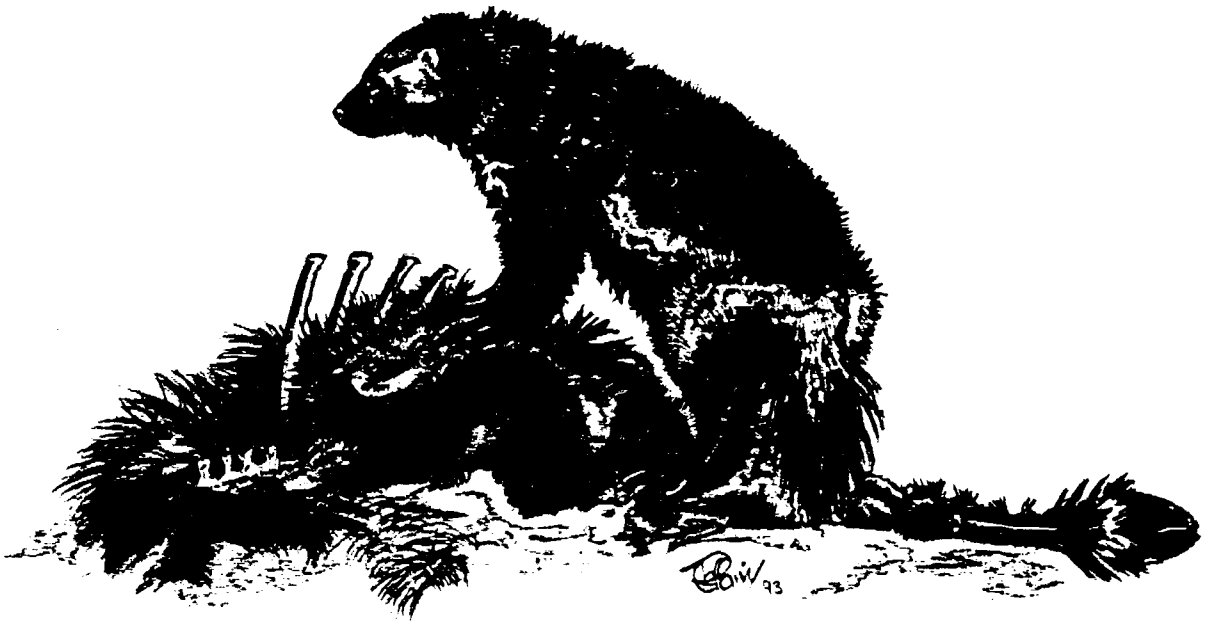
Alaska Department of Fish and Game
U.S. Fish and Wildlife Service
National Park Service
U.S. Forest Service

Cooperative Research Project

WOLVERINE POPULATION SURVEY ON THE KENAI PENINSULA

PROGRESS REPORT



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SUMMARY

We completed the first year of a three-year study of wolverines (Gulo gulo) on the Kenai Peninsula to determine their distribution and relative abundance, density, food and habitat availability, and harvest levels and patterns, and to develop a population model for estimating sustainable harvests. This is a cooperative project between the Alaska Department of Fish and Game (ADF&G), Kenai National Wildlife Refuge (KNWR) of the U. S. Fish and Wildlife Service (USFWS), Chugach National Forest (CNF) of the U. S. Forest Service (USFS), and Kenai Fjords National Park (KFNP) of the National Park Service (NPS). We conducted aerial surveys of tracks in the mountains and foothills of the Kenai Mountains on 2-5 March 1992. We did not conduct surveys in spring 1993 because of poor surveying conditions. During the March 1992 survey, we counted 19.6 tracks/1000 km^2 in the northern region, 17.9 tracks/1000 km^2 in the central region, and 11.8 tracks/1000 km^2 in the eastern and southern region. Large ungulate distribution and relative abundance was examined based on survey and inventory data, which indicated there are approximately 8,900 moose, 717 caribou, 1,450-1,650 Dall sheep, and 4,000 mountain goats on the peninsula. Harvest data since 1971 showed the take of wolverines declined by 67% until 1981 (48 to 16) and then seemed to level off. The percentage of males in the harvest averaged 68% since 1971. Game Management Unit (GMU) 7 generally had higher harvests, numbers of successful trappers, and numbers of wolverines caught/successful trapper. Work plans for FY 94 are outlined.

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BACKGROUND

There is a lack of population and habitat-requirement information about wolverines on the Kenai Peninsula on which to base management decisions. Wolverines require more attentive management because they occur at naturally low densities, have low reproductive rates, are sensitive to human development and harvest, and have been eliminated from vast areas of their former range (Allen 1942, Wilson 1982, Hash 1987). Maintenance of large wildlands and regulation of human exploitation are critical to maintaining viable wolverine populations (Wilson 1982, Whitman et al. 1986, Banci 1987, and Hash 1987). The wolverine's biology and apparent sensitivity to human development and exploitation could make it an indicator species for wilderness quality on the Kenai Peninsula.

Several factors make better population and habitat information for wolverines especially important on the Kenai Peninsula: (1) the small size and isolated configuration of the peninsula in relation to mainland Alaska; (2) the increasing human population density; (3) the high degree of public access; and (4) the rapid rate of past and present habitat change through wildfires and prescribed burning, human development, and tree mortality from the spruce bark beetle (Dendroctonus spp.).

The density of wolverines in an area is directly related to diverse and abundant food, primarily large ungulates (Hash 1987). Because wolverines have few natural predators, harvest by humans is believed to be the greatest factor influencing adult wolverine numbers (Van Zyll de Jong 1975, Hornocker and Hash 1981, Pulliainen 1982). There has been a widespread decline in the reported wolverine harvest in southcentral Alaska since 1971 (Whitman 1987, Golden et al. 1993). Wolverine take on the Kenai Peninsula decreased by 67% between 1971 and 1981 but seems to have leveled off since then. It is unknown whether these changes in harvest reflect actual changes in wolverine populations or changes in trapper interest and effort.

Most decisions regarding wolverine management on the Kenai Peninsula and, indeed, in the state of Alaska have relied on harvest data from pelt sealing reports or trapper questionnaires. The variability in harvest information and the lack of rigor in which they are collected makes management decisions tenuous. Sound management of wolverines on the Kenai Peninsula requires that we know how wolverines are distributed on the peninsula; if the population is increasing, stable, or decreasing; the availability of food and

suitable habitat; the extent and intensity of harvest; and what a sustainable harvest should be.

An interagency study was designed by the ADF&G, KNWR, KFNP, and CNF to address the above needs and to determine if further study of the Kenai Peninsula wolverine populations was warranted. The ADF&G is the lead agency but each of the other three agencies will participate equally with funding and personnel. The study was to be completed in two years but will be extended another year because of poor surveying conditions in 1993 and because we will attempt to estimate densities based on the development of a new technique.

OBJECTIVES

1. To determine the distribution and relative abundance of wolverines on the Kenai Peninsula.

2. To develop a system for monitoring wolverine population trends on the Kenai Peninsula.

3. To determine the distribution of key species as food for wolverines.

4. To define and map potential and most suitable wolverine habitat.

5. To determine the distribution and trend in harvest of wolverines caught on the Kenai Peninsula.

6. To develop a model to estimate sustainable harvest levels on the Kenai Peninsula.

STUDY AREA

The geography, flora, and fauna of the Kenai Peninsula are described in detail by Peterson et al. (1984). This study will attempt to encompass most of the 26,000-km^2 Kenai Peninsula and will include as much of NPS, USFS, and USFWS lands as possible. The focus in 1992

will be in the mountainous areas, which are in light forest, shrub, or tundra zones. In 1993 and 1994, we will investigate those areas missed in 1992 and more foothill areas.

Potential food for wolverines on the Kenai Peninsula include beached marine mammals, seabirds, mountain goats (Oreamnos americanus), Dall sheep (Ovis canadensis), caribou (Rangifer tarandus), moose (Alces alces), marmots (Marmota caligata), tundra voles (Microtus oeconomous), and salmon (Oncorhynchus sp.). Large predators that may provide carrion for wolverines are brown bears (Ursus arctos), black bears (Ursus americanus), wolves (Canis lupus), and coyotes (Canis latrans).

METHODS

Distribution and Relative Abundance (Objective 1)

We surveyed the distribution and relative abundance of wolverines on the Kenai Peninsula through aerial counts of tracks in snow on 2-5 March 1992. Surveys were flown in PA-18 Super Cubs under good light and generally favorable weather conditions approximately 3-6 days after a snowfall of > 7 cm on 28 February. Snow depth varied from 0.33 -1.0 m on the west side of the Kenai Mountains to 2.4 m on the east side. We divided the peninsula into 23 survey areas that could each be flown in day by one survey team. We flew the mountainous and foothill terrain along the Kenai Mountains. Other areas of the peninsula, particularly lowland areas, were given a lower priority and were not surveyed because poor tracking conditions limited survey time. We flew the contours of drainages at timberline to maximize sightability of tracks in the upper alpine and lower forested areas. Some areas were too windy to fly or the snow cover was too windswept to observe tracks, and stormy weather hampered surveys in the eastern and southern regions.

Observers recorded tracks that intercepted flight lines on 1:250,000-scale maps as an observation of one track or a group of two or more tracks, if it was suspected they belonged to more than one animal. The latter was a subjective determination; we made no attempt to relate the number of tracks seen to an estimate of wolverine abundance. Possible den sites, kill sites, the presence of moose, caribou, sheep, or other prey, and observations of wolverines were noted. Track sightings from all observers were compiled and quantified per 1000 km^2 of area surveyed.

Food and Habitat Availability (Objectives 3 and 4)

We used survey and inventory data, population studies, and new field observations to describe species occurrence and the extent of food potentially available to wolverines on the Kenai Peninsula.

Harvest Analysis (Objective 5)

Wolverine harvest was analyzed by GMU through ADF&G pelt sealing data recorded since 1972. Carcasses of wolverines trapped on the peninsula were purchased from trappers and then processed to provide additional data on mortality, sex and age ratios, reproductive status, and condition of wolverines. Body measurements and biological specimens were taken. Carcass data were not fully analyzed by the time this progress report was prepared.

RESULTS AND DISCUSSION

Distribution and Relative Abundance

Five teams flew portions of 12 of the 23 survey areas for a total of 7,591 km^2 and counted 134 tracks on 2-5 March 1992 (Table 1). Tracks were found at all but the highest elevations. Tracking conditions were best in the northern region of the peninsula, which may partly explain the higher track counts in that area.

Tracks were most abundant in the northern region along Resurrection and Juneau Creeks, Sixmile, Canyon, and Quartz Creeks, Mills, Johnson, and Trail Creeks, and the Kenai, Snow, and Nellie Juan Rivers (Appendix A). Tracks in the central region were most numerous near upper Kenai Lake and along the Killey River, Bear Creek, Indian Creek, the Fox River, and Sheep Creek (Appendix A). Eastern and southern regions showed concentrations of tracks near Callisto Peak by Resurrection Bay, on southwest Harris Peninsula by Northwestern Fiord in Harris Bay, downstream of Grewingk Glacier near Halibut Cove, and along Barabara Creek near Seldovia (Appendix A).

Incidental observations outside the track survey indicated there were numerous wolverine tracks in the vicinity of Caribou Hills northeast of Homer (G. DelFrate: pers. commun.).

We also counted four possible den sites, three in the north along Resurrection and Quartz Creeks and one in the south by Tutka Bay.

Wolverine track densities counted on the Kenai Peninsula (Table 1) were comparable to the intermediate and low densities found during similar surveys in the Nelchina River basin and Wrangell St-Elias National Park and Preserve, where the eastern Talkeetna Mountains had 25.9 tracks/1000 km^2, the western Wrangell Mountains had 19.6 tracks/1000 km^2, and the northern Chugach Mountains had 11.9 tracks/1000 km^2 (Golden et al. 1993).

Table 1. Summary of wolverine track counts and track densities observed during aerial surveys in the mountains and foothills of the Kenai Peninsula, 2-5 March 1992.

Region	Survey Units	Survey Area (km^2)[a]	Number Tracks Counted	Track Density (No./1000 km^2)
Northern	4,5,6,10	3,866	76	19.6
Central	8,9,12,16	2,287	41	17.9
Eastern & Southern	13,17,21,22	1,438	17	11.8
Peninsula-wide	All	7,591	134	17.8

[a]Portions of the survey areas that were not flown due to windy conditions were not included in these calculations.

Food and Habitat Availability

At the time this progress report was prepared, only general big game distribution and relative abundance had been examined from ADF&G survey and inventory data (T. Spraker: pers. commun.). Information on the availability of other potential food for wolverines will be compiled and analyzed in 1993 and 1994. Likewise, data on the availability of the various types of habitat suitable for wolverines is being examined and will be included in the final report.

Moose generally occupy all habitats below 600 m elevation, but they are scarce or absent along most of the eastern and southern coastal areas. Populations have been estimated at

3,200 in Subunit 15A, 1,200 in Subunit 15B, 3,000 in Subunit 15C, and 1,000 in GMU 7, for a peninsula total of 8,400 moose. Approximately 762 caribou exist among 4 mountain herds and 1 lowland herd on the Kenai Peninsula. The Kenai Mountains Caribou Herd of 390 animals straddles Resurrection Creek and ranges in rugged, mountainous terrain west of Quartz Creek and north of Cooper Landing to Turnagain Arm. The Killey River Caribou Herd numbers 222 animals and ranges between upper Benjamin and upper Bear Creeks near the headwaters of Killey River. The Twin Lakes Caribou Herd ranges north of the Killey River Herd and consists of 29 animals. The fourth mountain herd is the Fox River Caribou Herd of 65 animals that ranges above Tustumena Lake between the Fox River and the Tustumena Glacier. The Kenai Lowlands Caribou Herd consists of 56 animals and ranges roughly from the Cook Inlet coast east to the foothills of the Kenai Mountains and from the Sterling Highway north to the Swan Lake Road. Dall Sheep number 1,450-1,650 animals and occur primarily in the central portion of the Kenai Mountains west of the divide between Dinglestadt Glacier and the Cooper Landing-Kenai Lake area. Mountain goats number approximately 4,500 animals and occupy most of the Kenai Mountains from Turnagain Arm to the southern tip of the peninsula.

Harvest Analysis

Wolverine harvest on the Kenai Peninsula declined from 48 in 1971 to 19 in 1991, which was an average rate of decrease of about 3%/year. However, the downward harvest trend averaged 5%/year until 1981 and has since been more or less stable (Fig. 1). The percentages of male wolverines in the harvest on the Kenai Peninsula have fluctuated markedly about a mean of 68% since 1971, and only dipped below 50% in 1989. Of the 514 wolverines known to be harvested on the Kenai Peninsula since 1971, 58% were taken in GMU 7. Average annual harvest since 1971 was 14 in GMU 7 and 10 in GMU 15. Based on land area, the average annual wolverine take was 1.5/1000 km^2 in GMU 7 and 0.8/1000 km^2 in GMU 15. GMU 7 also had the highest average number of successful trappers/year since 1983 at 6.8 versus a mean of 4.8 in GMU 15. Successful trappers were those who caught and sealed wolverines. The number of wolverines caught/successful trapper averaged 1.7/year in GMU 7 and 1.8/year in GMU 15, and trends in those ratios between 1983 and 1991 generally varied with the number of successful trappers (Figs. 2 and 3).

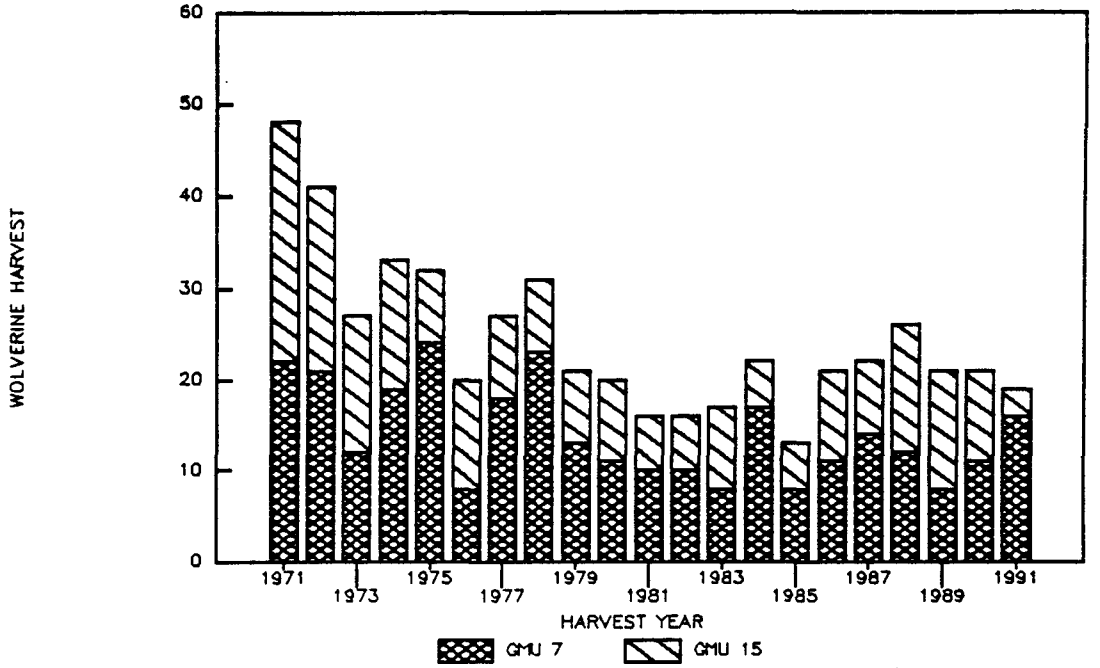

Figure 1. Kenai Peninsula wolverine harvest by GMU, 1971 to 1991.

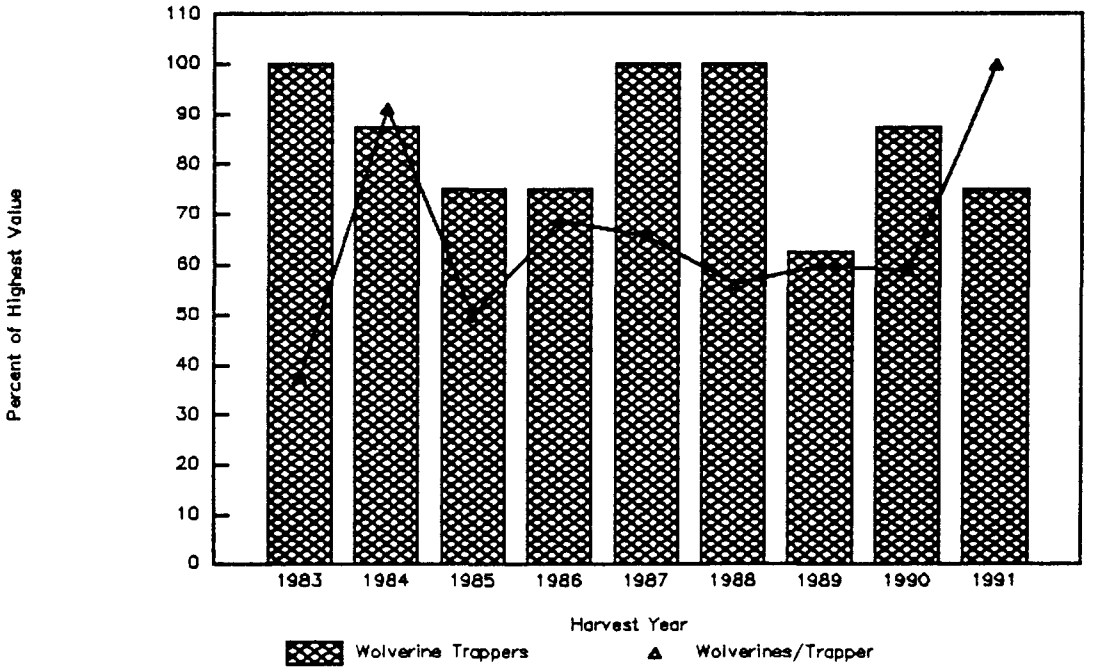

Figure 2. Trends in the number of successful wolverine trappers and catch per successful trapper in GMU 7 on the Kenai Peninsula, 1983 to 1991. Data are presented as percentages of the highest value for each category to be able to relate data on an equal scale.

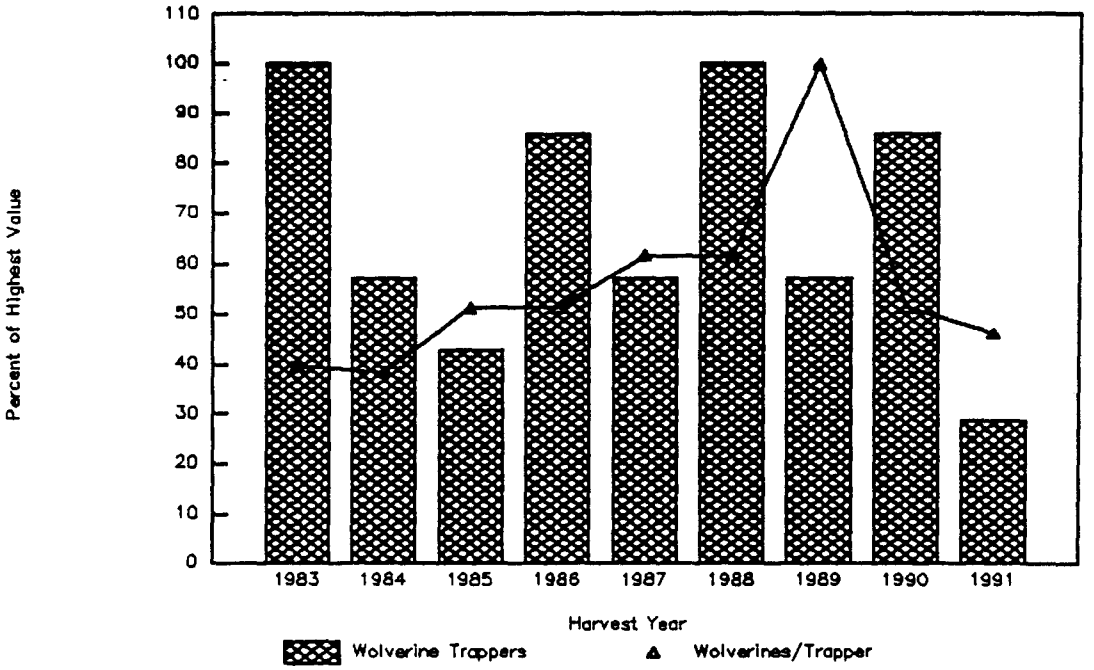

Figure 3. Trends in the number of successful wolverine trappers and catch per successful trapper in GMU 15 on the Kenai Peninsula, 1983 to 1991. Data are presented as percentages of the highest value for each category to be able to relate data on an equal scale.

WORK PLANS FOR FY 94

Distribution and Relative Abundance

We will conduct another aerial survey of wolverine tracks in the mountain and foothill areas that were missed or only partially surveyed in 1992. The same procedures described under Methods will be used. We will not attempt to survey lowland areas in GMU 15 but will survey some hilly areas such as the Caribou Hills.

Trend Areas and Density Estimates

We will use the results of the distribution and relative abundance surveys to establish trend areas to monitor changes in wolverine population density over time. A modification of Becker's (1991) track-intercept probability sampling estimator (TIPS estimator) is under development, and it has promise of being very useful in estimating wolverine population densities in the rugged terrain found on the Kenai Peninsula. The modified technique (as per E. Becker: pers. commun.) relies on the aerial observation of tracks in winter within

sample units (e.g., 3.2 km x 3.2 km squares) that are part of a grid system. Sample units will be classified based on an area's likelihood of containing wolverine tracks, and a random selection of sample units within classifications to be flown will made. The number of units to be flown will depend on the number of sample units in each classification and the level of accuracy desired. The selected units will be flown with PA-18 Super Cubs within 24-48 hours after a fresh snowfall. Each selected unit will be searched until a wolverine track is found. The track will then be followed until both ends of it, laid down since the snowfall, have been found. All grid units in which the track occurs will be noted. Density estimates will be calculated from the probability of observing the track in the sample.

Food and Habitat Availability

Information on food availability will again rely on survey and inventory data to document species occurrence. In addition we will attempt to conduct surveys of ungulate kill sites/carcasses and beached marine mammals. We will record the location and species type, if possible, of kill sites/carcasses occurring along drainages in the Kenai Mountains and along portions of the eastern and southern coastlines. Drainages will be surveyed 10-18 days after separate snowfalls during the winter and early spring. Coastlines will be surveyed at low tide during surveys for other kill site/carcasses or after storms. All kill sites/carcasses observed within a 1.6-km-wide strip along the bottom of a drainage or along the coastline will be recorded and densities per length of drainage or coastline will be calculated.

The availability of suitable habitat for wolverines will be determined from observations of winter track counts, distribution and abundance of food sources, and the existing literature. Habitat data will be digitized onto base maps for potential incorporation into a Geographical Information System (GIS) database used by the federal agencies.

Harvest Analysis

We will continue to monitor harvest levels and trends from pelt sealing data and trapper questionnaires and process sex, age, and other biological data from wolverine carcasses acquired from trappers. Trappers are required to seal pelts of all wolverines they catch in Alaska and give locations of catches down to minor drainage and landmark. Those data will be analyzed by ADF&G uniform coding units (UCU) to produce maps of trapper distribution and take on the Kenai Peninsula. All trappers on the peninsula will be sent

yearly trapper questionnaires to obtain information on their observations of wolverines and other furbearers. The age of each wolverine will be determined by counting tooth cementum layers from sectioned teeth sent to Matson's Laboratory. Reproductive tracts of females will be examined for corpora lutea and placental scars. All data on carcasses purchased from trappers between 1991 and 1994 will be combined and presented in the final report.

Wolverine Population Model

We will develop a population model to help in determining sustainable harvests of wolverines on the Kenai Peninsula and in deciding what future work on wolverines may be needed to meet management objectives. The model will be constructed using the density estimates derived in this study, harvest data, previous studies of wolverines and their harvest in North America (Gardner 1985, Magoun 1985, Banci 1987), and other available literature on wolverine biology.

Final Report

We will produce a final report by 30 September 1994. It will include our progress since this current report and our recommendations for future wolverine work on the Kenai Peninsula.

ACKNOWLEDGEMENTS

We thank everyone who has participated in the development and conduct of this study. The Super Cub pilots flew aerial surveys with safety and skill. Area Biologist Ted Spraker flew aerial surveys, provided data on large ungulate distribution and relative abundance, and participated in discussions on wolverines, trappers, and study needs. Assistant Area Biologist Gino DelFrate flew aerial surveys. Bud Rice and Kris Hundertmark helped in the early stages of this project. Kiana Koenen, Ken Holt, and Suzan Bowen processed carcasses and field data and prepared maps.

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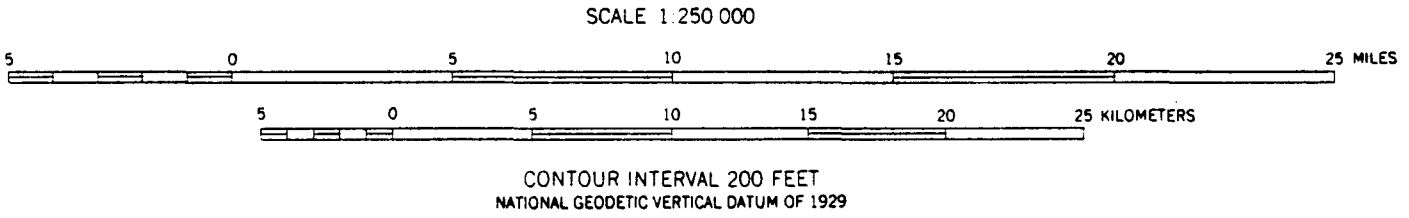
Appendix A. Locations of wolverine tracks observed during aerial surveys on the Kenai Peninsula, 2-5 March 1992. Portions of the numbered survey areas shown were flown. Locations of kill sites (K) and possible den sites (D) were also noted.

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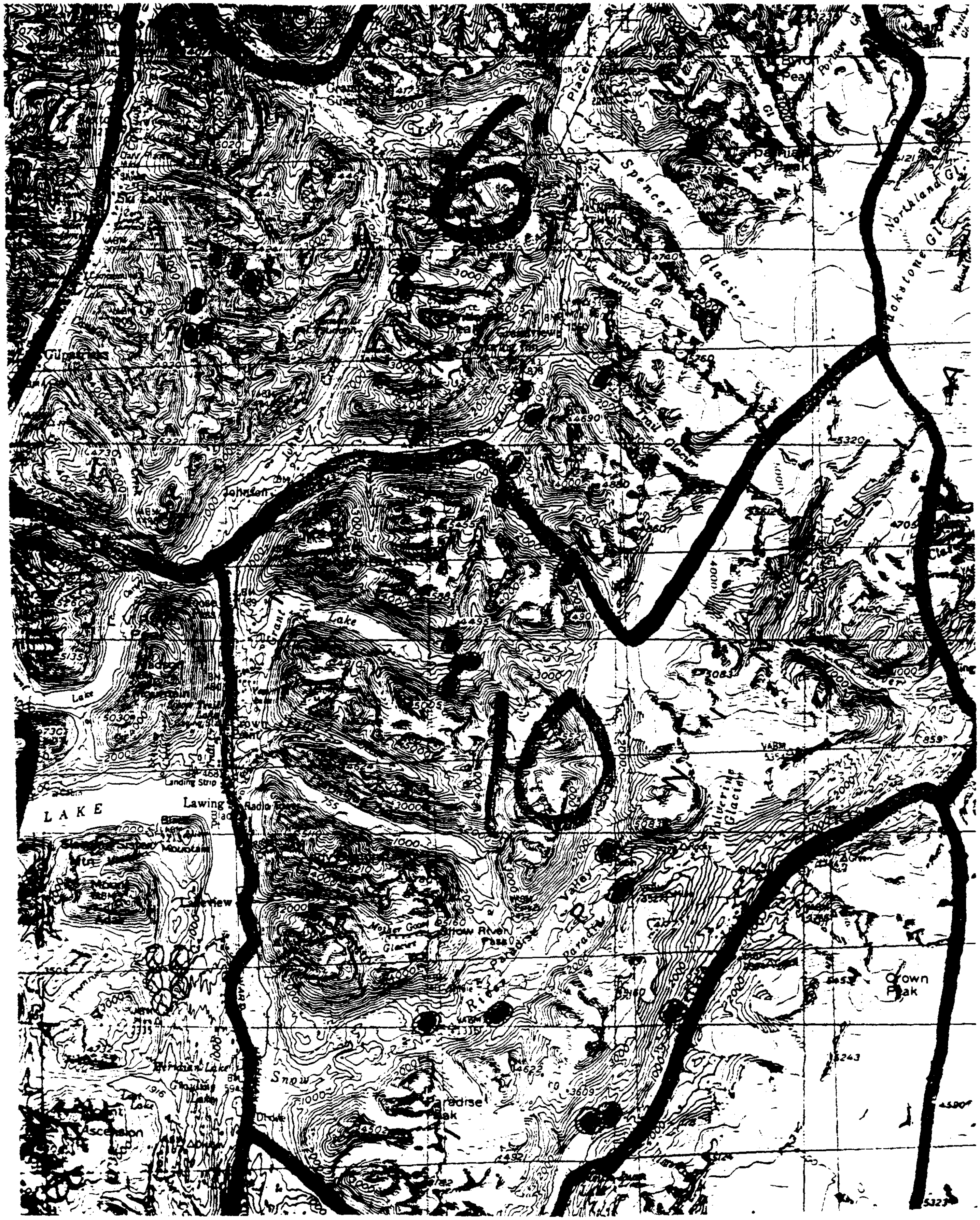
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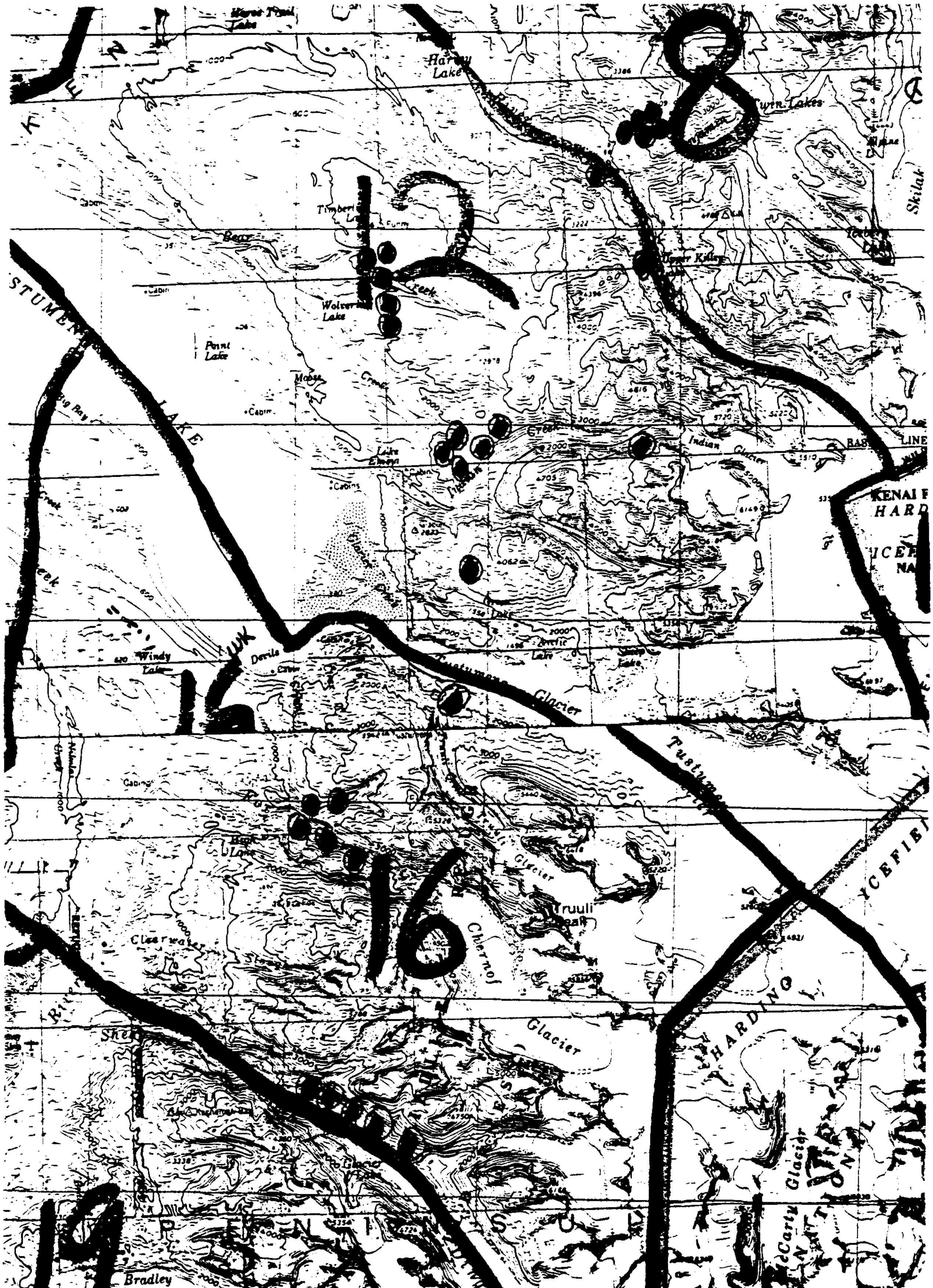
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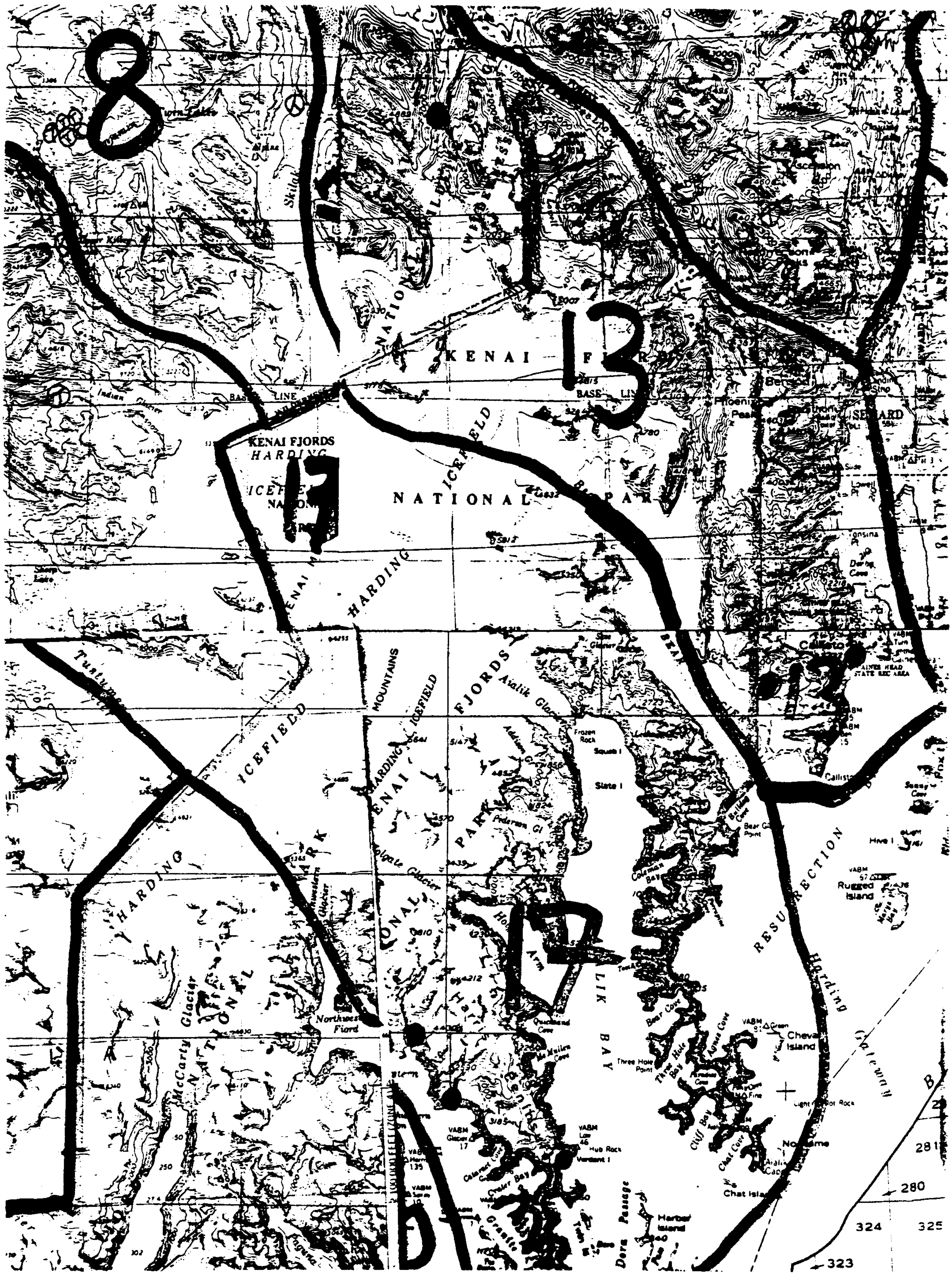
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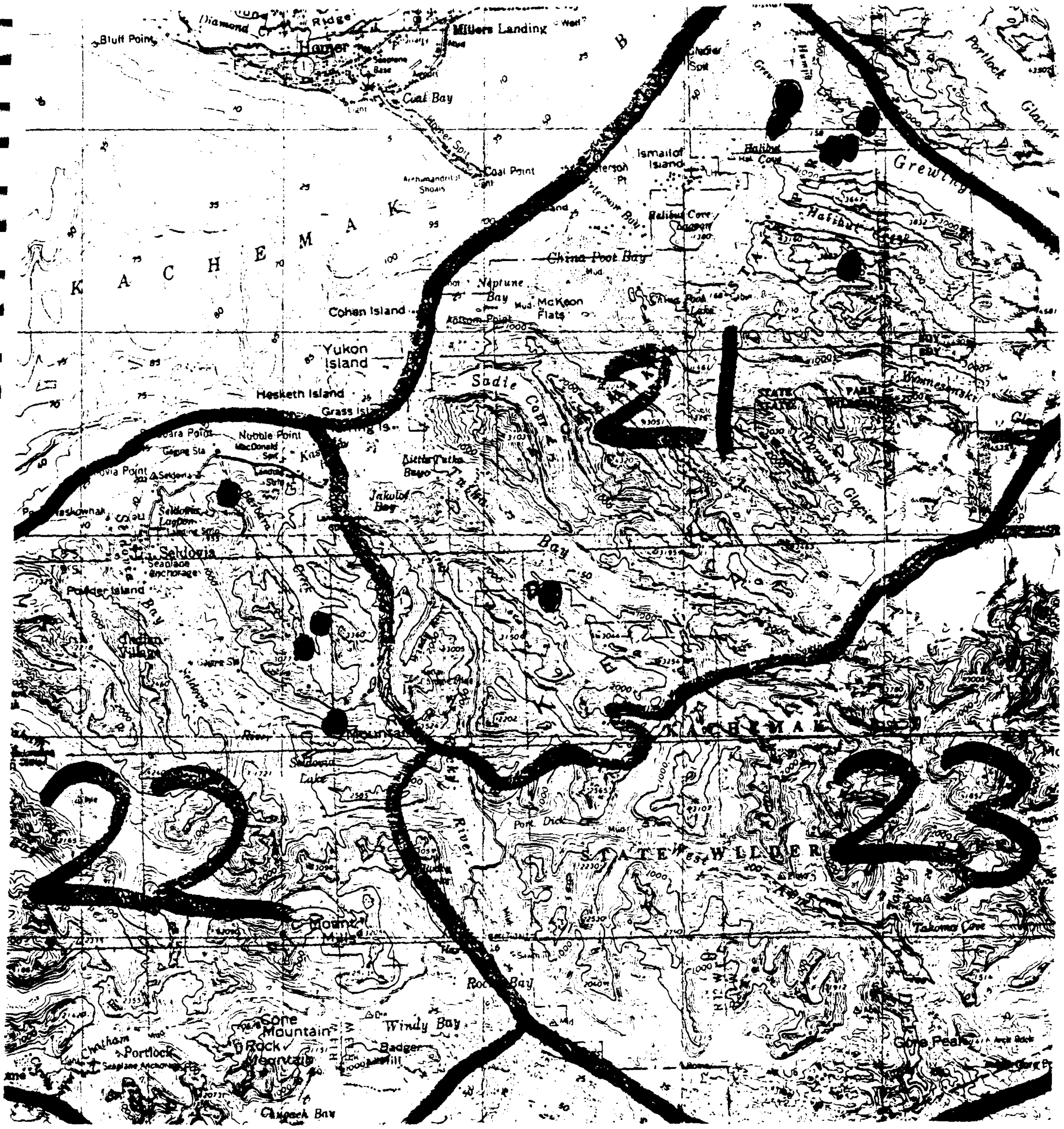
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