permanent surface plots be established in the new lava flow.

7. That permanent net-movement plots be established along the edge of the old lava flow and in the new lava flow, if possible.

8. That the four time-lapse cameras continue to be used (two in the old lava flow and two in the new lava).

9. That tents continue to be utilized in the Kiska Harbor area instead of the World War II building. The building can be used for gear storage.

10. Relocate and remark all of the permanent auklet plots established in 1985 and 1986 and if time permits attempt to relocate and remark all plots established in 1978.

11. Develop a description sheet, and pictures of age classes of least and crested auklets and practice determining age classes of auklets prior to 1987 field survey.

12. Use a combination of wire and/or boards to secure the new clock used for the time-lapse cameras in the auklet colony.

13. All time-lapse cameras should have the same features; i.e., intervalometers, light sensitive switch, etc.

14. The time-lapse cameras should be checked daily for satisfactory operation and film supply.

15 That a multimeter and wiring schematic of the time-lapse camera system help trouble shoot any problems that may develop with them.

16. That a 2" x 6" x 20' "crane" with double pulley system be used at the Sirius Point landing site.

17. That 2 x 4's be used for all tie downs, instead of 4 x 4's.

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