

AN OILSPILL RISK ANALYSIS FOR THE KODIAK ISLAND

(PROPOSED SALE 46) *

OUTER CONTINENTAL SHELF LEASE AREA

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Abstract

An oilspill risk analysis was conducted to determine the relative environmental hazards of developing oil in different regions of the Kodiak Island Outer Continental Shelf (OCS) lease area. The study analyzed the probability of spill occurrences, likely paths of oil slicks, and locations of resources vulnerable to spilled oil. The analysis included estimates of the time between spill occurrence and contact with resources. The combined results yielded estimates of the overall risks associated with development of the proposed lease area. Assuming that oil will be found in all parts of the lease area, and depending upon the routes chosen to transport oil from OCS platforms to the shore, the leasing of the tracts proposed for OCS Sale 46 will result in an expected number of 1.1 spills. The estimated probability that land will be contacted by one or more oilspills which have been at sea less than 30 days is 0.43.

Introduction

The Federal Government has proposed to offer Outer Continental Shelf (OCS) lands off the coast of Kodiak Island for oil and gas leasing. If petroleum is found and can be economically recovered, estimated resources for the proposed 555 tracts are on the order of 176 million barrels of crude oil (unrisked mean estimate - the amount of oil expected to be recovered, assuming that oil is found.) Contingent upon actual discovery of this quantity of oil, production is expected to span a period of 30 years.

Oilspills are one of the major concerns associated with offshore oil production. An important fact that stands out when one attempts to evaluate the significance of accidental oil spillage is that the problem is fundamentally probabilistic. Uncertainty exists about the amount of oil that will be produced and the number and size of spills that might occur during the life of production, as well as the wind and current conditions that would exist at the time of a spill and give direction to the oil slick. While some of the uncertainty reflects incomplete and imperfect data, considerable uncertainty is simply inherent in the problem of describing future events over which complete control cannot be exercised.

Since it can not be predicted with certainty that a probabilistic event such as an oilspill will occur, only the likelihood of occurrence can be quantified. It is important to consider the range of possible effects that could accompany a decision on oil and gas production. It is equally important, in attempting to maintain perspective on the problem, to associate each potential effect with a quantitative estimate of its probability of occurrence.

This report summarizes results of an oilspill risk analysis conducted for the proposed Kodiak Island OCS Lease Sale 46. The study had the objective of determining relative risks associated with oil and gas production in different regions of the proposed lease area. It was undertaken for consideration in the draft environmental impact statement (EIS), and to facilitate final selection of tracts to be offered for sale. A description of the oilspill trajectory analysis model can be found in a previous paper (Lanfear and others, 1979b). The analysis was conducted in three parts corresponding to different aspects of the overall problem. The first part dealt with the probability of oilspill occurrence, and the second with the trajectories of oilspills from potential launch points to various targets. Results of the first two parts of the analysis were then combined to give estimates of the overall oilspill risk associated with oil and gas production in the lease area.

Decisionmaking Under Risk and Uncertainty

Oilspill impacts result from two events which are probabilistic in nature: oilspill occurrence due to accidents, and oilspill movement by random winds and currents. While it can not be said with certainty that a probabilistic event, such as an oilspill will or will not occur, the likelihood of occurrence can be quantified. It is possible to predict the likelihood that oilspills will result from an OCS leasing decision, but whether they will actually occur can only be known after the area is explored and the oil, if any, is produced. This is in contrast to a deterministic situation where a particular action can be depended upon to produce a specific result.

In making decisions under risk and uncertainty, it is important to understand that a choice can have a range of possible outcomes. Generally, a desire to maximize the likelihood of the most favorable outcomes must be tempered by the need to minimize the probability of highly unfavorable outcomes. The USGS Oilspill Trajectory Analysis (OSTA) Model was designed to reflect the range of possible outcomes of leasing decisions by estimating the probability of occurrence for each discrete outcome; specifically, it estimates the likelihood that a target will be contacted by 0, 1, 2, ... oilspills during the production life of an OCS lease area.

The probability that, if an oilspill occurs at a given launch point, it will contact a particular target is termed a conditional probability. Such conditional probabilities can be very useful in identifying those launch points at which an oilspill, if it occurs, poses the highest risks to various targets. Tables of conditional probabilities can help the analyst to select alternatives that will reduce overall risk. However, conditional probabilities do not include the probability of oilspill occurrence. A tract that contains little or no oil is a small risk because, no matter how high the conditional probability of contacting a target may be, the small amount of oil makes it unlikely that an oilspill will occur. Also, conditional probabilities for spills originating at the production platforms do not necessarily reflect the risks of transportation. For these reasons, analysts are cautioned against basing judgments solely upon conditional probabilities.

Summary of the Proposed Action and the Major Alternatives

The proposed action is to lease 555 tracts on the outer continental shelf near Kodiak Island, Alaska. The study area for this analysis includes all of these tracts and extends from latitude 55 degrees N to 60 degrees 30 minutes N, and from longitude 147 degrees W to 157 degrees W, and is shown using a Mercator projection in Figure 1.

The proposed tracts are located in three areas, identified as areas I, II and III. For this analysis, they are further subdivided into 13 groups, as shown in Figure 2. The transportation scheme for the proposed action is to transport all of the oil to Kiliuda Bay via a network of pipelines; the oil would then be transported south by tankers. If oil is discovered and the area is developed for oil production, it has been assumed that oil will be transported to shore by the transportation routes shown in Figure 3.

Three alternative tract deletion schemes, identified as alternatives 1, 2, and 3 were examined in this analysis; each considers the effects of deleting one of the three areas of the proposed sale. Alternatives 1, 2, and 3 consist of deleting areas II, III, and I respectively. Oil from the remaining tracts would be transported by pipeline to Kiliuda Bay for alternatives 1 and 2, and to Chiniak Bay for alternative 3. Once ashore, oil would be loaded onto tankers and shipped south.

The cumulative effects of oil production from the proposed sale (or the alternatives) and oil transported south from existing Federal leases in Cook inlet was also evaluated. Other existing Federal leases in the Gulf of Alaska are not expected to present a significant oilspill risk to the study area (Lanfear and others, 1979a).

Environmental Resources

The locations of 24 categories of biological, recreational and other resources (or targets, as they are designated in this paper) were digitized in the same coordinate system, or base map, as that used in trajectory simulations. Maps of the digitized targets are shown in appendix A, Figures A-1 to A-24. The monthly sensitivities of these targets were also recorded so that, for example, a target such as migrating birds can be contacted by simulated oilspills only when it is actually present in the area. The targets are listed below:

- Salmon spawning areas (vulnerable May through September)
- Salmon fishing areas (vulnerable June through September)
- Razor clam beaches (vulnerable all year)

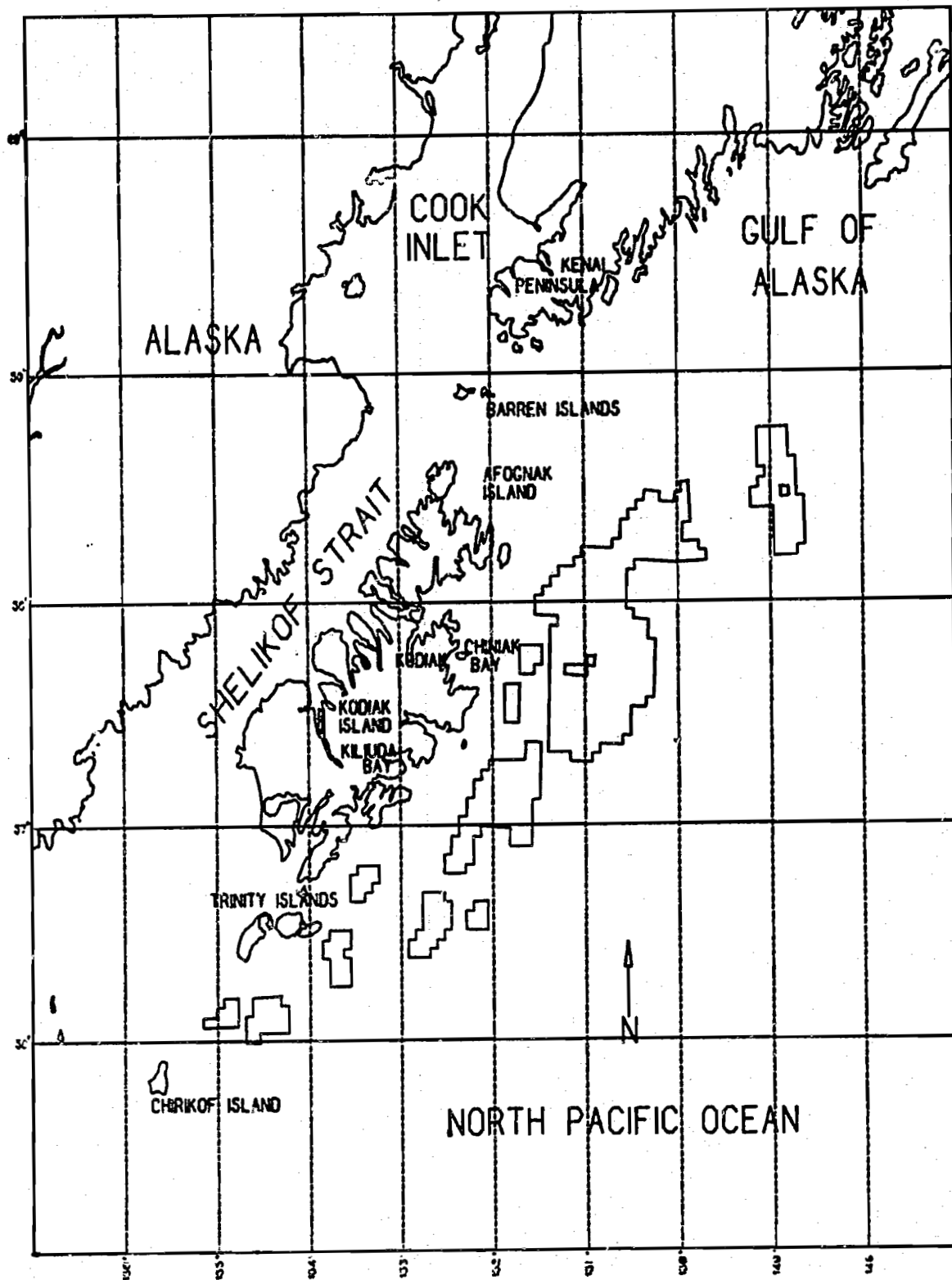


Figure 1.--Map showing the Kodiak Island OCS Lease Sale 46 study area and the proposed lease tracts.

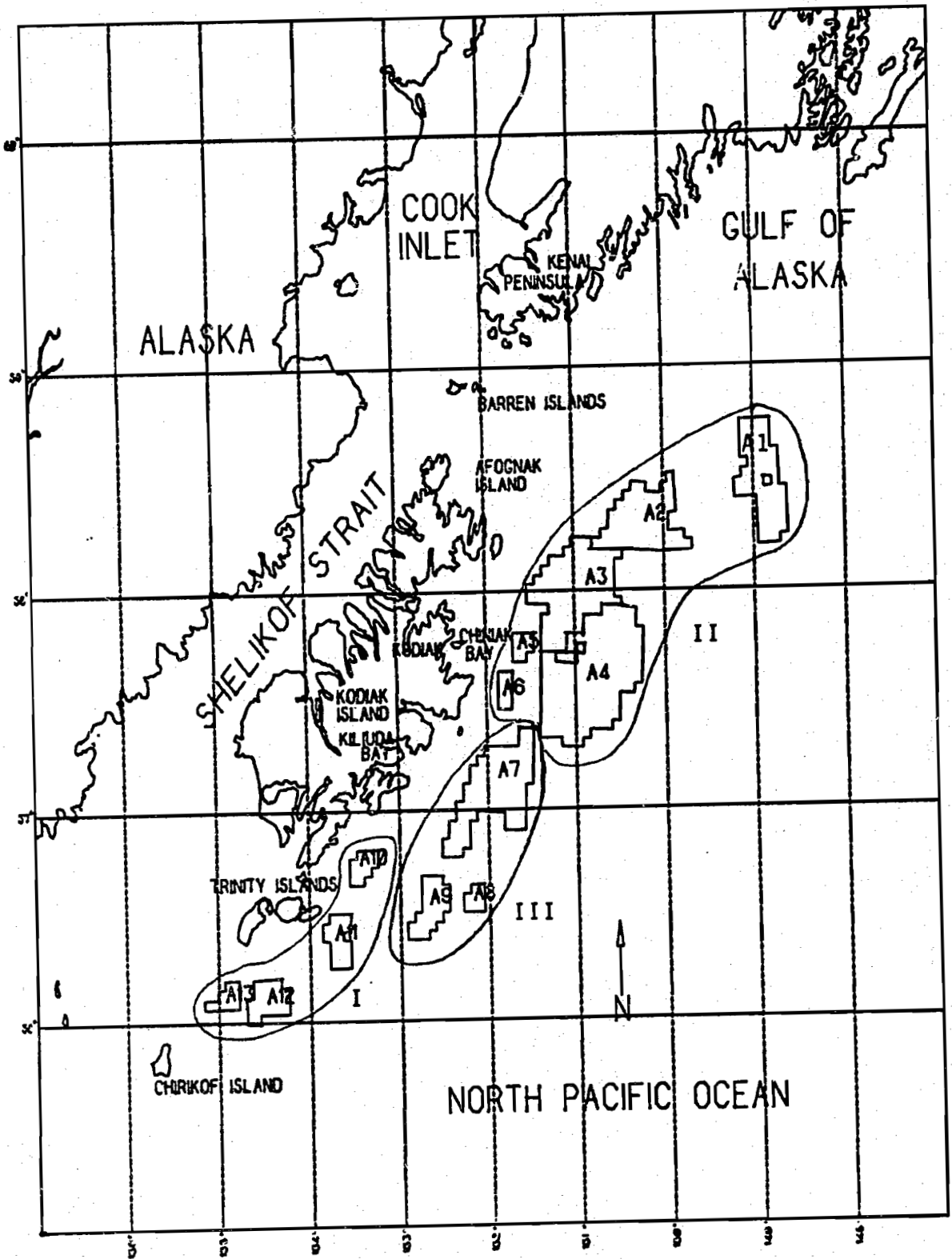


Figure 2.--Map showing subdivisions of the proposed leases for Kodiak Island OCS Lease Sale 46.

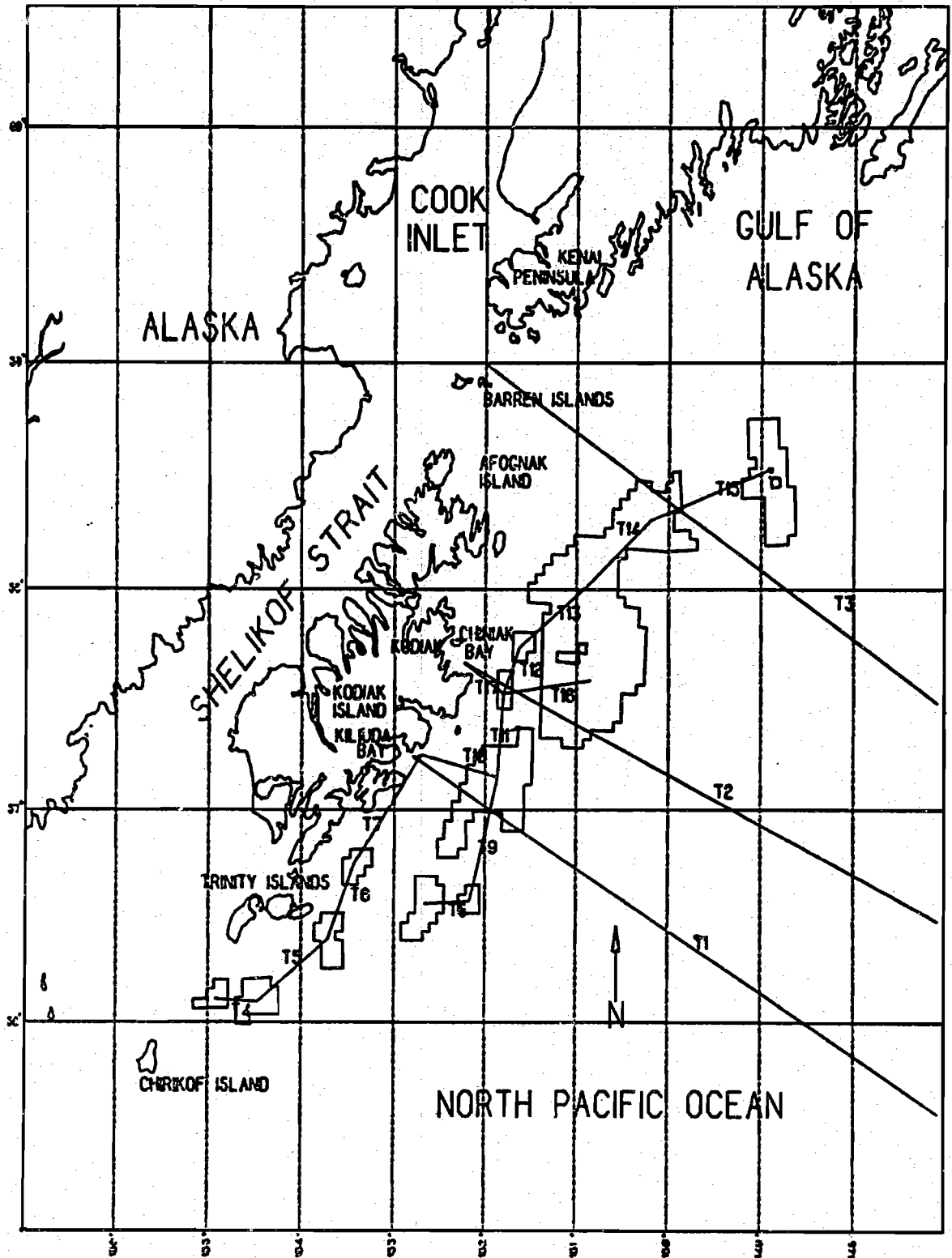


Figure 3.--Map showing the transportation route segments (T1-T17); polygons represent proposed lease tracts.

Benthic invertebrates, high biomass areas
(vulnerable all year)
Bird colonies (vulnerable all year)
Seabird foraging areas (vulnerable all year)
Marine mammal rookeries and concentrations
(vulnerable all year)
Whale sightings (vulnerable all year)
Whale migration route (vulnerable all year)
Areas of high biological cover (vulnerable all year)
Nearshore habitats (vulnerable all year)
Dungeness crab reproduction and catch areas
(vulnerable all year)
Shrimp reproduction and rearing areas
(vulnerable all year)
Shrimp catch areas (vulnerable all year)
King crab vital reproduction areas
(vulnerable all year)
King crab vital rearing areas
(vulnerable December through June)
King crab major catch areas
(vulnerable September through January)
Tanner crab vital reproduction and catch areas
(vulnerable September through January)
Tanner crab major catch areas
(vulnerable all year)
Cultural resources, National Register of
Historic Places (vulnerable all year)
Cultural resources, Alaska Heritage Resources
Survey (vulnerable all year)
Eastern and southern boundaries of the
study area (vulnerable all year)
Southern end of Shelikof Strait
(vulnerable all year)
Northern end of Shelikof Strait
(vulnerable all year)

Because the trajectory model simulates an oilspill as a point, most targets have been given an areal extent slightly greater than they actually occupy. For example, some shoreline targets extend a short distance offshore; this allows the model to simulate a spill that approaches land, makes partial contact, withdraws, and continues on its way.

To provide a more detailed analysis for land or land-based targets, the model includes a feature that allows subdividing the coastline into two sets of land segments. Figure 4 shows set number 1, which was selected by the Bureau of Land Management (BLM), and Figure 5 shows set number 2, in which the segments are of approximately equal length.

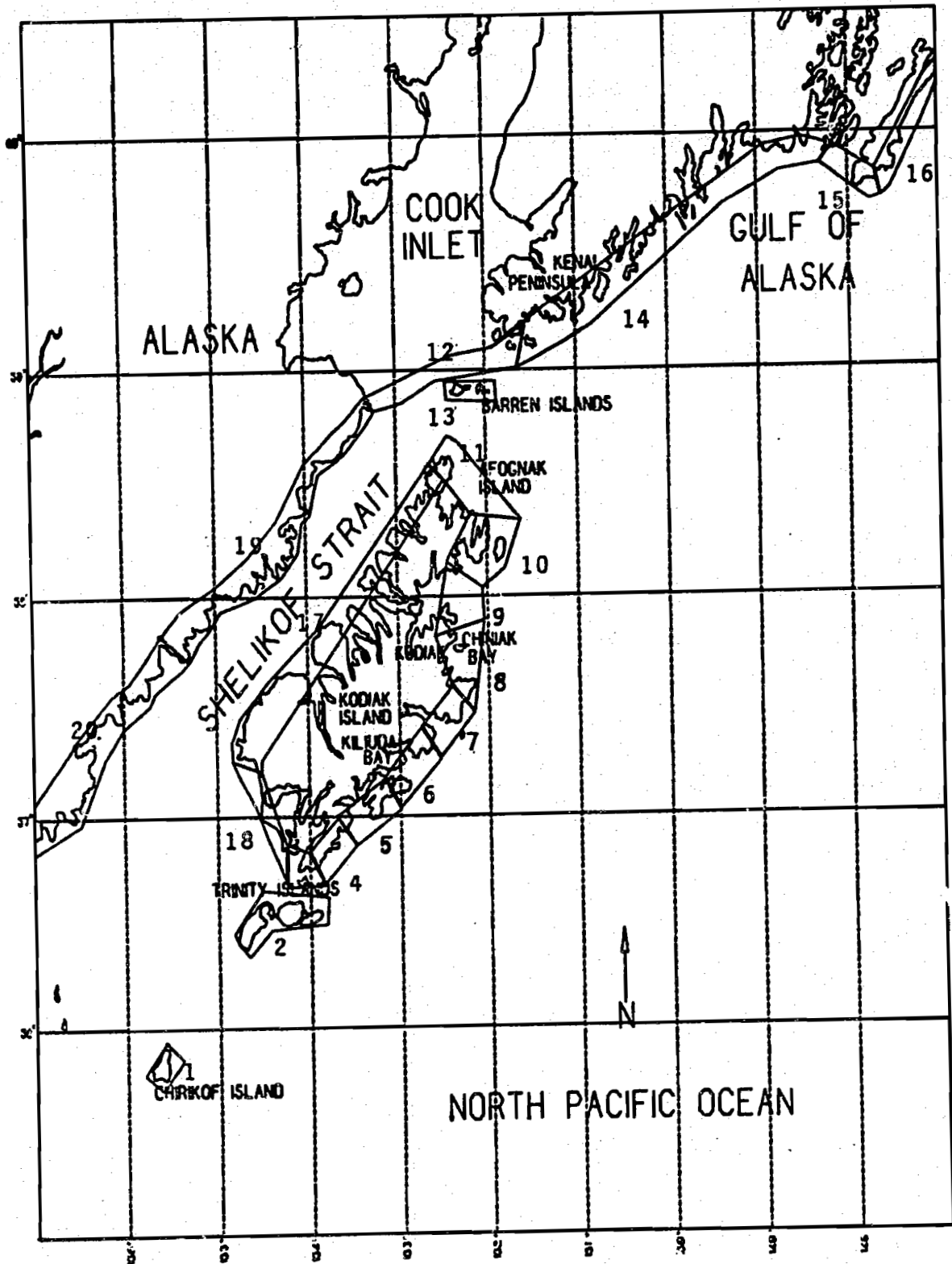


Figure 4.--Map showing the division of the shoreline of the western Gulf of Alaska into segments selected by BLM (set 1).

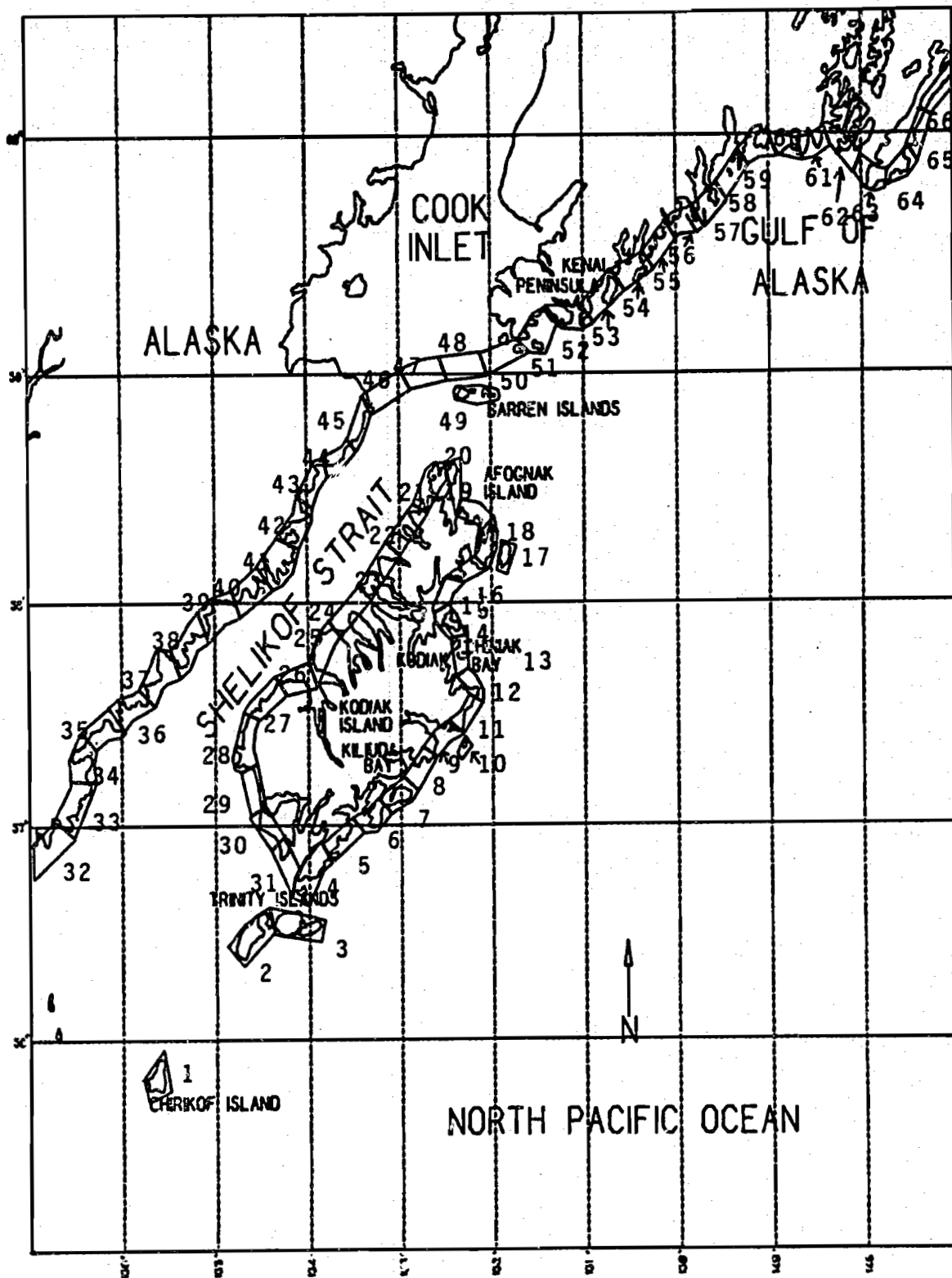


Figure 5.--Map showing the division of the shoreline of the western Gulf of Alaska into segments of approximately length (set 2).

Estimated Quantity of Oil Reserves

Considerable uncertainty exists in estimating the volume of oil that will be discovered and produced as a result of an OCS lease sale. There is a question of whether oilspill risk calculations should be based upon a single estimate of volume, or should consider volume to be a random variable and include some probability distribution for volume in computing oilspill occurrence probabilities. The choice may depend upon how the results are to be incorporated into benefit/risk analysis.

Benefits and risks (as well as many environmental impacts, such as air pollution) are simultaneous functions of volume of oil, and are not independent of each other. Greater risks are associated with greater volumes of oil and higher economic benefits. If benefits are evaluated by assuming production of a specific amount of oil, then the corresponding risks should be stated in a conditional form such as, "the risks are ..., given that the volume is ...". If benefits are evaluated for a number of discrete volumes, then risks should likewise be calculated for the same volumes. Any statements about the likelihood of a particular volume of oil apply equally well to the likelihood of the corresponding benefits and risks.

The estimated oil reserves used for oilspill risk calculations in this report correspond to those used by BLM in preparing the draft EIS, i.e., they are "unrisked mean estimates" or the amount of oil expected to result from the proposed sale, assuming that oil is discovered in economically recoverable quantities. It is important to note the difference between risked and unrisked mean estimates: risked mean estimates account for the possibility that oil may not be found in some or all of the tracts, while unrisked mean estimates assume that oil will be found somewhere within the lease area. Where the likelihood of not finding oil is high - as is the case for OCS Sale 46 - the risked mean estimate will be much lower than the unrisked mean estimate. Another important distinction is that risked mean estimates for subareas are additive (i.e., the risked mean estimate for the entire proposed OCS Sale 46 lease area is equal to the sum of the risked mean estimates for areas I, II, and III), while unrisked mean estimates are not. Adding the unrisked mean estimates for all three subareas would require assuming oil would be found in all three subareas - a very unlikely outcome for OCS Sale 46. For the entire proposed lease area, the unrisked mean estimate of oil reserves is 176 million barrels; for alternatives 1, 2, and 3, the

unrisked mean estimates are only slightly smaller. Thus, the primary effect of choosing an alternative to the proposed project would be to increase the chances of not finding any oil; this result is not considered in this study, which assumes oil will be found.

Probability of Oilspills Occurring

Statistical distributions for estimating probabilities of oilspill occurrence were taken from Devanney and Stewart (1974) and Stewart (1975), and from USGS files of offshore platform accidents. Besides the fundamental assumption that realistic estimates of future spill frequencies can be based on past OCS experience, use of these distributions requires the further assumptions that spills occur independently of each other (as a Poisson process), and that spill rate is dependent on volume of oil produced and handled. The first assumption - that past spill rates are indicative of future spill rates - might be modified either by assuming a decrease in future spill rates due to experience and improved standards, or by assuming an increase because of unknown conditions in new territory. The assumption that spills occur independently of each other could be modified either by assuming a positive correlation (if a spill occurs, conditions are such that more will follow shortly) or by assuming a negative correlation (if a spill occurs, extra precautions are taken). This analysis takes the middle ground between these two assumptions by using the historic spill rates. The final assumption - that the spill rate is a function of the volume of oil handled - might be modified on the basis of size, extent, frequency, and duration of the handling. In the case of tanker transport, for example, the number of port calls and the number of tanker-years have been contemplated (Stewart, 1976, and Stewart and Kennedy, 1978). This analysis uses volume of oil handled, since all other estimates must ultimately be derived from this quantity.

Spill frequency estimates for oilspills greater than 1000 barrels in size were computed for the proposed action and each of the three alternatives. These estimates include both the risks from producing crude oil and the risks of transporting it to shore. Table 1 shows the expected number of spills, the most likely number of spills that will occur during the production lives of the lease area and alternatives; Figure 6 shows the probability that 0, 1, 2, ... spills will occur.

Table 1. -- Oilspill probability estimates for spills greater than 1000 barrels occurring in the Kodiak Island area resulting from OCS Lease Sale 46 or from existing Federal leases in Cook Inlet.

	Expected number of spills (mean).	Most likely number of spills (mode).	Probability of one or more spills.
Proposed	1.1	1	0.65
Alternative 1	0.74	0	0.52
Alternative 2	0.95	0	0.61
Alternative 3	0.88	0	0.59
Existing leases (Cook Inlet)	1.2	1	0.69

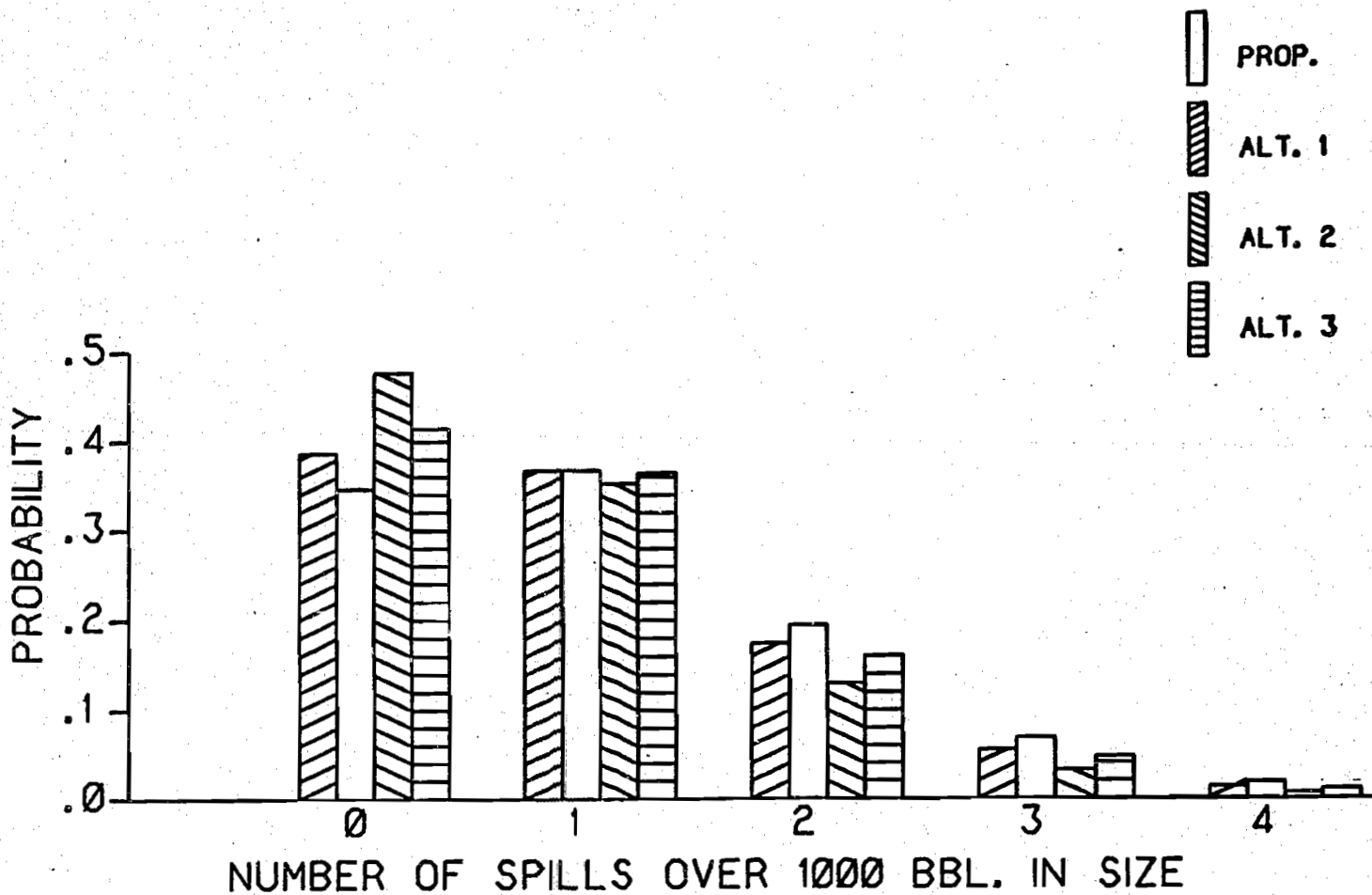


Figure 6.-- Estimated frequency distribution for oilspills greater than 1000 barrels occurring during the production life of the proposed lease area for Kodiak Island OCS Lease Sale 46.

Oilspill Trajectory Simulations

The trajectory simulation portion of the model consists of a large number of hypothetical oilspill trajectories which, collectively, represent both the general trend and the variability of winds and currents, and which can be described in statistical terms. Representations of the monthly surface water velocity field were based upon data supplied by the National Oceanic and Atmospheric Administration through the BLM Environmental Studies Program. Short-term patterns in wind variability were characterized by probability matrices for successive 3-hour velocity transitions. A first-order Markov process with 41 wind velocity states (eight compass directions by five wind speed classes, plus the calm condition) was assumed. A wind transition matrix was calculated from the U.S. Weather Service records from Data Buoy EBO-3 (station number 46001), located about 100 miles south of Kodiak Island.

Five hundred hypothetical oilspill trajectories were simulated in Monte-Carlo fashion for each of the four seasons from 13 potential oilspill locations in the proposed lease areas, and from 17 locations along the transportation network. Each potential spill source was represented as either a single point (e.g., a small portion of the lease area), or as a straight line with the potential spills uniformly distributed along the line (e.g., a transportation route). Surface transport of the oil slick for each spill was simulated as a series of straight-line displacements of a point under the joint influence of winds and currents for a 3-hour period. The wind transition probability matrix was randomly sampled each period for a new wind speed and direction, and the current velocity was updated as the spill changed location or the simulated month changed. The wind drift factor was taken to be 0.035 with a drift angle of 20 degrees clockwise. As the simulated oilspill was moved, any contacts with targets were recorded. Spill movement continued until the spill hit land, moved off of the map, or aged more than 30 days.

It should be emphasized that the trajectories simulated by the model represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quantity or quality of oil that may eventually come in contact with targets. An implicit analysis of weathering and decay can be considered by noting the age of simulated oilspills when they contact targets. For this analysis, three time periods were selected: 3 days, to represent diminished toxicity of the spill; 10 days, to allow for deployment of cleanup equipment; and 30 days, since most spills are difficult to track or locate after this time.

Each entry of Tables 2, 3, and 4 represents the probability (expressed as percent chance) that, if a spill starts from a certain location, it will contact a particular target within 3, 10, or 30 days. Tables 5 through 10 show similar probabilities for land segments. These conditional probabilities consider, for targets, that the targets may not be vulnerable to oilspills for the entire year: a target which is vulnerable for only 1 month, for example, could have a conditional probability no higher than about 1/12.

Combined Analysis of Oilspill Occurrence and Oilspill Trajectory Simulations

Data in Figure 6 indicates the probabilities of different numbers of oilspills occurring as a result of the various alternatives. Tables 2 through 10 indicate the probabilities that targets or land segments will be contacted, given that an oilspill occurs. Combining these two sets of probabilities yields the chances that oilspills will occur and contact targets or land segments.

There is a critical difference between the conditional probabilities calculated in the previous section and the overall probabilities calculated in this section. Conditional probabilities depend only upon the winds and currents of the study area - elements over which the decisionmaker has no control. Overall probabilities, on the other hand, will depend not only on the physical conditions, but also on the course of action chosen by the decisionmaker, e. g., choosing one of the alternatives.

Tables 11 through 14 show, for the proposed project and the three alternatives, the probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets, within periods of 3, 10, and 30 days, over the production life of the lease area. Tables 15 through 22 show similar probabilities for land segments.

The overall probabilities are also shown graphically in Appendices B and C. Figures B-1 through B-21 are histograms which show probabilities of 1, 2, ... N spills occurring and contacting the targets within periods of 3, 10, and 30 days; the probabilities for the proposed action and the three alternatives are all shown on the same histogram, for easier comparison. Histograms for salmon fishing areas, cultural resources (NRHP), southern Shelikof Strait, and northern Shelikof Strait are not

Table 2. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 3 days.

Target	Hypothetical Spill Location															
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	T1	T2	
Land	n	n	2	4	22	22	18	3	8	44	35	20	12	8	7	
Salmon spawning	n	n	n	1	5	7	5	1	3	13	5	n	n	4	3	
Salmon fishing	n	n	n	1	4	5	4	1	2	10	4	n	n	4	3	
Razor clam beaches	n	n	n	1	4	2	4	2	3	14	2	13	8	2	1	
Benthic invert.	1	27	9	26	**	**	44	24	26	78	17	6	4	14	26	
Bird colonies	n	n	n	n	5	12	4	n	1	4	1	n	n	5	5	
Seabird foraging	n	n	1	3	27	32	33	3	6	**	8	n	n	9	8	
Marine mammal conc.	n	n	1	1	12	11	13	2	6	34	31	17	9	8	5	
Whale sightings	1	35	59	**	78	59	69	61	63	56	46	11	18	27	29	
Whale migration	n	12	30	33	46	50	62	71	61	8	27	33	17	12	15	
High biol. cover	n	n	2	3	15	16	10	2	6	34	30	4	1	3	5	
Nearshore habitats	n	n	1	n	6	5	10	2	4	17	30	30	24	3	2	
Dungeness crab	n	n	1	2	16	23	15	4	11	56	54	36	28	8	7	
Shrimp repro.	n	7	47	19	55	29	10	2	6	38	9	n	n	8	12	
Shrimp catch areas	1	65	51	25	76	**	44	20	42	**	95	**	**	16	23	
King crab repro.	n	10	11	13	**	60	37	8	25	86	**	**	86	14	16	
King crab rearing	n	n	n	n	3	3	n	1	4	29	29	17	59	n	2	
King crab maj. catch	n	22	42	16	35	42	18	11	42	42	42	42	42	8	10	
Tanner crab repro.	n	3	7	10	42	42	35	9	11	24	8	17	13	10	13	
Tanner crab catch	n	21	**	49	**	**	**	**	**	**	**	**	**	29	25	
Cultural, NRHP	n	n	n	n	5	3	n	n	n	n	n	n	n	n	1	
Cultural, AHRS	n	n	2	3	16	17	18	2	5	31	26	16	9	8	5	
E. and S. boundaries	n	n	n	n	n	n	n	n	n	n	n	n	n	10	10	
S. Shelikof Strait	n	n	n	n	n	n	n	n	n	n	n	11	32	n	n	
N. Shelikof Strait	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	

	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	
Land	10	18	31	38	67	6	11	42	23	24	12	1	n	11	55	
Salmon spawning	n	n	1	10	27	2	3	12	7	7	2	n	n	2	19	
Salmon fishing	n	n	1	8	20	2	2	11	5	6	2	n	n	1	12	
Razor clam beaches	n	12	10	5	42	3	3	13	2	4	2	n	n	2	5	
Benthic invert.	18	4	7	39	45	24	33	33	85	**	46	15	14	81	78	
Bird colonies	7	n	n	3	16	1	3	19	6	9	1	n	n	4	55	
Seabird foraging	n	n	2	39	44	4	13	46	32	32	8	1	n	13	49	
Marine mammal conc.	9	15	27	31	61	4	8	38	11	13	5	n	n	5	36	
Whale sightings	11	11	25	51	42	58	74	76	62	76	65	52	8	68	34	
Whale migration	15	25	30	16	7	86	84	29	54	47	59	18	4	65	24	
High biol. cover	2	2	17	31	47	4	4	16	15	17	10	1	n	8	39	
Nearshore habitats	n	29	35	25	35	3	5	16	8	7	4	n	n	3	8	
Dungeness crab	n	33	52	54	89	7	10	38	21	21	6	n	n	9	64	
Shrimp repro.	1	n	1	27	45	4	8	35	13	44	62	31	2	30	69	
Shrimp catch areas	27	**	99	**	**	30	32	75	73	94	64	79	23	73	90	
King crab repro.	5	98	**	96	59	14	23	79	48	95	40	11	1	36	81	
King crab rearing	n	42	21	31	14	2	n	1	5	1	n	n	n	2	13	
King crab maj. catch	13	42	42	41	29	21	14	35	28	42	36	36	9	23	42	
Tanner crab repro.	2	15	27	12	41	9	19	40	42	42	20	6	1	31	42	
Tanner crab catch	3	**	**	**	**	**	**	**	**	**	**	**	81	4	76	**
Cultural, NRHP	n	n	n	n	n	n	n	n	1	5	2	n	n	2	5	
Cultural, AHRS	n	15	26	21	61	4	10	40	21	17	10	1	n	8	40	
E. and S. boundaries	11	n	n	n	n	n	n	n	n	n	n	n	n	n	n	
S. Shelikof Strait	n	20	3	n	n	n	n	n	n	n	n	n	n	n	n	
N. Shelikof Strait	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	

Notes: ** = Greater than 99.5 percent; n = less than 0.5 percent.

Table 3. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 10 days.

Target	Hypothetical Spill Location														T1	T2
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13			
Land	13	19	22	22	47	46	40	27	34	67	58	49	46	17	16	
Salmon spawning	0	0	2	3	9	11	10	7	10	20	9	1	1	6	4	
Salmon fishing	0	0	2	3	9	9	9	6	8	16	7	1	1	6	4	
Razor clam beaches	0	0	1	3	9	6	9	10	13	23	9	25	21	5	2	
Benthic invert.	4	48	40	59	**	**	71	61	61	83	37	23	19	25	39	
Bird colonies	0	3	5	3	9	16	10	6	5	8	3	1	1	6	7	
Seabird foraging	0	1	6	13	40	45	45	18	21	**	15	2	1	13	13	
Marine mammal conc.	3	11	11	11	25	24	28	21	27	53	51	39	35	14	9	
Whale sightings	10	55	88	**	92	76	85	85	84	62	63	30	31	36	44	
Whale migration	17	42	56	57	62	64	73	84	76	32	44	48	36	22	29	
High biol. cover	0	3	12	15	34	33	24	15	22	50	46	12	9	8	11	
Nearshore habitats	0	1	6	6	13	12	17	13	18	29	45	54	47	7	4	
Dungeness crab	0	1	4	10	28	38	33	27	37	74	70	59	52	16	14	
Shrimp repro.	1	17	60	41	72	49	28	17	19	51	19	3	1	12	19	
Shrimp catch areas	5	78	71	57	89	**	67	55	70	**	98	**	**	26	33	
King crab repro.	1	20	32	36	**	75	58	40	50	90	**	**	92	22	25	
King crab rearing	0	0	0	2	5	5	3	9	13	35	38	29	59	2	4	
King crab maj. catch	2	29	43	28	40	43	31	27	43	43	43	43	43	15	18	
Tanner crab repro.	0	8	17	20	43	43	40	21	22	28	15	27	25	13	16	
Tanner crab catch	1	32	**	76	**	**	**	**	**	**	**	**	**	37	40	
Cultural, NRHP	0	0	1	3	10	6	2	0	0	0	0	0	0	0	2	
Cultural, AHRs	0	1	11	15	35	35	37	21	25	48	42	34	25	15	12	
E. and S. boundaries	22	2	1	4	1	2	6	18	13	3	9	12	7	28	28	
S. Shelikof Strait	0	0	0	0	0	0	0	1	0	0	1	19	44	0	0	
N. Shelikof Strait	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	

Target	Hypothetical Spill Location																
	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17		
Land	25	49	58	64	79	31	37	61	44	48	35	19	15	33	70		
Salmon spawning	0	1	4	16	30	8	9	17	10	11	4	1	0	5	21		
Salmon fishing	0	1	2	12	23	7	7	15	9	10	5	1	0	5	15		
Razor clam beaches	0	25	20	14	47	12	11	18	6	8	4	0	0	6	8		
Benthic invert.	30	21	26	56	48	59	65	52	92	**	64	40	26	90	78		
Bird colonies	10	1	1	5	18	5	9	24	12	13	6	4	1	7	56		
Seabird foraging	1	2	7	47	47	18	29	56	43	44	17	4	0	26	52		
Marine mammal conc.	17	38	48	52	71	24	28	51	23	26	17	11	5	16	43		
Whale sightings	28	28	44	64	45	84	92	78	75	89	89	78	25	89	42		
Whale migration	30	42	45	36	21	91	89	44	66	61	71	47	27	76	34		
High biol. cover	6	11	29	49	55	18	20	27	30	34	25	7	1	23	49		
Nearshore habitats	1	53	56	38	40	15	16	23	15	14	10	3	0	10	12		
Dungeness crab	1	59	71	73	93	32	33	53	36	34	12	2	0	21	71		
Shrimp repro.	6	2	8	39	50	18	23	47	33	62	74	42	5	52	78		
Shrimp catch areas	37	**	**	**	**	61	62	86	82	97	82	87	35	85	90		
King crab repro.	11	99	**	97	62	43	50	87	66	97	57	26	6	55	83		
King crab rearing	0	47	34	39	16	10	5	2	3	7	2	0	0	4	15		
King crab maj. catch	17	43	43	41	29	32	28	39	35	43	41	39	14	33	42		
Tanner crab repro.	5	26	32	18	41	21	28	42	43	43	27	13	3	35	42		
Tanner crab catch	13	**	**	**	**	**	**	**	**	**	**	83	11	89	**		
Cultural, NRHP	0	0	0	0	0	0	1	1	4	9	4	1	0	5	7		
Cultural, AHRs	2	32	44	39	71	24	32	58	38	36	24	5	0	24	51		
E. and S. boundaries	22	8	8	6	1	16	13	4	3	1	0	2	10	3	1		
S. Shelikof Strait	0	31	7	0	0	0	0	0	0	0	0	0	0	0	0		
N. Shelikof Strait	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		

Notes: ** = Greater than 99.5 percent; n = less than 0.5 percent.

Table 4. -- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain target within 30 days.

Target	Hypothetical Spill Location																														
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	
Land	37	53	54	49	69	67	61	50	57	80	73	70	75	29	31	46	75	75	77	88	54	58	75	65	68	62	52	45	59	82	
Salmon spawning	0	2	4	6	12	14	13	12	15	24	11	3	2	8	6	1	3	6	19	32	13	13	20	13	13	6	3	1	9	23	
Salmon fishing	0	2	5	6	11	12	12	10	12	19	9	3	2	8	6	1	3	4	15	24	11	11	18	11	13	7	3	1	8	16	
Razor clam beaches	0	2	5	7	12	10	14	17	19	27	15	31	29	8	6	1	31	25	18	49	19	17	22	10	12	7	3	1	9	10	
Benthic invert.	10	65	62	76	**	**	78	73	72	84	42	30	26	37	49	40	27	32	59	49	71	74	55	95	**	78	61	38	94	78	
Bird colonies	1	7	11	7	13	20	13	8	8	10	4	3	4	8	9	13	4	3	7	19	8	12	26	15	16	11	9	3	12	58	
Seabird foraging	1	5	12	21	45	51	51	24	29	**	19	5	4	17	18	3	5	10	50	49	25	35	60	48	48	22	9	3	32	54	
Marine mammal conc.	11	26	31	27	38	37	42	38	43	63	63	54	54	23	20	27	56	61	62	77	42	44	61	36	39	33	27	17	31	51	
Whale sightings	19	66	93	**	93	77	86	87	88	63	66	36	37	46	52	37	34	48	66	45	87	93	79	76	90	92	84	39	92	43	
Whale migration	30	66	74	73	63	65	73	82	77	34	46	51	40	32	39	43	44	46	39	22	91	89	45	67	62	78	70	48	81	35	
High biol. cover	1	10	25	27	44	44	35	27	35	57	55	20	17	14	19	11	19	37	56	59	31	31	35	40	45	35	16	5	36	56	
Nearshore habitats	1	5	14	15	20	20	28	28	31	36	55	65	60	14	12	5	65	66	46	45	30	28	29	24	20	17	9	3	18	16	
Dungeness crab	1	6	13	23	37	49	47	44	55	82	79	71	66	26	24	2	70	80	81	95	50	48	63	48	43	20	10	4	32	75	
Shrimp repro.	2	23	66	49	78	56	37	24	29	57	24	5	3	18	25	10	5	11	44	53	27	33	53	41	68	78	49	11	60	81	
Shrimp catch areas	10	83	82	72	94	**	75	66	79	**	98	**	**	36	44	44	**	**	**	71	71	90	86	98	90	93	43	91	90	90	
King crab repro.	4	32	50	55	**	84	73	58	66	90	**	**	92	34	38	20	99	**	97	63	60	65	92	78	98	68	42	15	70	84	
King crab rearing	1	2	3	8	9	10	10	18	21	39	43	34	60	7	9	2	49	38	42	19	19	12	6	9	11	6	3	2	9	17	
King crab maj. catch	4	33	45	35	43	44	37	33	44	44	43	44	44	19	22	19	44	44	43	29	37	34	42	40	44	44	41	17	38	42	
Tanner crab repro.	2	13	22	25	44	44	42	26	27	30	18	30	29	16	20	8	30	35	21	41	26	32	43	43	44	31	19	6	39	42	
Tanner crab catch	5	40	**	84	**	**	**	**	**	**	**	**	**	45	51	21	**	**	**	**	**	**	**	**	**	**	**	85	20	93	**
Cultural, NRHP	0	0	2	3	12	8	3	1	1	0	0	0	0	0	2	0	0	0	0	0	1	1	2	5	11	5	1	0	6	8	
Cultural, AHRS	1	7	22	27	45	47	50	36	40	57	53	43	35	22	21	6	42	53	48	77	39	46	67	50	46	34	14	5	36	57	
E. and S. boundaries	51	24	23	28	14	18	25	39	33	13	21	24	18	57	54	41	20	20	17	8	38	30	15	22	15	16	25	36	22	10	
S. Shelikof Strait	0	1	1	2	1	2	3	6	4	2	3	23	48	2	2	1	35	11	2	1	4	4	1	2	1	1	1	0	2	1	
N. Shelikof Strait	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	

Notes: ** = Greater than 99.5 percent; n = less than 0.5 percent.

Table 7. --- Probabilities (expressed in percent chance) that an oilspill starting at a particular location will contact a certain land segment (set 1) within 30 days.

Land Segment	Hypothetical Spill Location																															
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17		
1	n	n	n	n	n	n	n	3	1	n	1	2	4	1	n	3	1	1	n	2	2	1	1	1	n	1	n	n	n	n	n	
2	n	1	1	2	1	n	2	5	5	5	25	34	24	3	1	31	35	12	2	6	4	2	3	1	2	1	n	n	n	n	n	
3	n	n	n	n	n	n	1	1	2	1	4	2	2	n	n	1	2	5	1	1	1	n	n	n	n	2	1	n	n	n	n	n
4	n	1	1	1	1	1	2	3	7	21	14	3	1	1	1	2	5	23	4	5	3	1	1	1	1	2	1	n	n	n	n	n
5	n	1	1	2	1	1	3	8	13	32	8	2	2	2	1	2	4	19	25	11	5	3	2	1	1	3	1	1	1	1	1	1
6	n	1	1	2	2	3	8	13	15	14	5	1	1	3	1	1	3	9	50	14	15	25	4	2	1	10	1	1	1	1	2	2
7	n	n	1	2	2	5	11	4	4	2	1	n	n	1	1	n	1	1	3	4	9	19	3	1	4	1	1	n	n	n	3	3
8	n	1	3	5	15	19	10	2	2	1	n	n	n	8	n	n	n	1	1	2	5	6	16	18	6	2	2	1	1	11	41	41
9	n	1	3	5	14	8	4	1	1	1	n	n	n	2	n	n	n	n	n	1	1	2	4	14	7	1	2	n	n	1	7	6
10	n	3	11	13	19	11	4	1	1	1	n	n	n	5	2	n	n	n	n	1	1	2	7	14	19	n	6	1	6	1	15	8
11	n	1	6	3	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	2	n	2	n	3	2	1	1
12	n	4	5	2	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	2	4	n	6	4	1	2	1	1
13	n	28	13	6	4	3	1	n	n	n	n	n	n	n	1	6	n	n	n	n	n	n	1	2	3	9	n	20	27	5	2	2
14	5	2	n	n	n	n	n	n	n	n	n	n	n	n	1	19	n	n	n	n	n	n	n	n	n	n	n	2	4	n	n	n
15	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	1	1	n	n	n
16	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	2	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n
17	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	4	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n
18	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	3	6	n	n	n	n	n	n	n	n	n	n	n	n	n	n
19	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	1	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
20	n	n	n	n	n	n	n	1	1	n	n	5	10	n	n	8	2	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n

Note: n = less than 0.5 percent.

Table 11. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the proposed lease area.

Target	----- Within 3 days -----						----- Within 10 days -----						----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
Land	18	0	0.2	27	0	0.3	31	0	0.4	49	0	0.7	43	0	0.6	67	1	1.1
Salmon spawning	6	0	0.1	6	0	0.1	9	0	0.1	9	0	0.1	11	0	0.1	12	0	0.1
Salmon fishing	5	0	0.1	5	0	0.1	8	0	0.1	8	0	0.1	10	0	0.1	11	0	0.1
Razor clam beaches	6	0	0.1	6	0	0.1	10	0	0.1	11	0	0.1	14	0	0.1	15	0	0.2
Benthic invert.	27	0	0.3	41	0	0.5	38	0	0.5	56	0	0.8	44	0	0.6	65	1	1.0
Bird colonies	6	0	0.1	13	0	0.1	9	0	0.1	19	0	0.2	11	0	0.1	23	0	0.3
Seabird foraging	18	0	0.2	18	0	0.2	23	0	0.3	24	0	0.3	27	0	0.3	29	0	0.3
Marine mammal conc.	15	0	0.2	23	0	0.3	24	0	0.3	38	0	0.5	33	0	0.4	51	0	0.7
Whale sightings	40	0	0.5	48	0	0.6	47	0	0.6	62	0	1.0	50	0	0.7	67	1	1.1
Whale migration	25	0	0.3	37	0	0.5	36	0	0.4	55	0	0.8	40	0	0.5	64	1	1.0
High biol. cover	10	0	0.1	13	0	0.1	19	0	0.2	24	0	0.3	25	0	0.3	34	0	0.4
Nearshore habitats	9	0	0.1	9	0	0.1	16	0	0.2	17	0	0.2	22	0	0.3	26	0	0.3
Dungeness crab	20	0	0.2	20	0	0.2	28	0	0.3	29	0	0.3	35	0	0.4	39	0	0.5
Shrimp repro.	19	0	0.2	20	0	0.2	27	0	0.3	32	0	0.4	31	0	0.4	39	0	0.5
Shrimp catch areas	42	0	0.5	57	0	0.9	48	0	0.7	67	1	1.1	52	0	0.7	71	1	1.2
King crab repro.	34	0	0.4	38	0	0.5	41	0	0.5	48	0	0.7	47	0	0.6	58	0	0.9
King crab rearing	4	0	0.0	4	0	0.0	7	0	0.1	7	0	0.1	12	0	0.1	14	0	0.2
King crab maj. catch	22	0	0.2	32	0	0.4	26	0	0.3	39	0	0.5	29	0	0.3	43	0	0.6
Tanner crab repro.	19	0	0.2	21	0	0.2	23	0	0.3	27	0	0.3	25	0	0.3	31	0	0.4
Tanner crab catch	51	0	0.7	53	0	0.7	54	0	0.8	60	0	0.9	56	0	0.8	65	1	1.1
Cultural, NRHP	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
Cultural, AHRS	16	0	0.2	16	0	0.2	26	0	0.3	27	0	0.3	33	0	0.4	37	0	0.5
E. and S. boundaries	3	0	0.0	15	0	0.2	12	0	0.1	32	0	0.4	29	0	0.3	56	0	0.8
S. Shelikof Strait	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0
N. Shelikof Strait	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent.

Table 12. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the lease area, alternative 1.

Target	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----											
	Proposed			Proposed			Proposed											
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean									
Land	18	0	0.2	27	0	0.3	28	0	0.3	46	0	0.6	35	0	0.4	62	0	1.0
Salmon spawning	6	0	0.1	6	0	0.1	8	0	0.1	8	0	0.1	10	0	0.1	11	0	0.1
Salmon fishing	5	0	0.0	5	0	0.0	7	0	0.1	7	0	0.1	9	0	0.1	9	0	0.1
Razor clam beaches	7	0	0.1	7	0	0.1	11	0	0.1	11	0	0.1	14	0	0.1	15	0	0.2
Benthic invert.	18	0	0.2	34	0	0.4	27	0	0.3	48	0	0.7	31	0	0.4	57	0	0.8
Bird colonies	5	0	0.1	12	0	0.1	7	0	0.1	17	0	0.2	8	0	0.1	21	0	0.2
Seabird foraging	16	0	0.2	16	0	0.2	20	0	0.2	21	0	0.2	22	0	0.3	25	0	0.3
Marine mammal conc.	16	0	0.2	24	0	0.3	24	0	0.3	37	0	0.5	29	0	0.3	48	0	0.7
Whale sightings	28	0	0.3	37	0	0.5	33	0	0.4	52	0	0.7	35	0	0.4	58	0	0.9
Whale migration	17	0	0.2	30	0	0.4	25	0	0.3	47	0	0.6	27	0	0.3	56	0	0.8
High biol. cover	10	0	0.1	13	0	0.1	17	0	0.2	22	0	0.3	21	0	0.2	31	0	0.4
Nearshore habitats	11	0	0.1	11	0	0.1	17	0	0.2	18	0	0.2	21	0	0.2	26	0	0.3
Dungeness crab	21	0	0.2	21	0	0.2	29	0	0.3	30	0	0.4	34	0	0.4	38	0	0.5
Shrimp repro.	12	0	0.1	13	0	0.1	17	0	0.2	23	0	0.3	21	0	0.2	29	0	0.3
Shrimp catch areas	35	0	0.4	53	0	0.8	40	0	0.5	61	0	0.9	42	0	0.5	65	1	1.1
King crab repro.	32	0	0.4	35	0	0.4	36	0	0.4	44	0	0.6	39	0	0.5	52	0	0.7
King crab rearing	6	0	0.1	6	0	0.1	9	0	0.1	9	0	0.1	12	0	0.1	15	0	0.2
King crab maj. catch	17	0	0.2	28	0	0.3	20	0	0.2	34	0	0.4	21	0	0.2	37	0	0.5
Tanner crab repro.	15	0	0.2	18	0	0.2	18	0	0.2	23	0	0.3	19	0	0.2	26	0	0.3
Tanner crab catch	44	0	0.6	45	0	0.6	45	0	0.6	52	0	0.7	46	0	0.5	57	0	0.9
Cultural, NRHP	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
Cultural, AHRS	16	0	0.2	16	0	0.2	24	0	0.3	25	0	0.3	29	0	0.3	33	0	0.4
E. and S. boundaries	2	0	0.0	14	0	0.2	9	0	0.1	30	0	0.4	21	0	0.2	51	0	0.7
S. Shelikof Strait	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	4	0	0.0	5	0	0.0
N. Shelikof Strait	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent.

Table 13. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the lease area, alternative 2.

Target	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----											
	Proposed			Proposed			Proposed											
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean									
Land	16	0	0.2	26	0	0.3	28	0	0.3	46	0	0.6	40	0	0.5	65	1	1.0
Salmon spawning	5	0	0.1	5	0	0.1	7	0	0.1	8	0	0.1	9	0	0.1	10	0	0.1
Salmon fishing	4	0	0.0	4	0	0.0	7	0	0.1	7	0	0.1	8	0	0.1	9	0	0.1
Razor clam beaches	6	0	0.1	6	0	0.1	9	0	0.1	9	0	0.1	12	0	0.1	13	0	0.1
Benthic invert.	25	0	0.3	39	0	0.5	35	0	0.4	54	0	0.8	40	0	0.5	62	0	1.0
Bird colonies	5	0	0.0	12	0	0.1	7	0	0.1	17	0	0.2	9	0	0.1	22	0	0.2
Seabird foraging	14	0	0.2	14	0	0.2	19	0	0.2	20	0	0.2	22	0	0.3	25	0	0.3
Marine mammal conc.	13	0	0.1	21	0	0.2	21	0	0.2	35	0	0.4	30	0	0.4	48	0	0.7
Whale sightings	36	0	0.4	43	0	0.6	42	0	0.5	58	0	0.9	45	0	0.6	64	1	1.0
Whale migration	21	0	0.2	33	0	0.4	31	0	0.4	52	0	0.7	36	0	0.5	61	0	1.0
High biol. cover	10	0	0.1	12	0	0.1	17	0	0.2	22	0	0.3	23	0	0.3	32	0	0.4
Nearshore habitats	9	0	0.1	9	0	0.1	14	0	0.2	15	0	0.2	20	0	0.2	24	0	0.3
Dungeness crab	18	0	0.2	18	0	0.2	25	0	0.3	26	0	0.3	31	0	0.4	35	0	0.4
Shrimp repro.	18	0	0.2	19	0	0.2	25	0	0.3	30	0	0.4	29	0	0.3	37	0	0.5
Shrimp catch areas	39	0	0.5	56	0	0.8	45	0	0.6	64	1	1.0	48	0	0.7	69	1	1.2
King crab repro.	31	0	0.4	34	0	0.4	37	0	0.5	45	0	0.6	42	0	0.5	54	0	0.8
King crab rearing	5	0	0.1	5	0	0.1	7	0	0.1	7	0	0.1	11	0	0.1	13	0	0.1
King crab maj. catch	20	0	0.2	31	0	0.4	24	0	0.3	37	0	0.5	26	0	0.3	40	0	0.5
Tanner crab repro.	16	0	0.2	18	0	0.2	20	0	0.2	24	0	0.3	22	0	0.2	28	0	0.3
Tanner crab catch	46	0	0.6	47	0	0.6	49	0	0.7	56	0	0.8	51	0	0.7	61	0	0.9
Cultural, RRHP	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
Cultural, AHRS	14	0	0.1	14	0	0.2	22	0	0.3	24	0	0.3	28	0	0.3	33	0	0.4
E. and S. boundaries	3	0	0.0	15	0	0.2	11	0	0.1	31	0	0.4	27	0	0.3	54	0	0.8
S. Shelikof Strait	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0
N. Shelikof Strait	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent.

Table 14. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting targets over the production life of the lease area, alternative 3.

Target	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----											
	Proposed			Proposed			Proposed											
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean									
Land	12	0	0.1	22	0	0.2	23	0	0.3	43	0	0.6	36	0	0.5	63	0	1.0
Salmon spawning	4	0	0.0	4	0	0.0	6	0	0.1	6	0	0.1	8	0	0.1	9	0	0.1
Salmon fishing	3	0	0.0	3	0	0.0	5	0	0.1	5	0	0.1	7	0	0.1	8	0	0.1
Razor clam beaches	2	0	0.0	2	0	0.0	4	0	0.0	4	0	0.0	7	0	0.1	8	0	0.1
Benthic invert.	31	0	3.4	44	0	0.6	40	0	0.5	57	0	0.8	44	0	0.6	65	1	1.0
Bird colonies	8	0	0.1	15	0	0.2	10	0	0.1	20	0	0.2	12	0	0.1	24	0	0.3
Seabird foraging	12	0	0.1	12	0	0.1	18	0	0.2	18	0	0.2	21	0	0.2	24	0	0.3
Marine mammal conc.	7	0	0.1	16	0	0.2	14	0	0.2	29	0	0.3	23	0	0.3	44	0	0.6
Whale sightings	35	0	0.4	43	0	0.6	43	0	0.6	59	0	0.9	45	0	0.6	65	1	1.0
Whale migration	25	0	0.3	36	0	0.5	34	0	0.4	54	0	0.8	39	0	0.5	63	0	1.0
High biol. cover	8	0	0.1	11	0	0.1	16	0	0.2	21	0	0.2	22	0	0.3	31	0	0.4
Nearshore habitats	3	0	0.0	3	0	0.0	7	0	0.1	8	0	0.1	13	0	0.1	17	0	0.2
Dungeness crab	12	0	0.1	12	0	0.1	18	0	0.2	19	0	0.2	24	0	0.3	29	0	0.3
Shrimp repro.	20	0	0.2	21	0	0.2	28	0	0.3	33	0	0.4	32	0	0.4	40	0	0.5
Shrimp catch areas	34	0	0.4	52	0	0.7	41	0	0.5	62	0	1.0	45	0	0.6	67	1	1.1
King crab repro.	24	0	0.3	28	0	0.3	32	0	0.4	40	0	0.5	39	0	0.5	51	0	0.7
King crab rearing	2	0	0.0	2	0	0.0	4	0	0.0	4	0	0.0	8	0	0.1	10	0	0.1
King crab maj. catch	18	0	0.2	29	0	0.3	22	0	0.3	36	0	0.4	25	0	0.3	40	0	0.5
Tanner crab repro.	16	0	0.2	19	0	0.2	20	0	0.2	24	0	0.3	22	0	0.2	28	0	0.3
Tanner crab catch	42	0	0.5	44	0	0.6	46	0	0.6	54	0	0.8	49	0	0.7	60	0	0.9
Cultural, NHRP	1	0	0.0	1	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0
Cultural, AIRS	9	0	0.1	9	0	0.1	17	0	0.2	19	0	0.2	24	0	0.3	29	0	0.3
E. and S. boundaries	3	0	0.0	15	0	0.2	10	0	0.1	30	0	0.4	25	0	0.3	53	0	0.8
S. Shelikof Strait	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	3	0	0.0
N. Shelikof Strait	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent.

Table 15. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 1) over the production life of the proposed lease area.

Land Segment	Within 3 days		Within 10 days		Within 30 days	
	Proposed	Existing and Proposed	Proposed	Existing and Proposed	Proposed	Existing and Proposed
	Prob Mode	Mean	Prob Mode	Mean	Prob Mode	Mean
1	n	0	n	0	1	0
2	1	0	3	0	5	0
3	n	0	n	0	1	0
4	1	0	2	0	3	0
5	2	0	3	0	5	0
6	7	0	9	0	11	0
7	3	0	5	0	5	0
8	1	0	3	0	4	0
9	n	0	1	0	2	0
10	1	0	3	0	4	0
11	n	0	n	0	n	0
12	n	0	6	0	1	0
13	n	0	3	0	1	0
14	n	0	3	0	4	0
15	n	0	n	0	n	0
16	n	0	n	0	n	0
20	n	0	n	0	1	0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 16. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 1) over the production life of the lease area, alternative 1.

Land Segment	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
2	2	0	0.0	2	0	0.0	4	0	0.0	4	0	0.0
3	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
4	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
5	3	0	0.0	3	0	0.0	4	0	0.0	6	0	0.1
6	7	0	0.1	7	0	0.1	10	0	0.1	11	0	0.1
7	3	0	0.0	3	0	0.0	4	0	0.0	4	0	0.0
8	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
9	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
10	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
11	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
12	n	0	0.0	6	0	0.1	n	0	0.0	n	0	0.0
13	n	0	0.0	3	0	0.0	n	0	0.0	9	0	0.1
14	n	0	0.0	3	0	0.0	n	0	0.0	6	0	0.1
15	n	0	0.0	n	0	0.0	n	0	0.0	11	0	0.1
16	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
20	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 17. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 1) over the production life of the lease area, alternative 2.

Land Segment	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----					
	Proposed			Proposed			Proposed					
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean			
1	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
2	1	0	0.0	1	0	0.0	3	0	0.0	5	0	0.0
3	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
4	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
5	2	0	0.0	2	0	0.0	3	0	0.0	4	0	0.0
6	6	0	0.1	6	0	0.1	8	0	0.1	9	0	0.1
7	2	0	0.0	2	0	0.0	3	0	0.0	4	0	0.0
8	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0
9	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
10	1	0	0.0	1	0	0.0	3	0	0.0	4	0	0.0
11	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
12	n	0	0.0	6	0	0.1	n	0	0.0	1	0	0.0
13	n	0	0.0	3	0	0.0	n	0	0.0	1	0	0.0
14	n	0	0.0	3	0	0.0	1	0	0.0	4	0	0.0
15	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
16	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 18. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 1) over the production life of the lease area, alternative 3.

Land Segment	----- Within 3 days -----			----- Within 10 days -----			----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
2	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
5	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
6	1	0	0.0	1	0	0.0	2	0	0.0	3	0	0.0
7	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
8	6	0	0.1	6	0	0.1	8	0	0.1	9	0	0.1
9	1	0	0.0	1	0	0.0	3	0	0.0	3	0	0.0
10	1	0	0.0	1	0	0.0	5	0	0.0	7	0	0.1
11	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
12	n	0	0.0	6	0	0.1	n	0	0.0	10	0	0.1
13	n	0	0.0	3	0	0.0	n	0	0.0	6	0	0.1
14	n	0	0.0	3	0	0.0	1	0	0.0	12	0	0.1
15	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0
16	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 19. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 2) over the production life of the proposed lease area.

Land Segment	----- Within 3 days -----		----- Within 10 days -----		----- Within 30 days -----	
	Proposed	Existing and Proposed	Proposed	Existing and Proposed	Proposed	Existing and Proposed
	Prob Mode	Mean	Prob Mode	Mean	Prob Mode	Mean
1	0	0.0	0	0.0	1	0
2	1	0	1	0.0	3	0
3	1	0	2	0.0	3	0
4	n	0	1	0.0	2	0
5	1	0	1	0.0	2	0
6	1	0	2	0.0	3	0
7	2	0	3	0.0	4	0
8	4	0	6	0.1	6	0
9	2	0	3	0.0	3	0
10	2	0	3	0.0	4	0
11	1	0	3	0.0	4	0
12	n	0	1	0.0	1	0
13	n	0	1	0.0	1	0
14	n	0	1	0.0	1	0
15	n	0	1	0.0	1	0
16	n	0	n	0.0	1	0
17	n	0	1	0.0	2	0
18	n	0	n	0.0	n	0
19	n	0	n	0.0	n	0
20	n	0	n	0.0	n	0
48	n	0	1	0.0	n	0
49	n	0	3	0.0	1	0
50	n	0	5	0.0	1	0
51	n	0	2	0.0	1	0
52	n	0	n	0.0	n	0
53	n	0	n	0.0	n	0
54	n	0	n	0.0	n	0
55	n	0	n	0.0	n	0
56	n	0	n	0.0	n	0
57	n	0	n	0.0	n	0
58	n	0	n	0.0	n	0
59	n	0	n	0.0	n	0
60	n	0	n	0.0	n	0
61	n	0	n	0.0	n	0
62	n	0	n	0.0	n	0
63	n	0	n	0.0	n	0
64	n	0	n	0.0	n	0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 20. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 2) over the production life of the lease area, alternative 1.

Land Segment	----- Within 3 days -----						----- Within 10 days -----						----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
2	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
3	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0
4	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
5	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
6	2	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
7	3	0	0.0	3	0	0.0	4	0	0.0	4	0	0.0	5	0	0.0	5	0	0.1
8	4	0	0.0	4	0	0.0	5	0	0.0	5	0	0.1	6	0	0.1	6	0	0.1
9	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0
10	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0
11	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
12	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
14	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
17	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
19	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
20	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
48	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
49	n	0	0.0	3	0	0.0	n	0	0.0	5	0	0.0	n	0	0.0	6	0	0.1
50	n	0	0.0	5	0	0.0	n	0	0.0	7	0	0.1	n	0	0.0	9	0	0.1
51	n	0	0.0	2	0	0.0	n	0	0.0	4	0	0.0	n	0	0.0	5	0	0.0
52	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
53	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
54	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
55	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
56	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
57	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
58	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
59	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
60	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
61	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
62	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 21. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 2) over the production life of the lease area, alternative 2.

Land Segment	----- Within 3 days -----						----- Within 10 days -----						----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
2	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
3	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	4	0	0.0
4	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
5	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
6	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
7	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0	4	0	0.0
8	3	0	0.0	3	0	0.0	4	0	0.0	4	0	0.0	5	0	0.0	5	0	0.0
9	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0
10	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0	2	0	0.0
11	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0
12	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
13	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
14	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
15	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
16	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
17	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0
18	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
19	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
20	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
48	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
49	n	0	0.0	3	0	0.0	n	0	0.0	5	0	0.0	1	0	0.0	7	0	0.1
50	n	0	0.0	5	0	0.0	n	0	0.0	7	0	0.1	1	0	0.0	10	0	0.1
51	n	0	0.0	2	0	0.0	n	0	0.0	4	0	0.0	1	0	0.0	6	0	0.1
52	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
53	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	n	0	0.0	3	0	0.0
54	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
55	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
56	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
57	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
58	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
59	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
60	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
61	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
62	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
63	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
64	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

Table 22. -- Probabilities (expressed in percent chance) of one or more spills, the most likely number of spills, and the expected number of spills occurring and contacting land segments (set 2) over the production life of the lease area, alternative 3.

Land Segment	----- Within 3 days -----						----- Within 10 days -----						----- Within 30 days -----					
	Proposed			Existing and Proposed			Proposed			Existing and Proposed			Proposed			Existing and Proposed		
	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean	Prob	Mode	Mean
1	.n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
2	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
3	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	2	0	0.0
4	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
5	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
6	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0
7	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
8	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0
9	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
10	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
11	2	0	0.0	2	0	0.0	3	0	0.0	3	0	0.0	3	0	0.0	4	0	0.0
12	4	0	0.0	4	0	0.0	5	0	0.0	5	0	0.0	5	0	0.0	5	0	0.0
13	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
14	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0
15	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
16	n	0	0.0	n	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0	1	0	0.0
17	1	0	0.0	1	0	0.0	2	0	0.0	2	0	0.0	3	0	0.0	4	0	0.0
18	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
19	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
20	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0
48	n	0	0.0	1	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
49	n	0	0.0	3	0	0.0	n	0	0.0	5	0	0.0	1	0	0.0	7	0	0.1
50	n	0	0.0	5	0	0.0	n	0	0.0	7	0	0.1	1	0	0.0	10	0	0.1
51	n	0	0.0	2	0	0.0	n	0	0.0	4	0	0.0	1	0	0.0	6	0	0.1
52	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0	n	0	0.0	2	0	0.0
53	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0	1	0	0.0	3	0	0.0
54	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
55	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
56	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
57	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	2	0	0.0
58	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
59	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
60	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
61	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
62	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
63	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0
64	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	n	0	0.0	1	0	0.0

Note: n = less than 0.5 percent. Those land segments for which all probabilities of one or more spills are less than 0.5 percent are not shown.

shown because of their low probability of contact (Tables 11-14). Figures C-1 through C-4 indicate, through circles superimposed on a map of the coastline, the probabilities of one or more spills occurring and contacting the land segments within 3, 10, and 30 days, for the proposed action and each of the alternatives.

Discussion of Results

The data in Table 8 indicate that there is a 0.43 probability that one or more oilspills will occur as a result of the proposed lease sale and contact land within 30 days. From Tables 15 and 19, it can be inferred that any spills that contact land will do so on the eastern side of Kodiak Island. There is very little probability that the proposed lease sale will result in oilspills occurring and contacting the mainland or the western side of Kodiak Island. It is also very unlikely that a spill will occur and enter Shelikof Strait. Except for land, the model does not directly report how oilspill contacts are distributed among different areas of each target; however, the above analysis strongly implies that most contacts of targets will occur east of Kodiak Island.

Along the eastern side of Kodiak Island, oilspill risks are evenly distributed among the land segments. This distribution, however, is due to the large size of the proposed leasing area and the uncertainties regarding the location of oil (if any) within the area; if oil is discovered, then the risks of production will tend to concentrate in some segments more than others.

In comparing the proposed lease area to the three alternatives, few significant differences are apparent. This is because risk calculations have been based on the unrisksed mean estimate of oil reserves; deleting portions of the lease area changes the probability that oil will be found but does not, in this case, greatly change the unrisksed mean estimate (which is conditioned upon oil being found in economically recoverable quantities). Since the risks of the proposed action and all three alternatives are based upon nearly the same amount of oil, the only differences are due to the tract locations. Alternative 3 would probably result in less oilspills occurring and contacting land within 3 days, compared to the proposed action and the other alternatives, since it would delete those tracts closest to shore; this difference is minimized, however, when contacts within 30 days are considered.

Conclusions

This analysis indicates that, assuming that oil is found in economically recoverable amounts, OCS Lease Sale 46 will result in an expected number of 1.1 oilspills occurring off the coast of Kodiak Island. The probability that one or more oilspills will occur and contact land within 3 days is 0.18; for contacts within 30 days, this probability increases to 0.43. Again, it is emphasized that these estimates are contingent upon economically recoverable amounts of petroleum being found in the lease area, and that the likelihood of this is small.

Oilspill risks to land occur primarily along the eastern shore of Kodiak Island, and any oilspill impacts to targets located at sea will probably also occur east of Kodiak Island.

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Appendix A

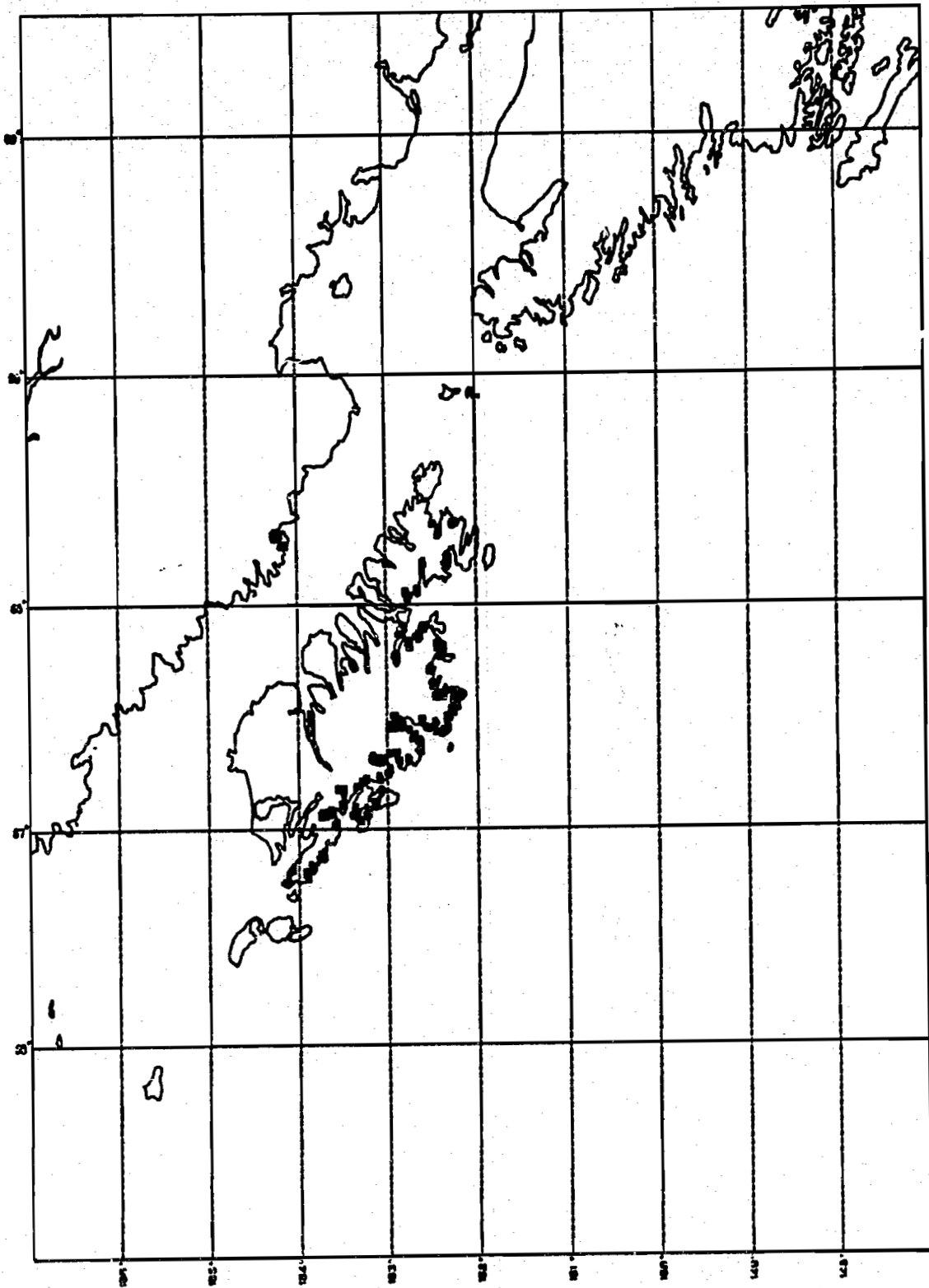


Figure A.1.--Map showing the location of salmon spawning areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

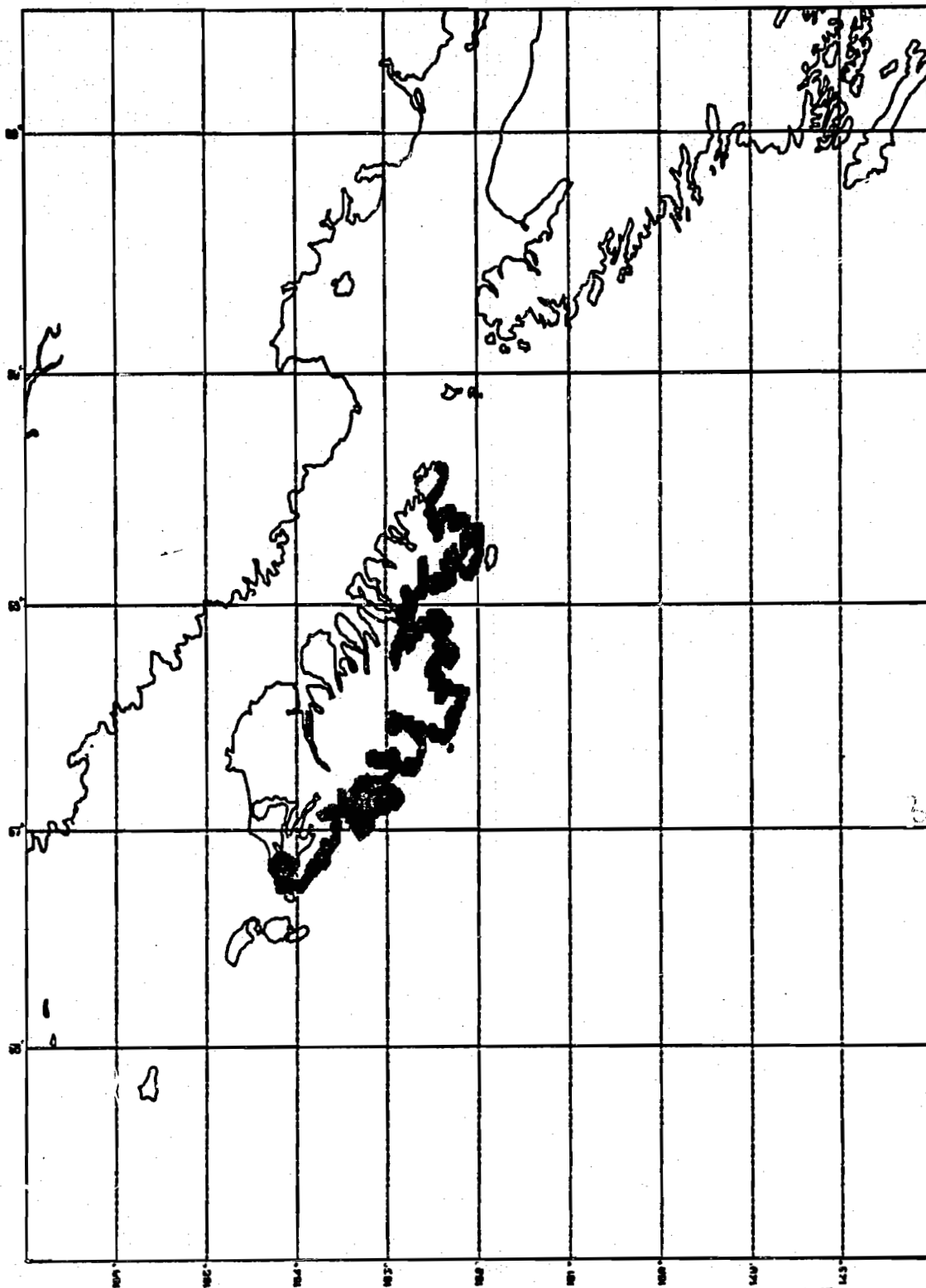


Figure A.2.--Map showing the location of salmon fishing areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

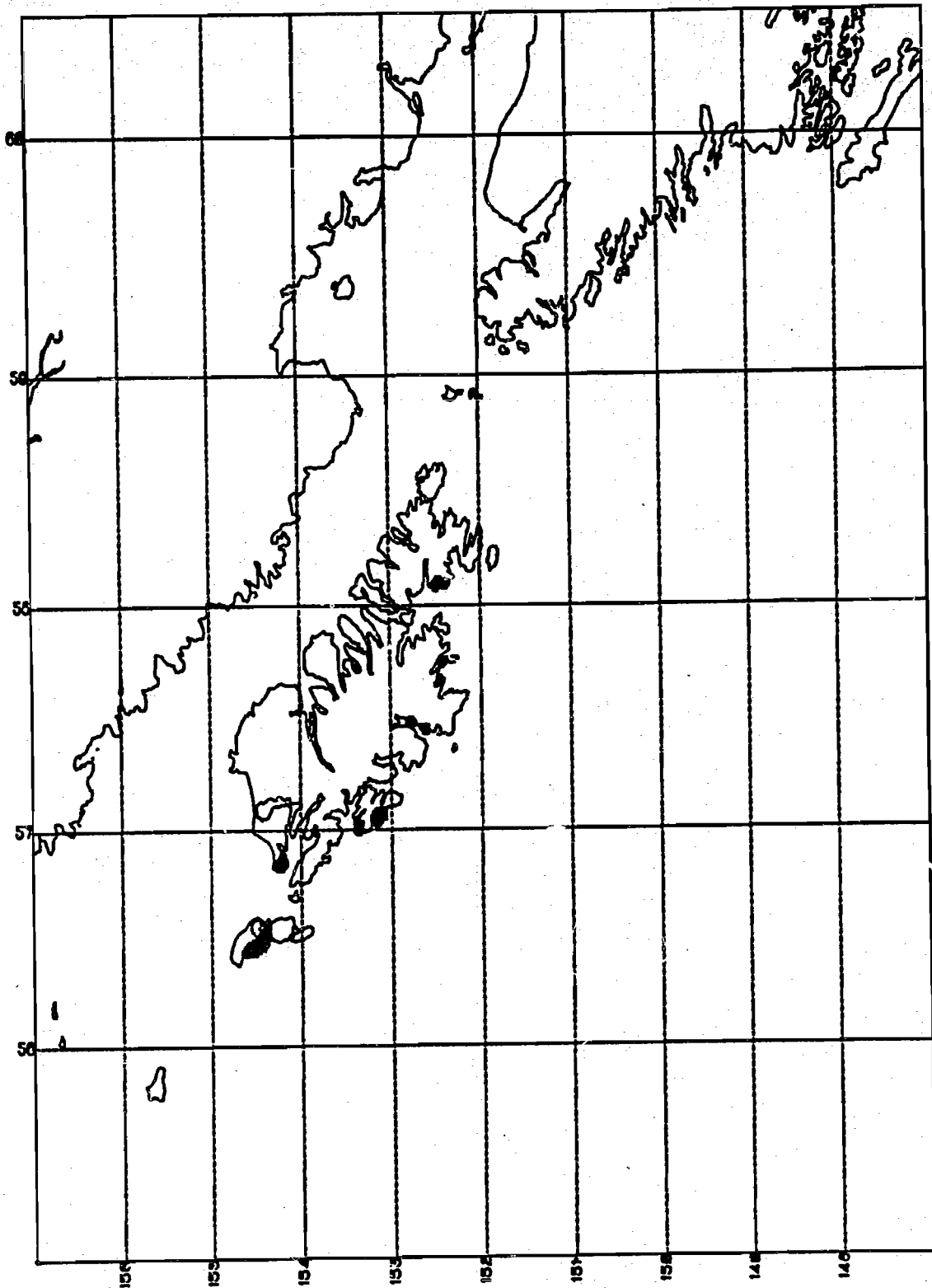


Figure A.3.--Map showing the location of razor clam beaches, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

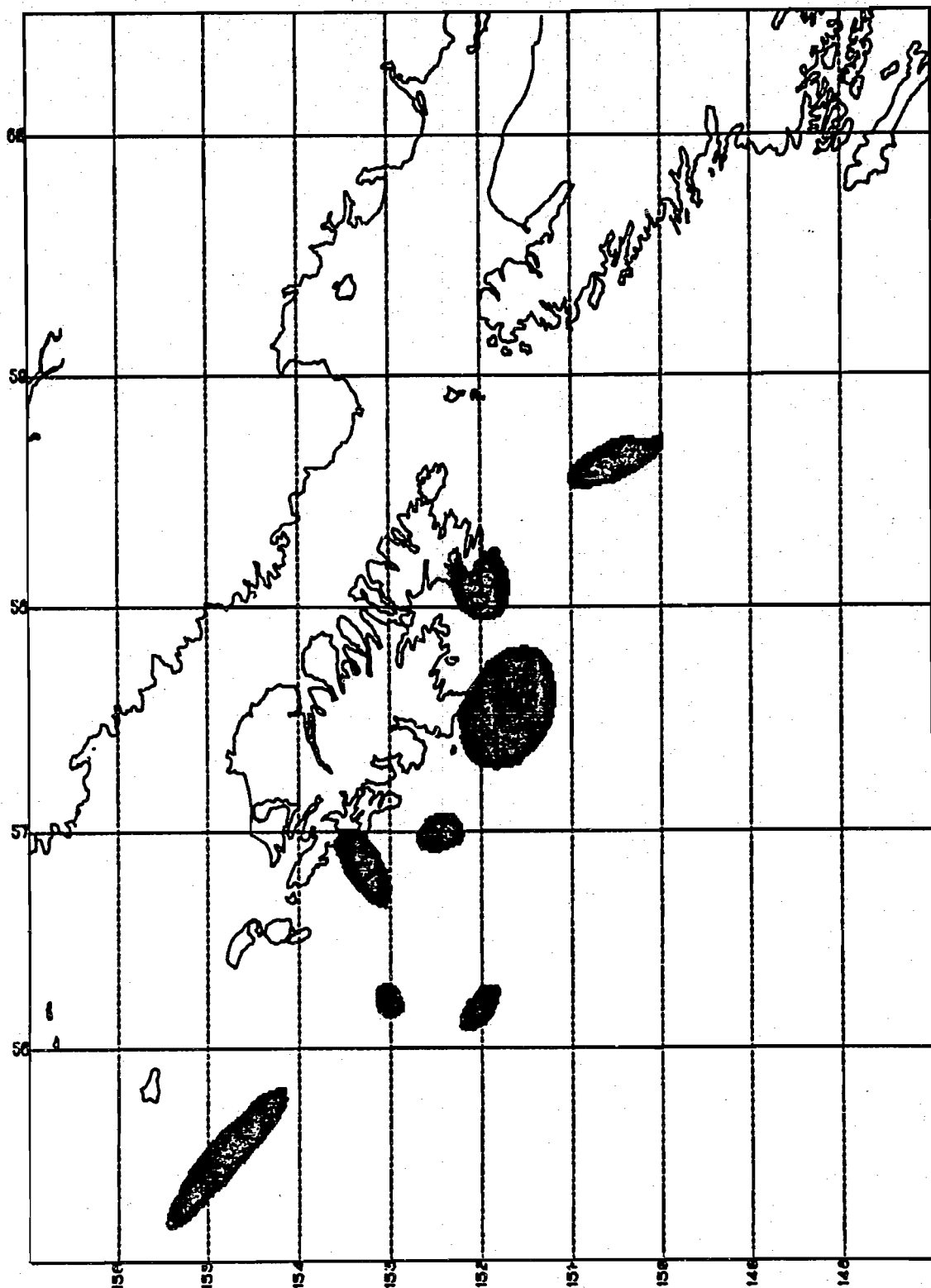


Figure A.4.--Map showing the location of benthic invertebrate high biomass areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

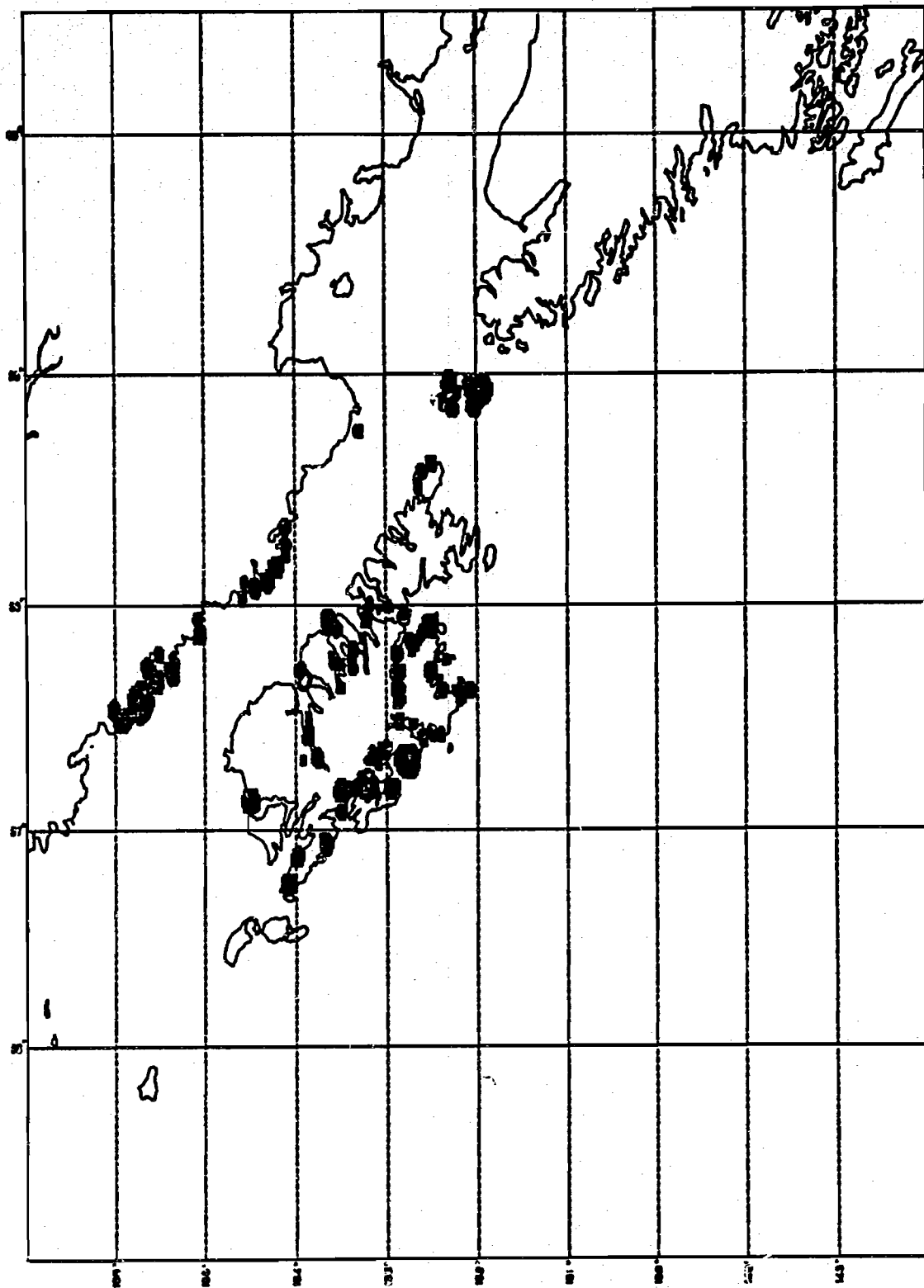


Figure A.5.--Map showing the location of bird colonies, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

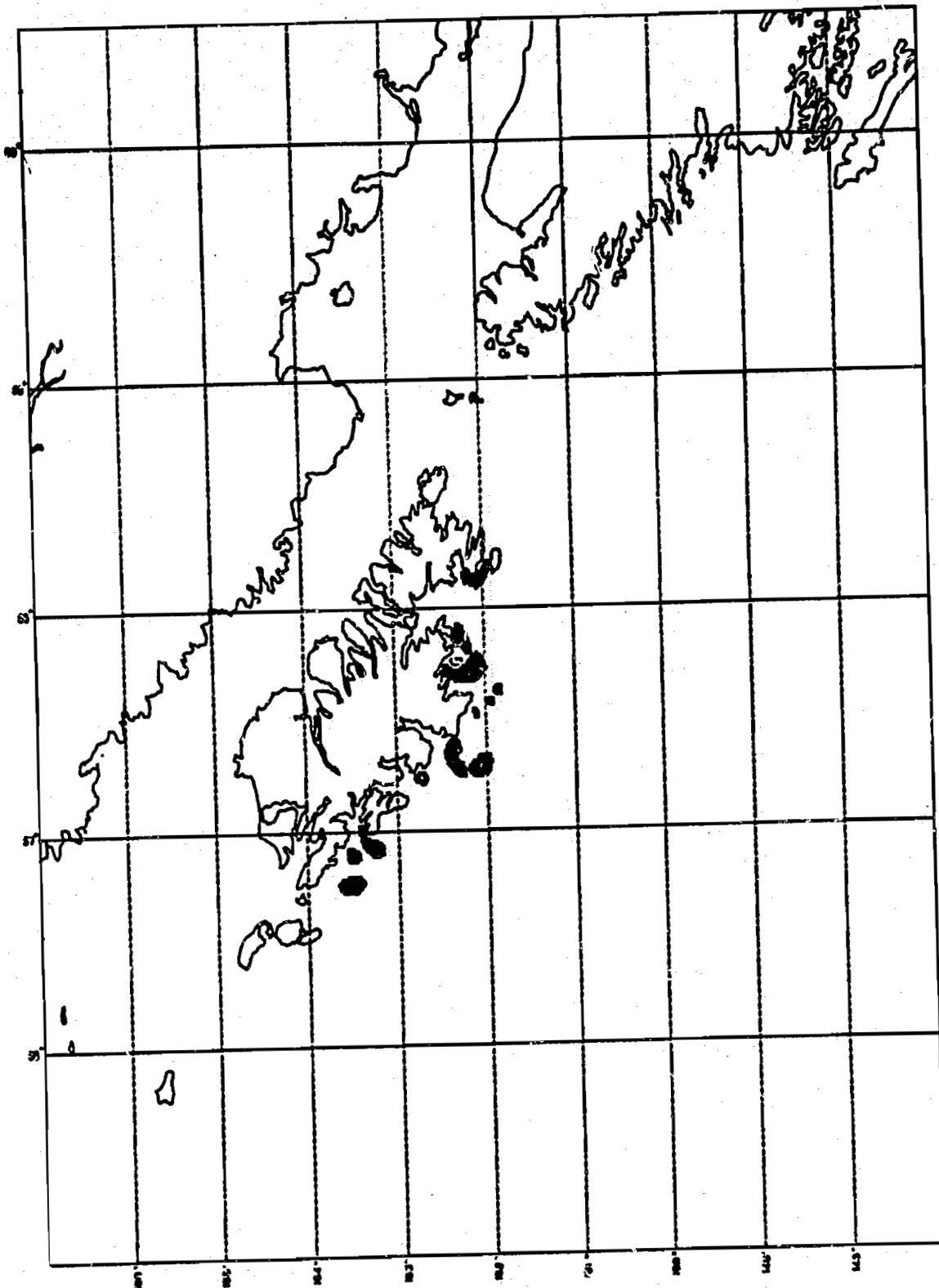


Figure A.6.--Map showing the location of seabird foraging areas Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

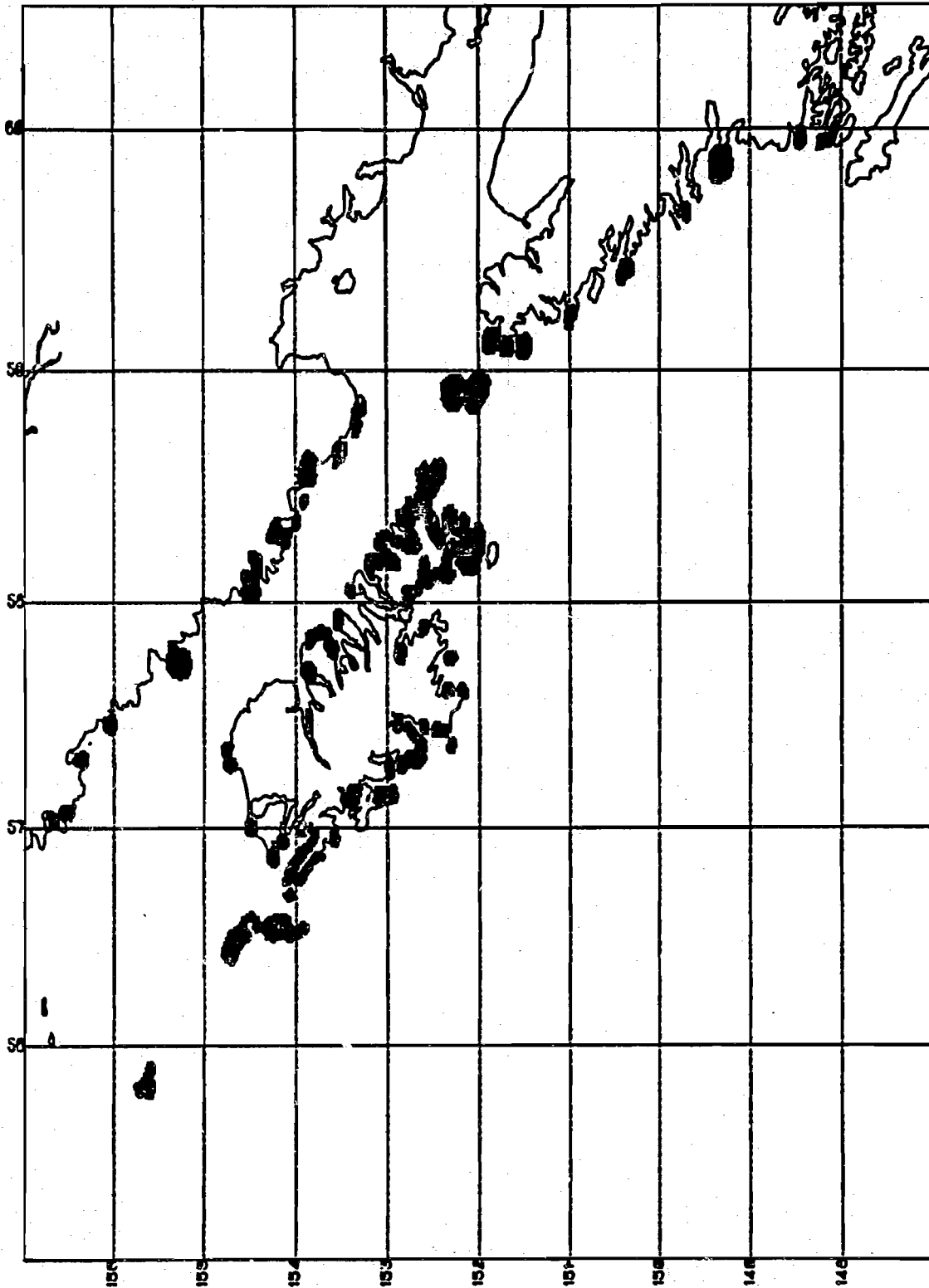


Figure A.7.--Map showing the location of marine mammal rookeries and concentrations, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

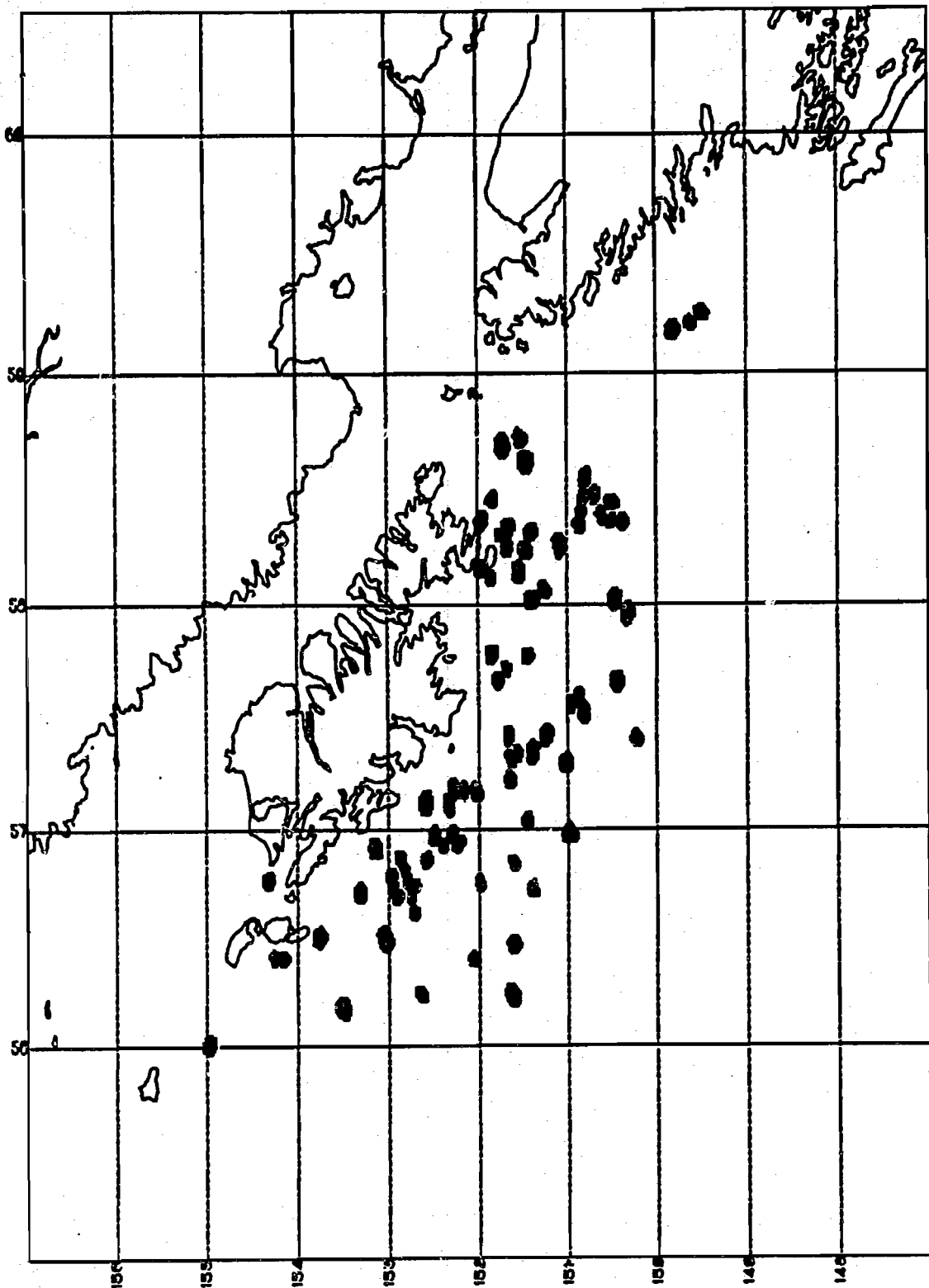


Figure A.8.--Map showing the location of whale sightings, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

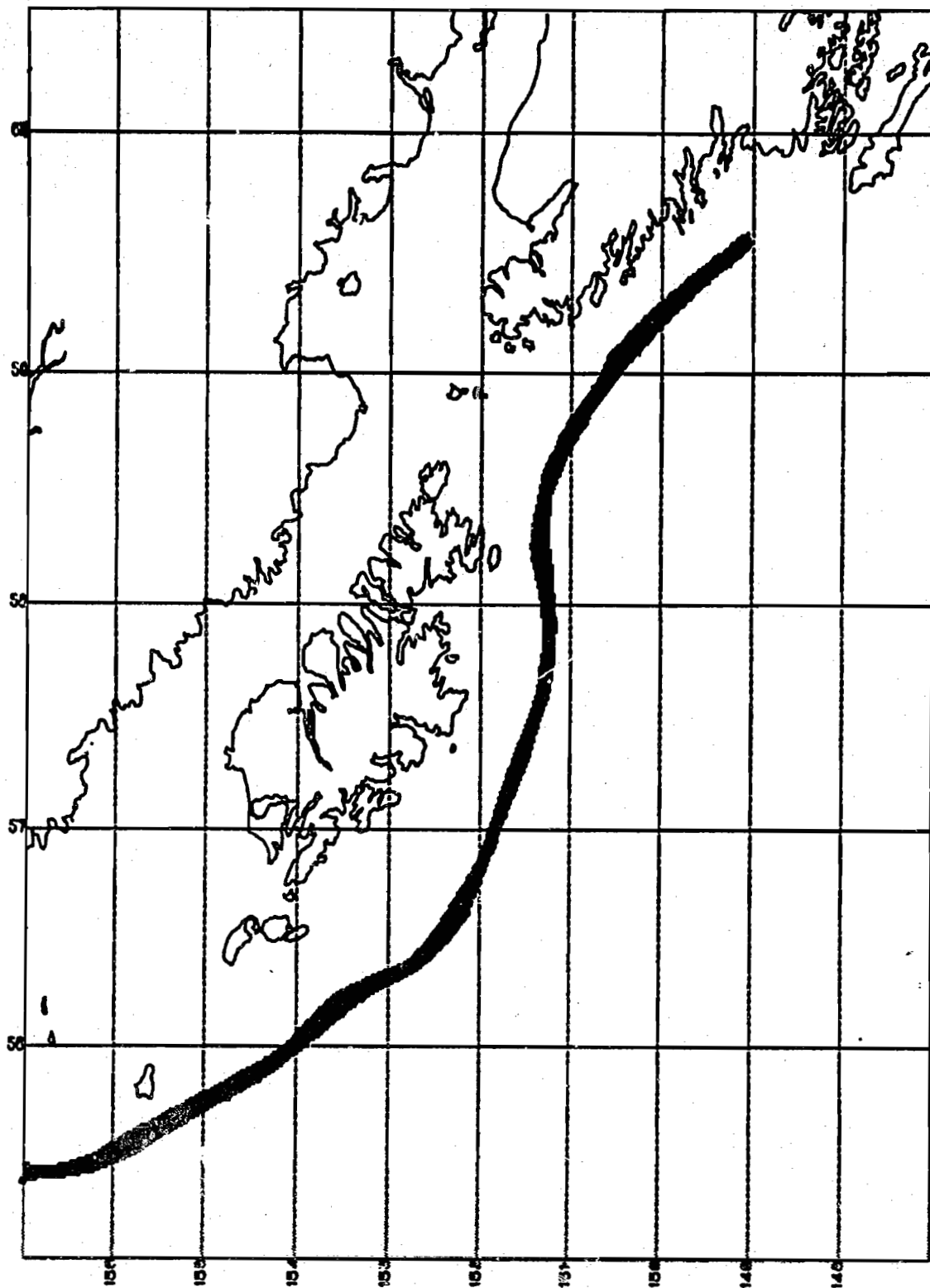


Figure A.9.--Map showing the location of the whale migration route, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

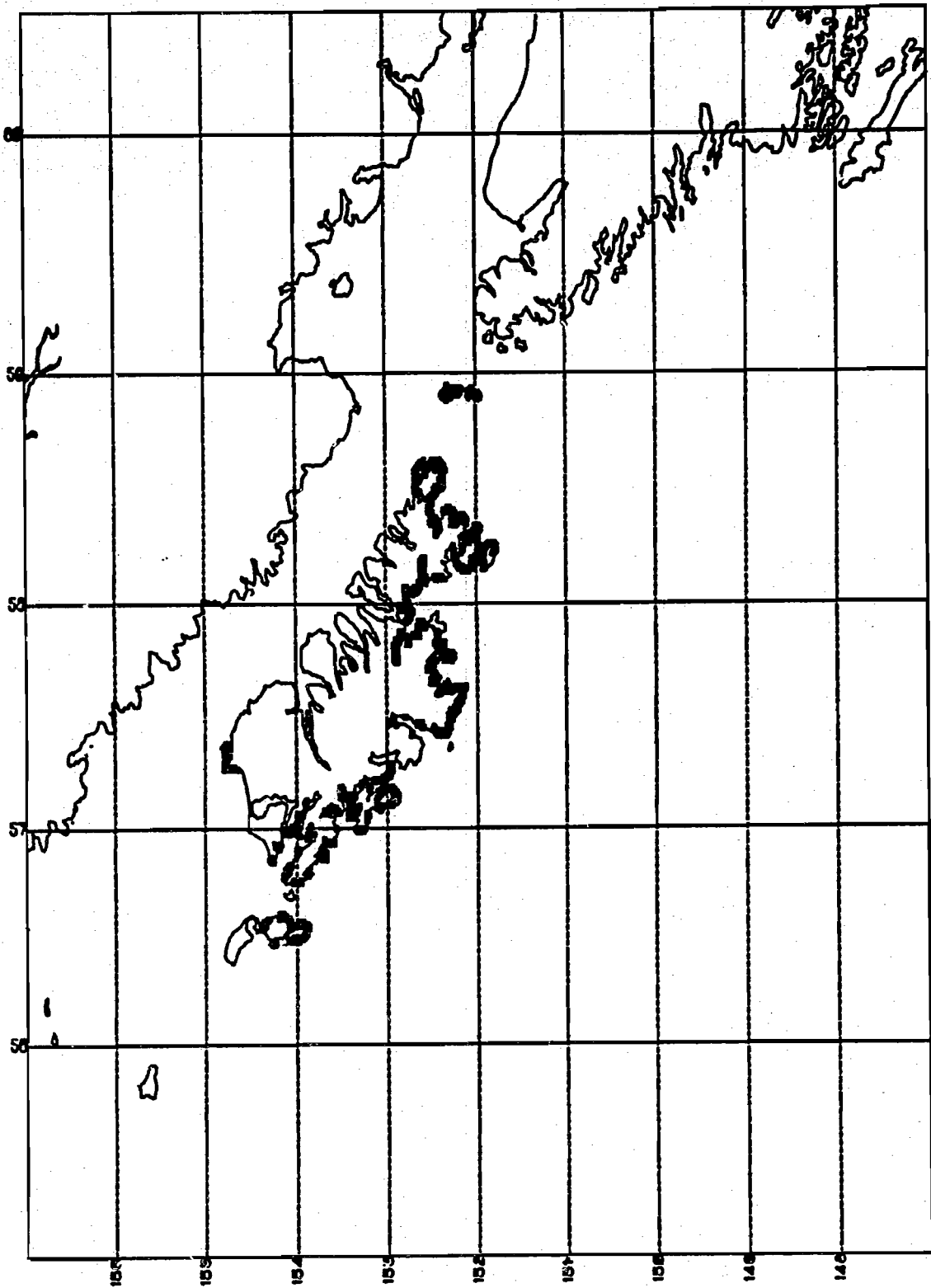


Figure A.10.--Map showing the location of areas of high biological cover, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

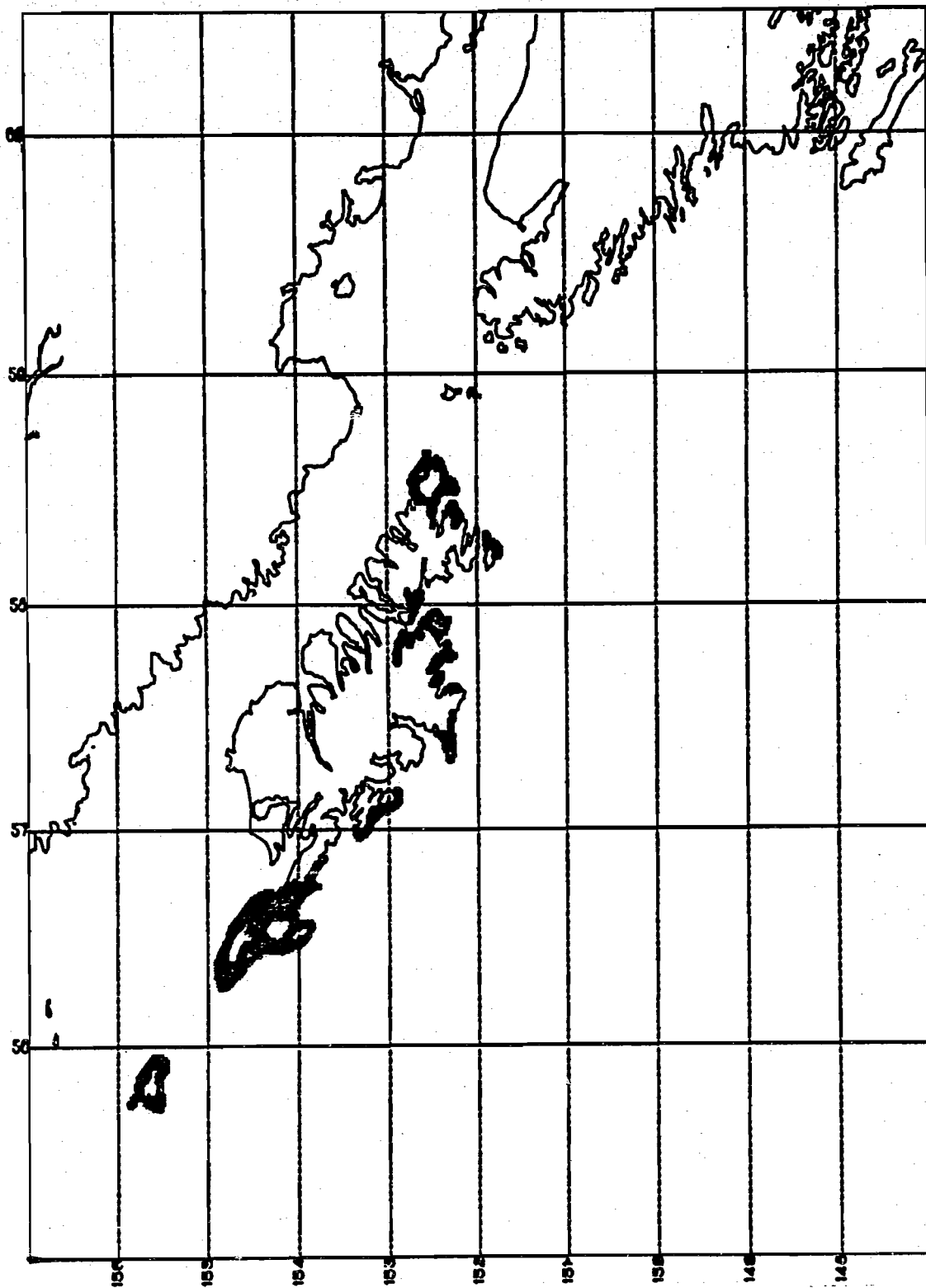


Figure A.11.--Map showing the location of nearshore habitats, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

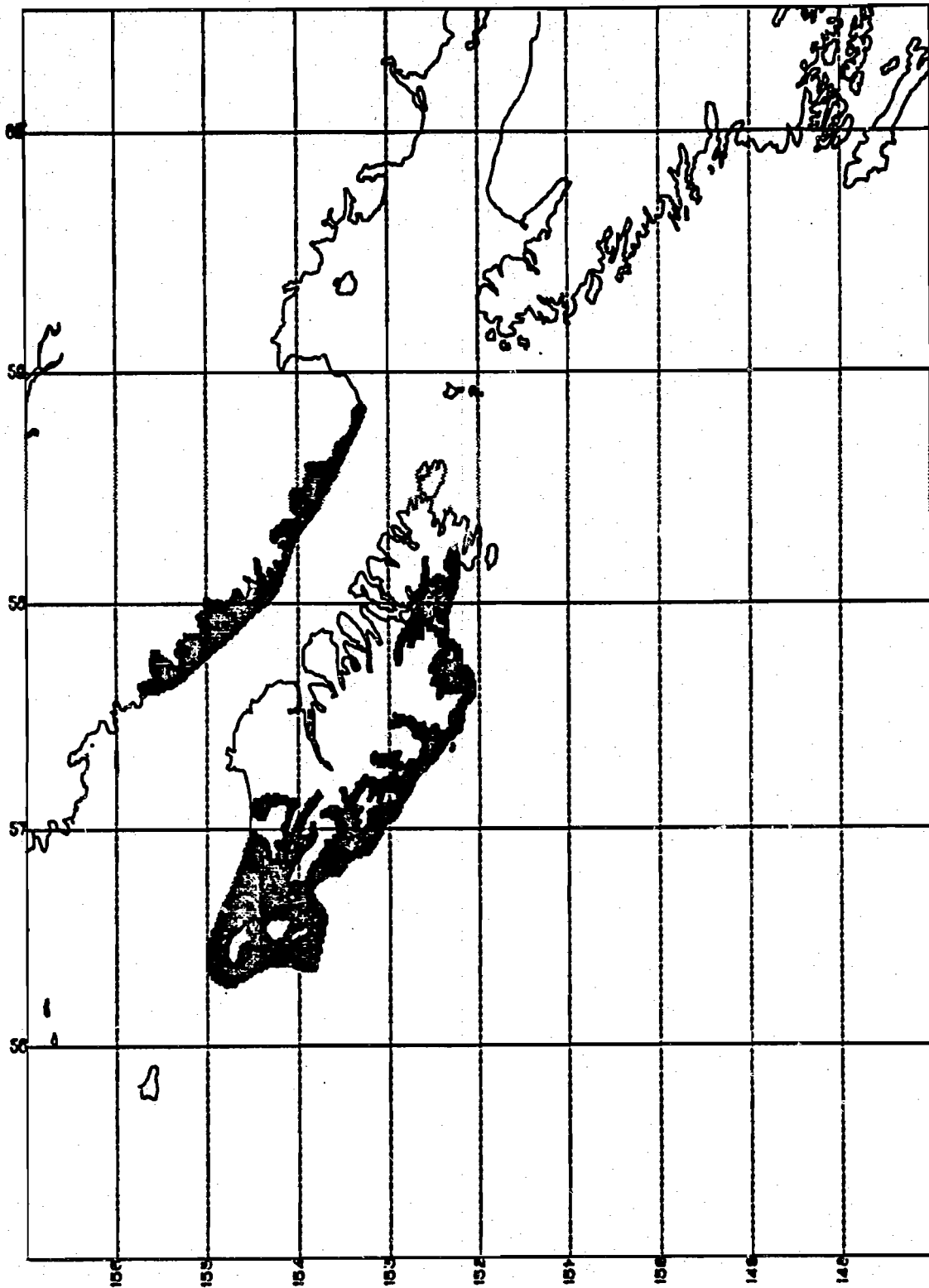


Figure A.12.--Map showing the location of Dungeness crab reproduction and catch areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

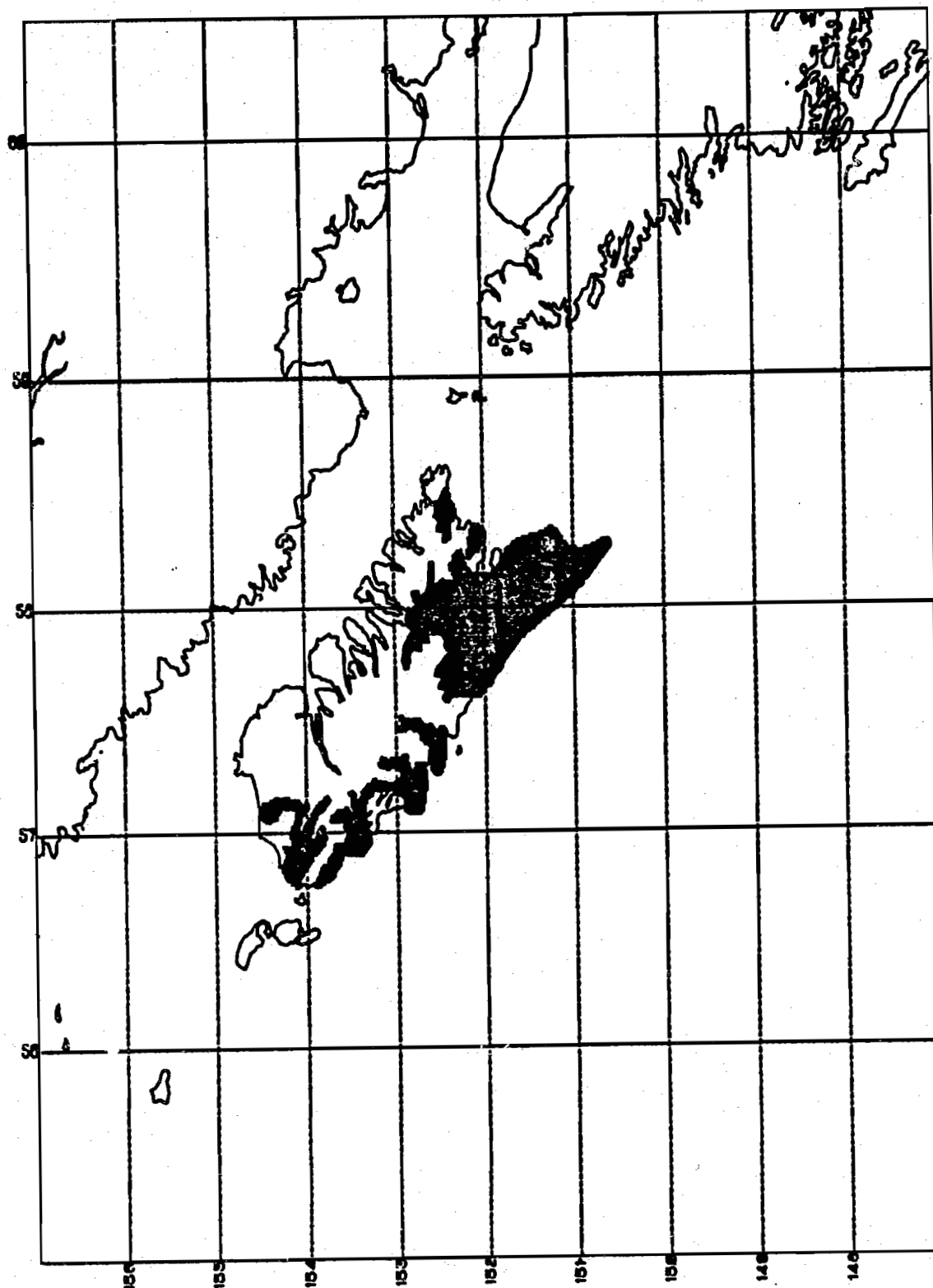


Figure A.13.--Map showing the location of shrimp reproduction and rearing areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

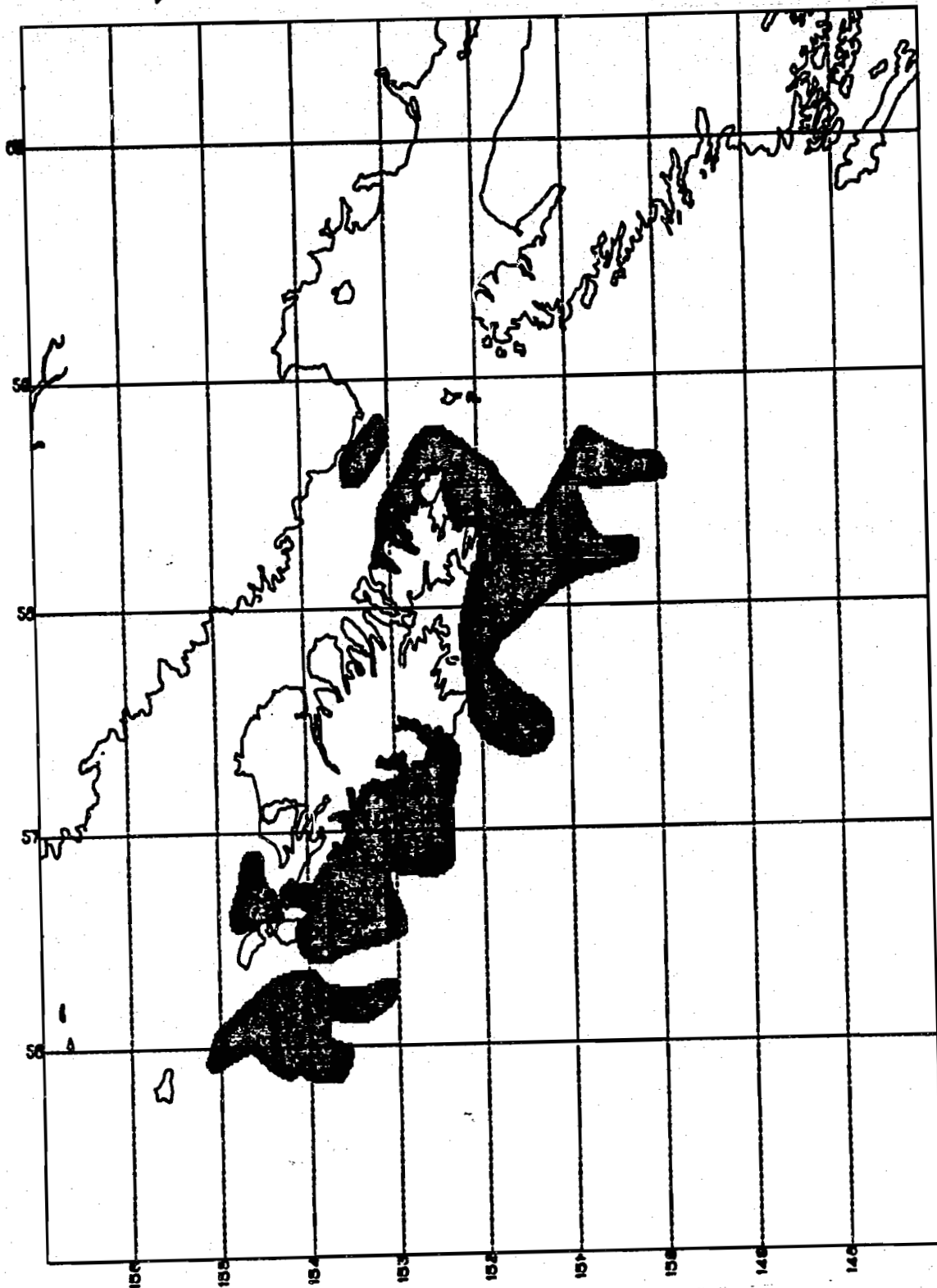


Figure A.14.--Map showing the location of shrimp catch areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

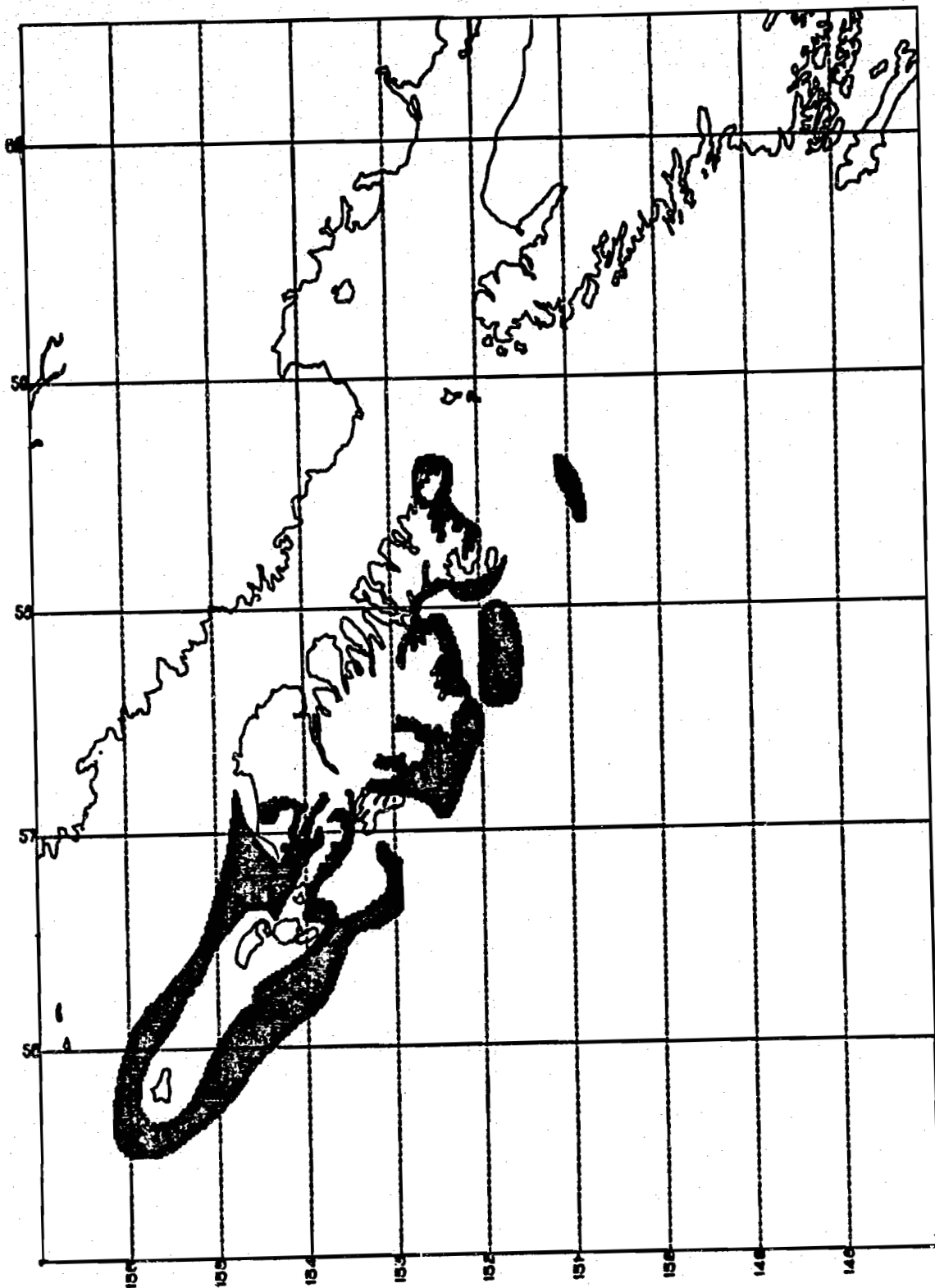


Figure A.15.--Map showing the location of King crab vital reproduction areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

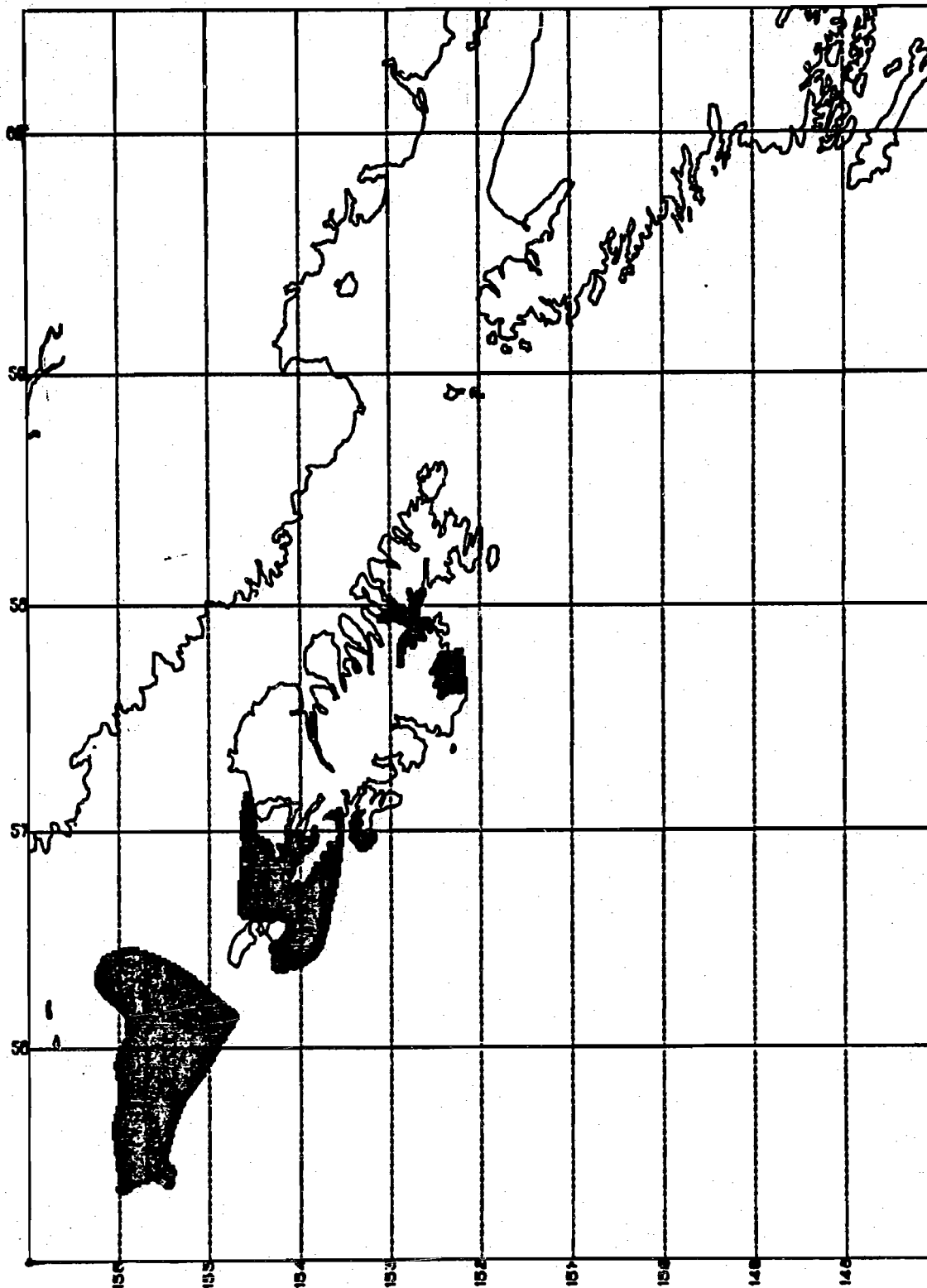


Figure A.16.--Map showing the location of King crab vital rearing areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

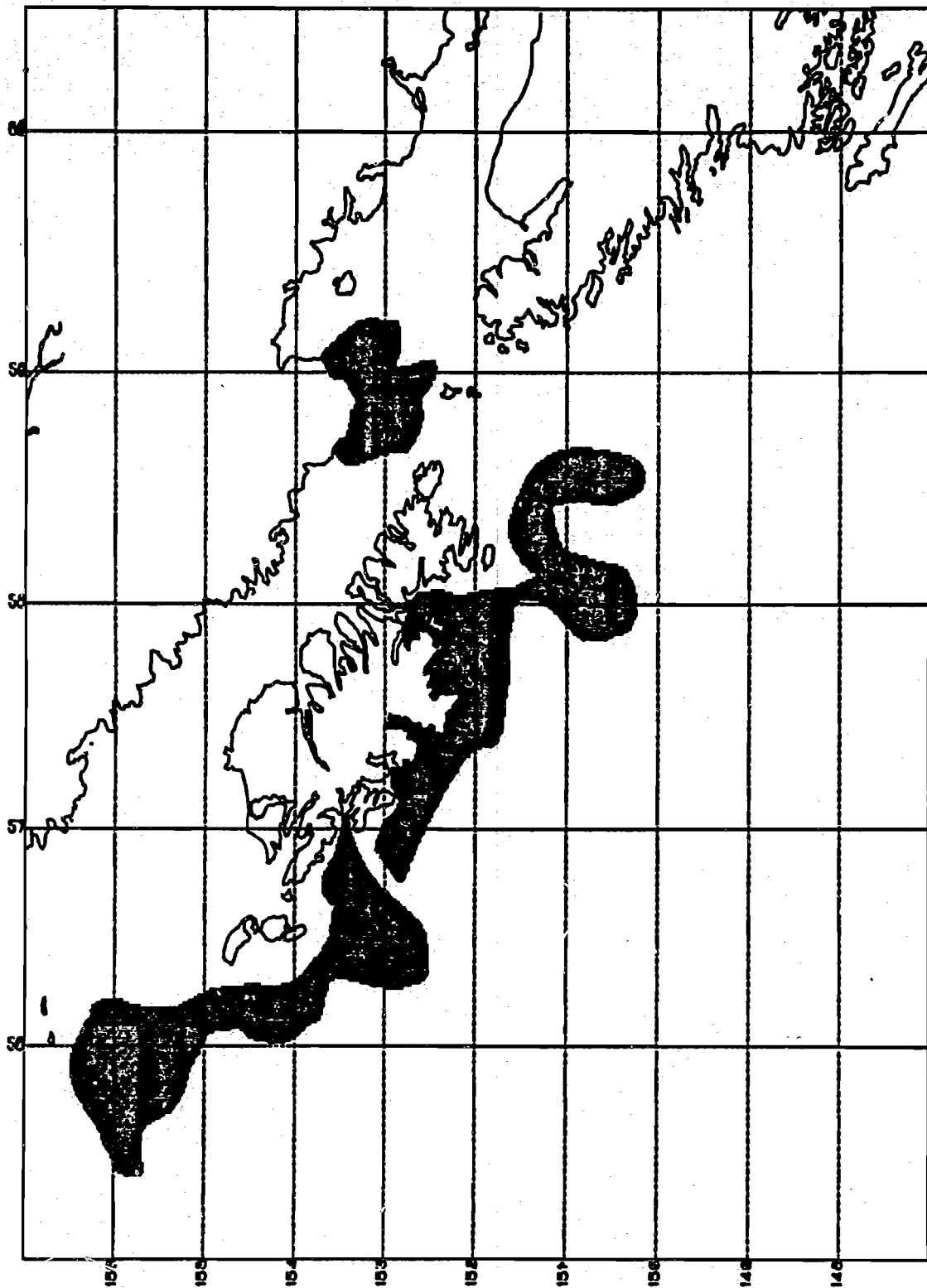


Figure A.17.--Map showing the location of King crab major catch areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

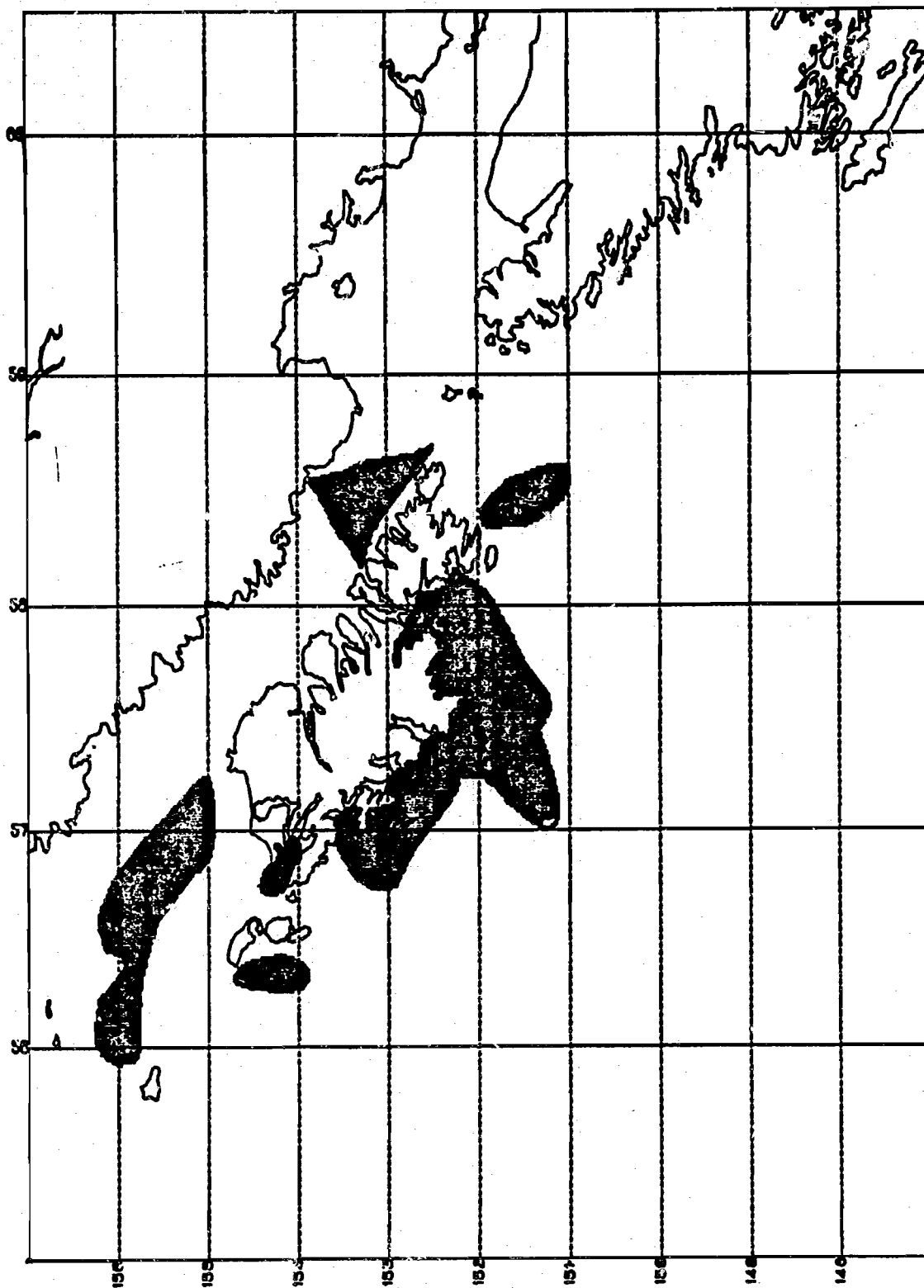


Figure A.18.--Map showing the location of Tanner crab vital reproduction and catch areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

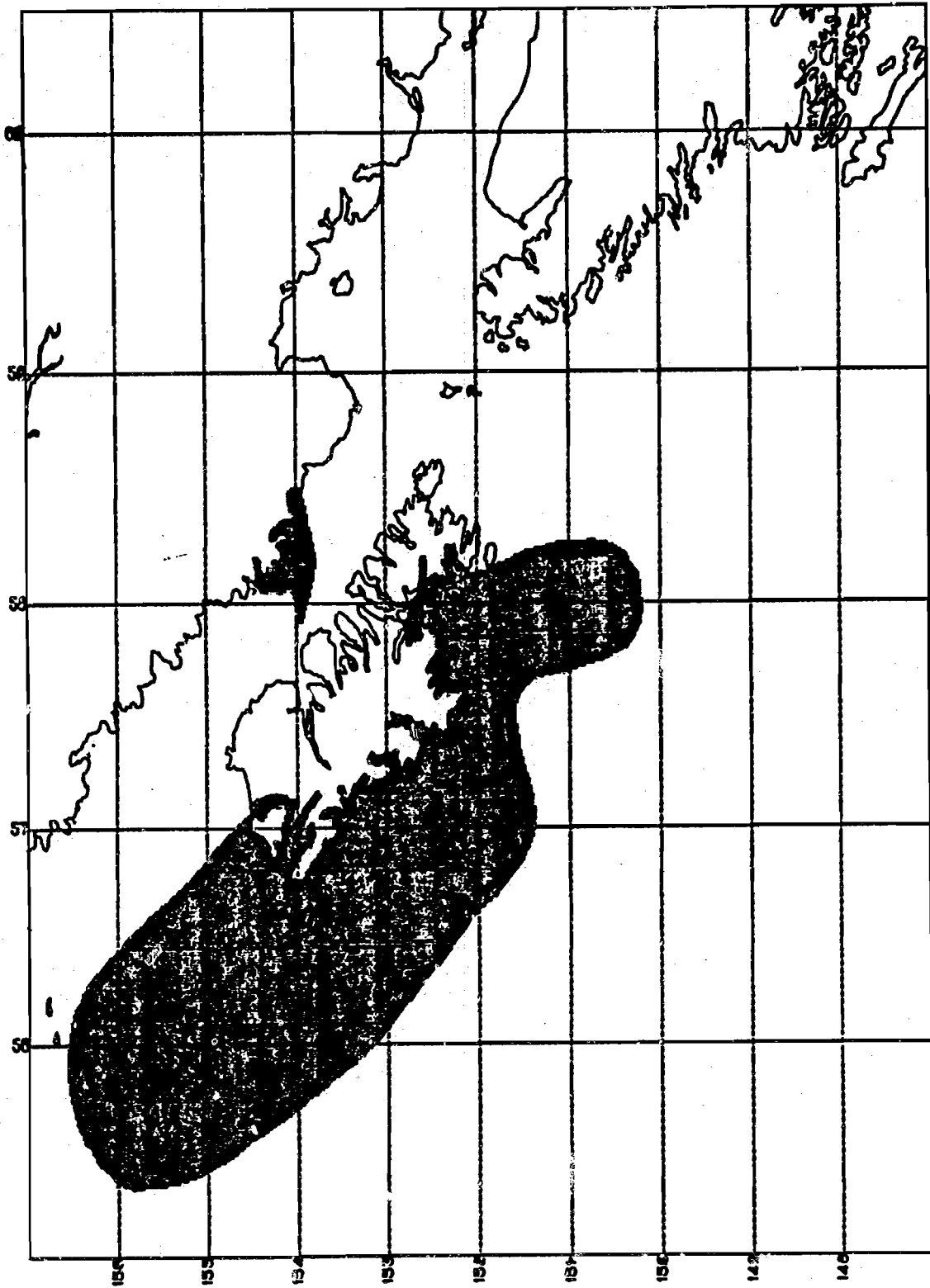


Figure A.19.--Map showing the location of Tanner carb major catch areas, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

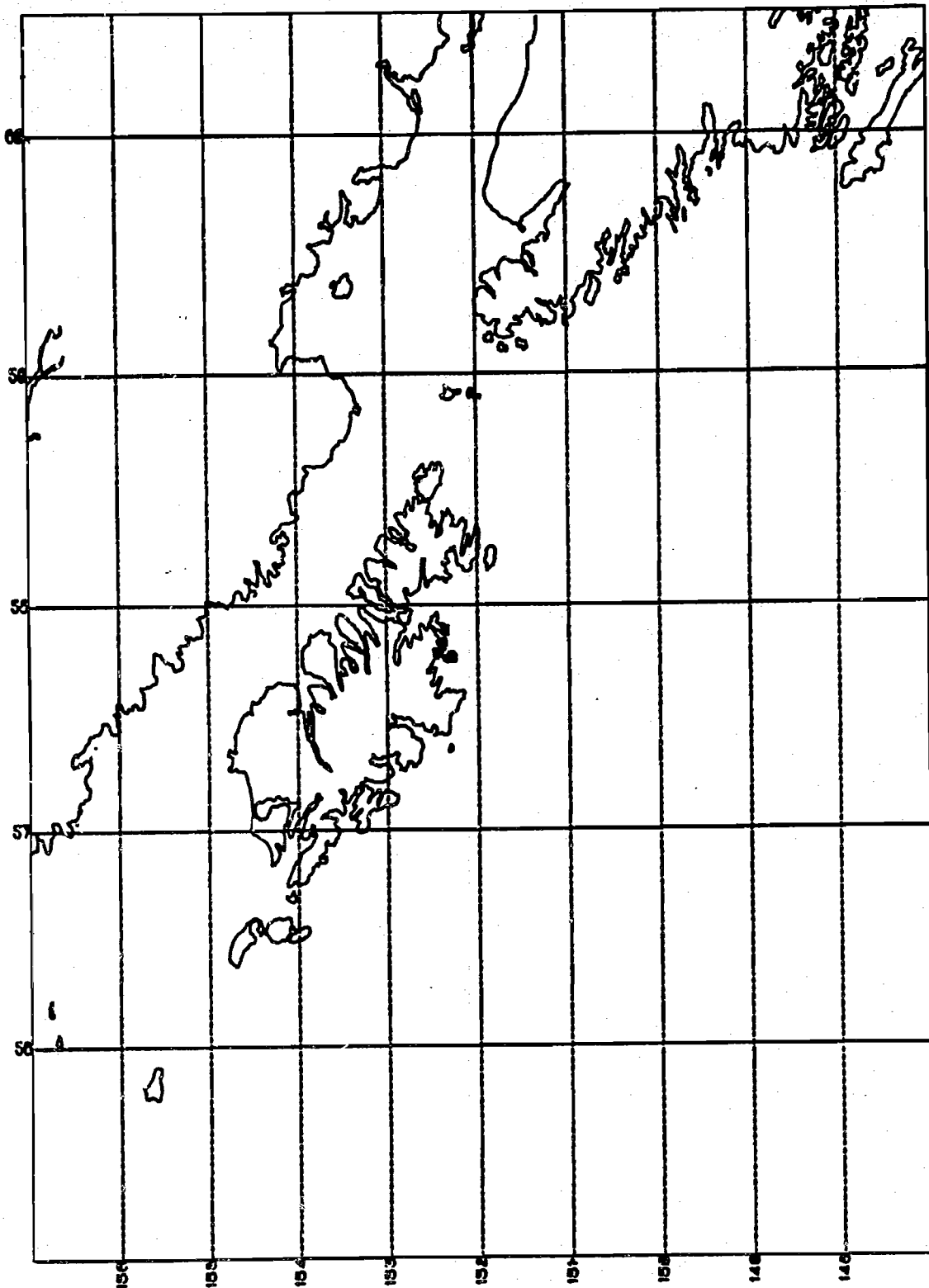


Figure A.20.--Map showing the location of cultural resources (National Register of Historic Places), Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

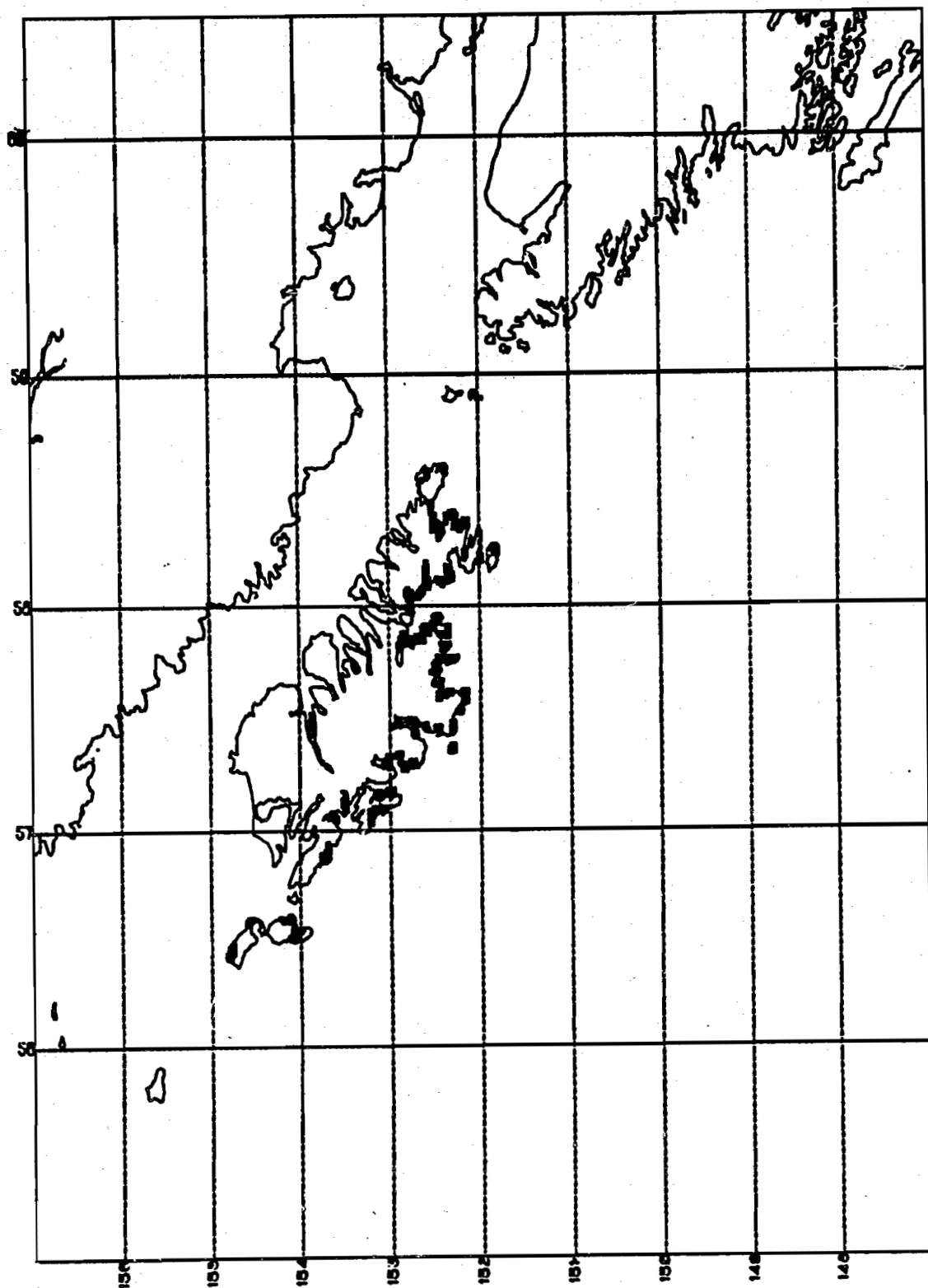


Figure A.21.--Map showing the location of cultural resources (Alaska Heritage Resources Survey), Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

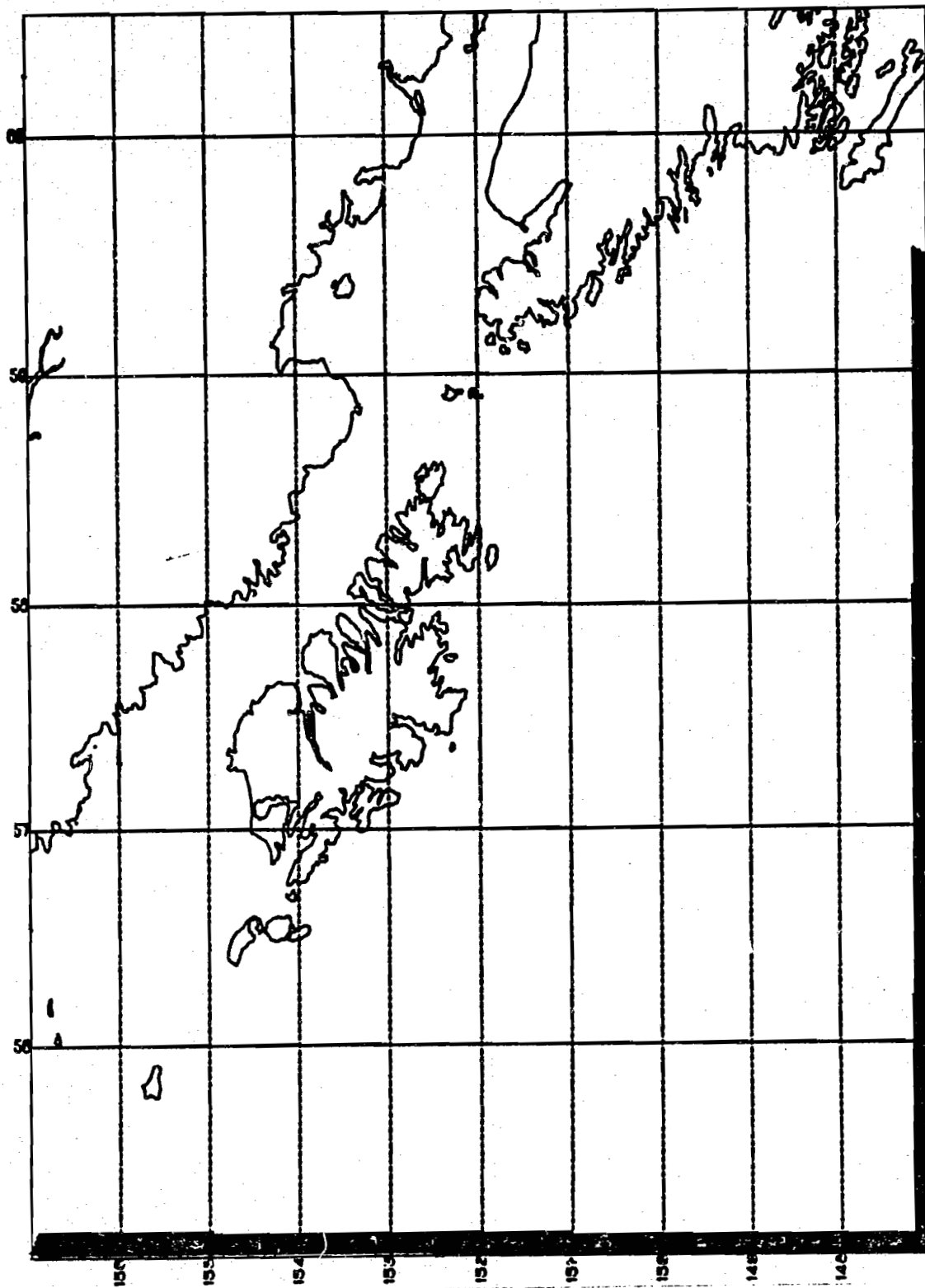


Figure A.22.--Map showing the location of eastern and southern boundaries of the study area, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

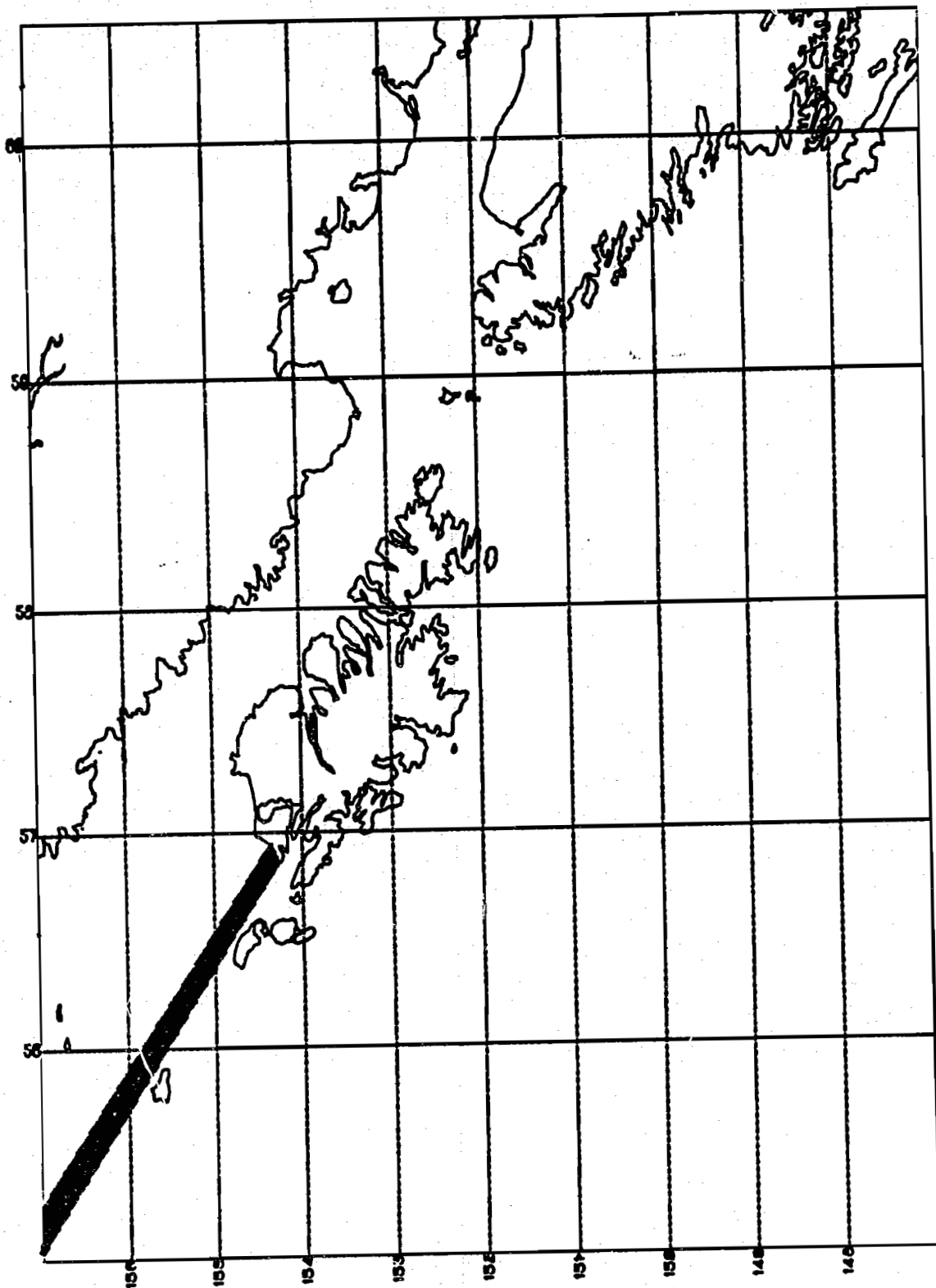


Figure A.23.--Map showing the location of the southern end of Shelikof Strait, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

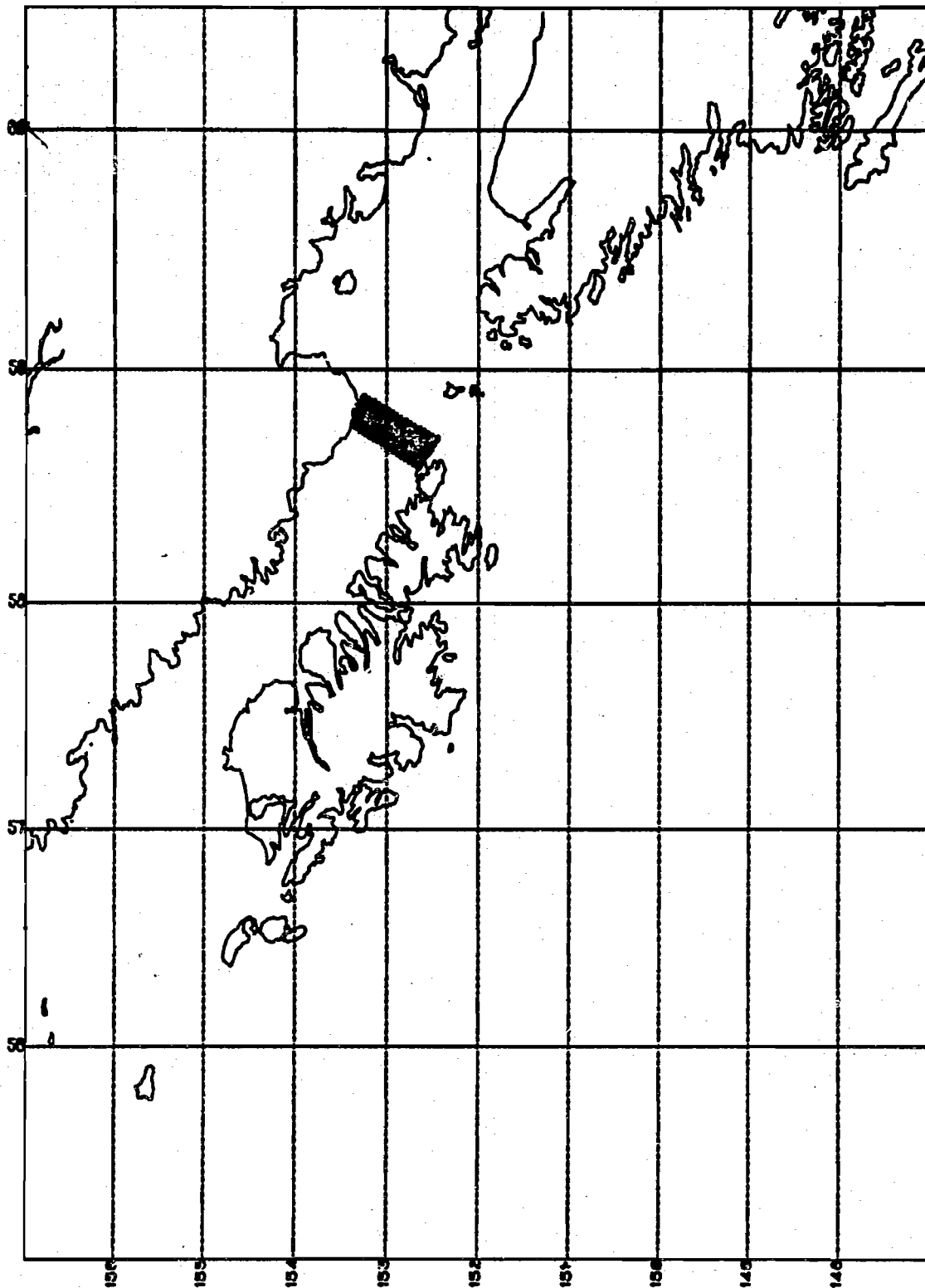


Figure A.24.--Map showing the location of the northern end of Shelikof Strait, Kodiak Island OCS Lease Sale 46: crosshatching indicates areal extent.

Appendix B

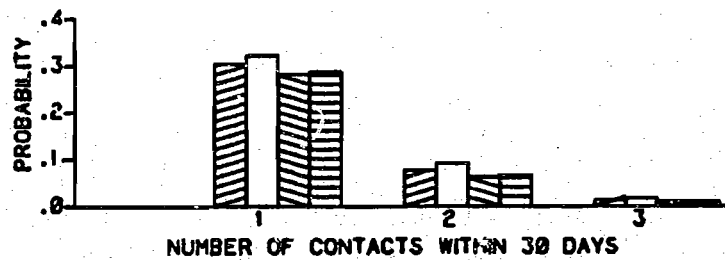
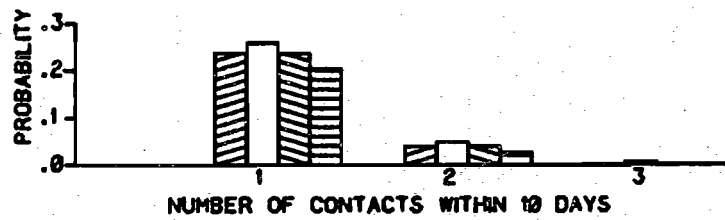
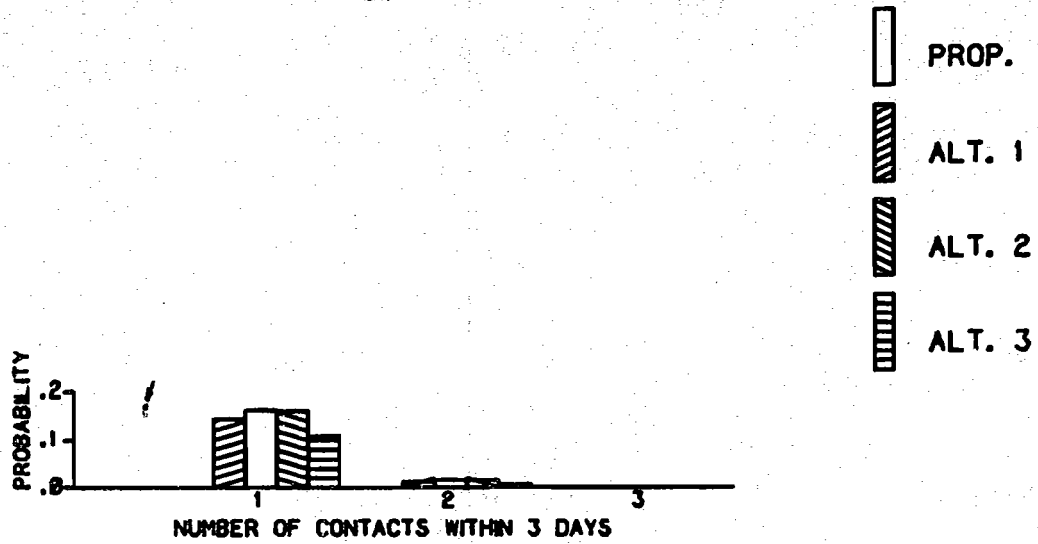


Figure B.1.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting land within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

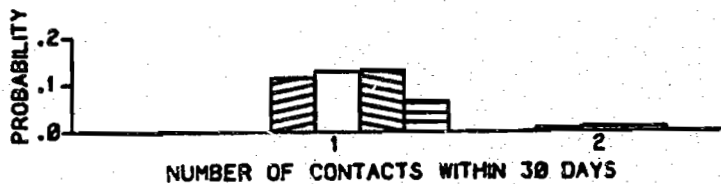
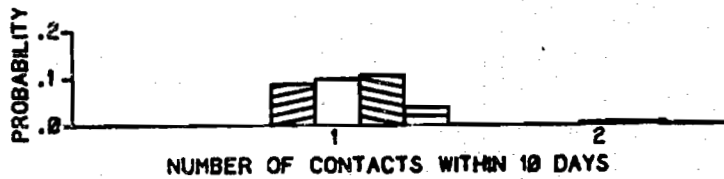
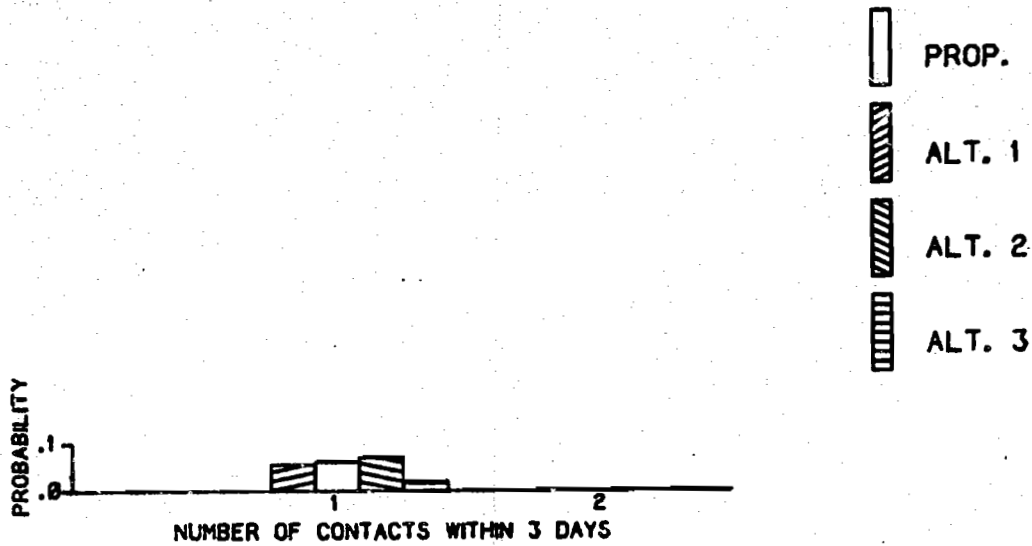


Figure B.3.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting razor clam beaches within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

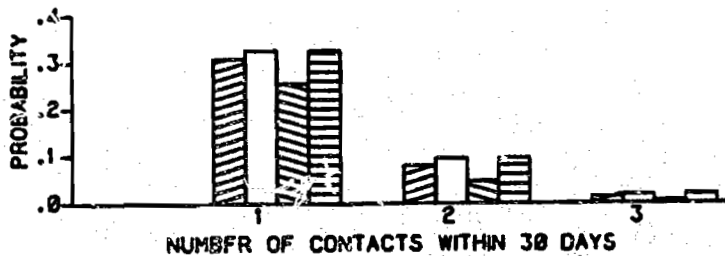
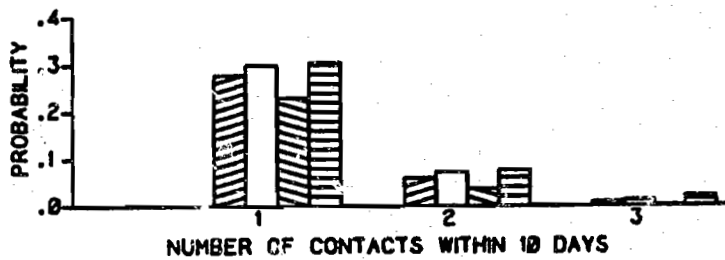
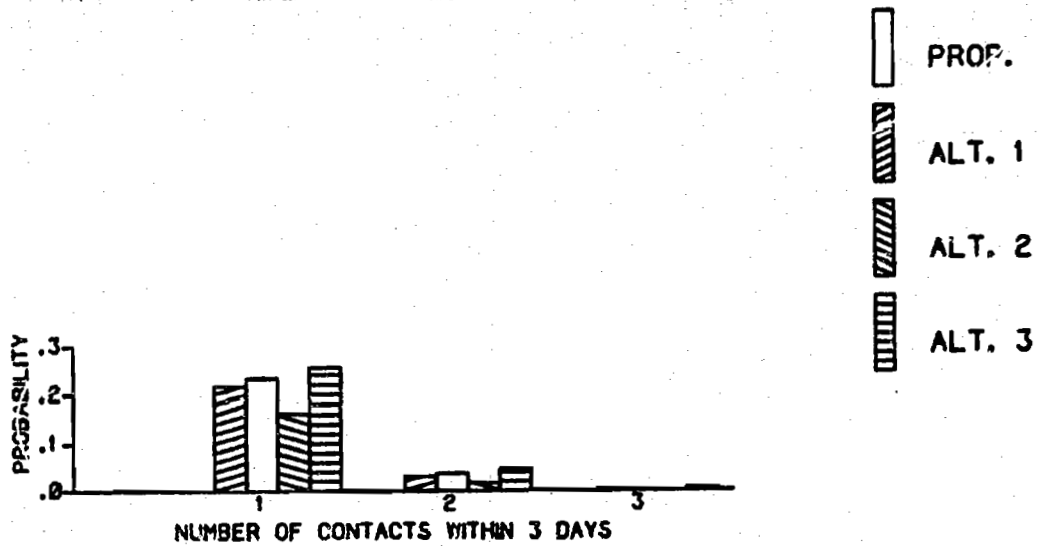


Figure B.4.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting benthic invertebrates, high biomass areas, within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

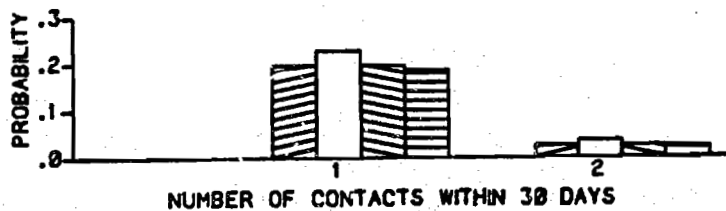
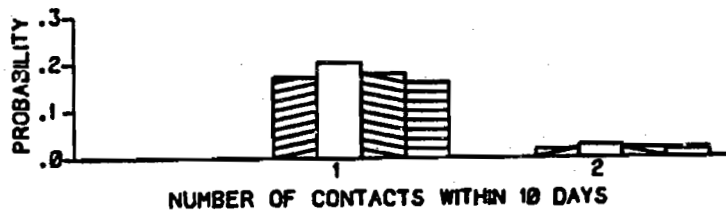
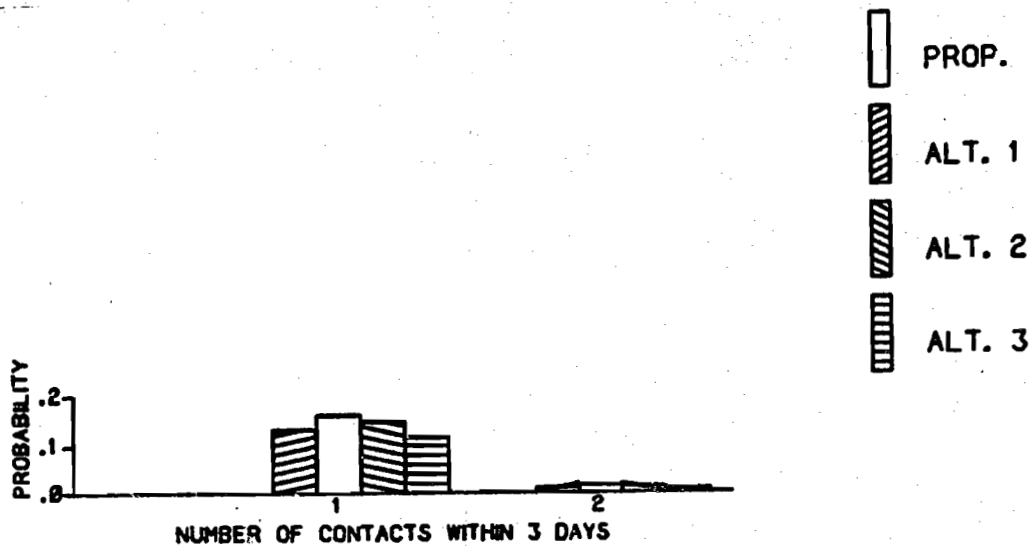


Figure B.6.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting seabird foraging areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

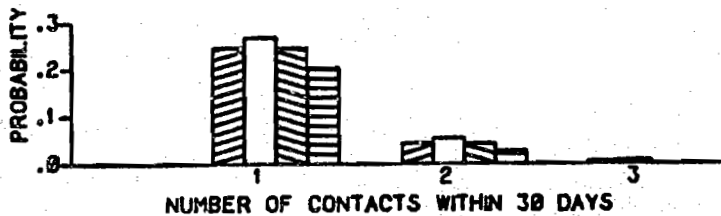
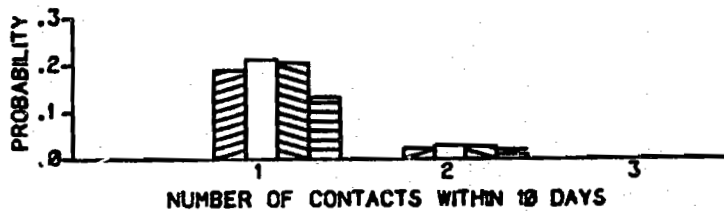
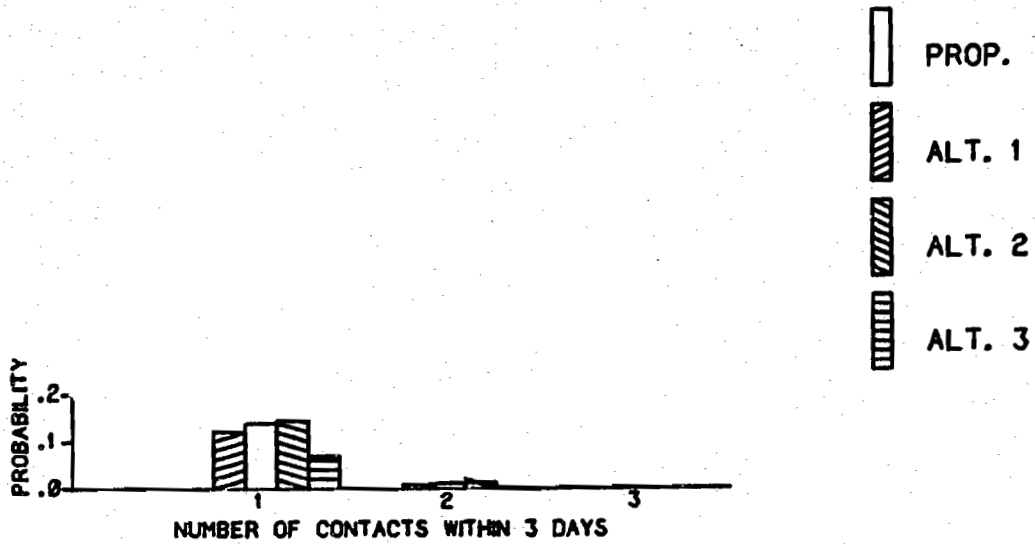


Figure B.7.--Histograms showing the probability of 1, 2 or 3 oilspills occurring and contacting marine mammal rookeries and concentrations within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

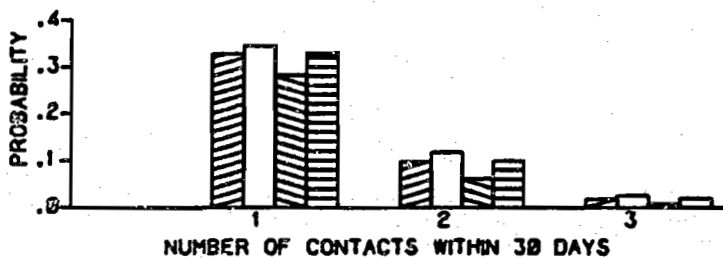
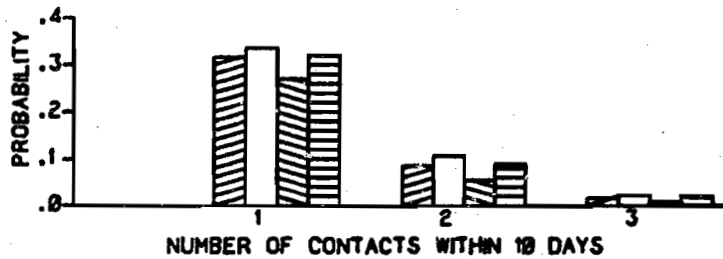
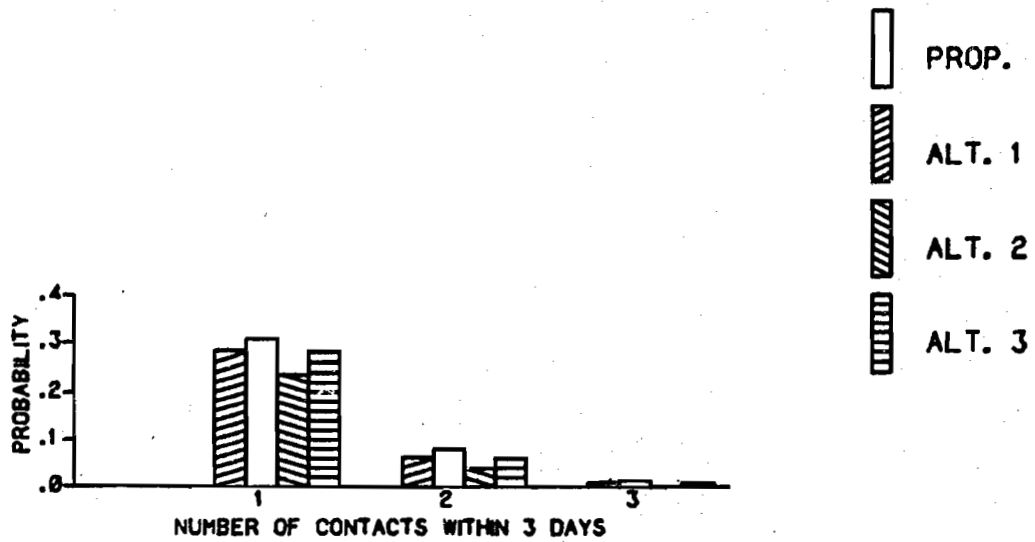


Figure B.8.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting whale sightings within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

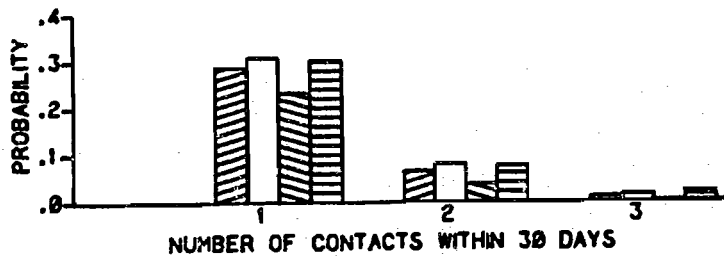
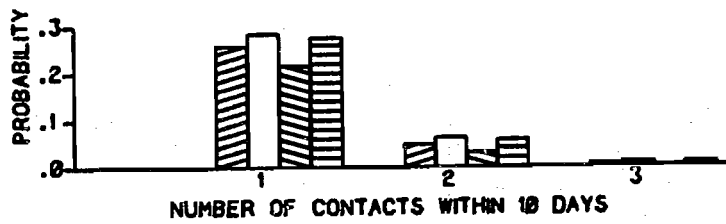
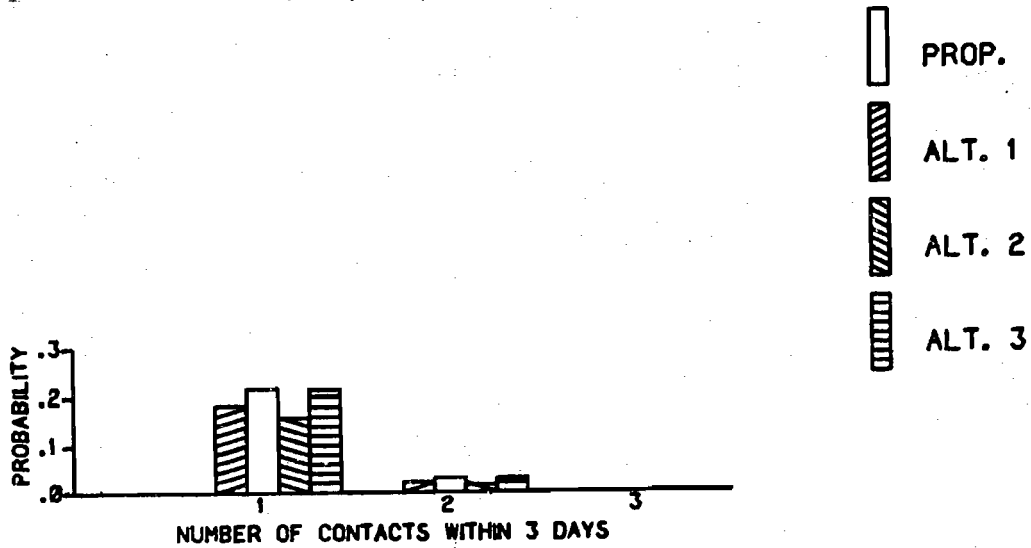


Figure B.9.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting a whale migration route within 3, 10 or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

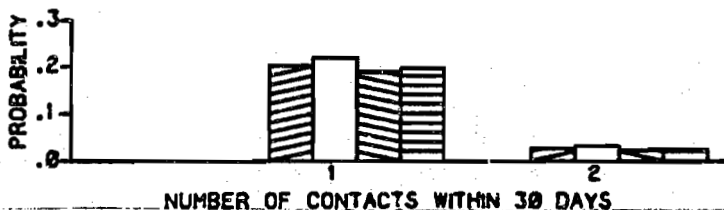
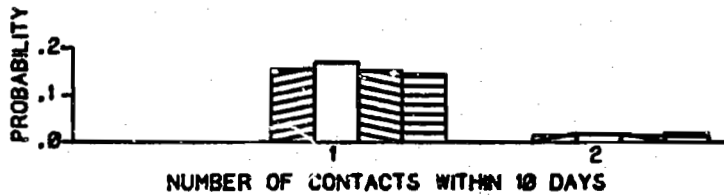
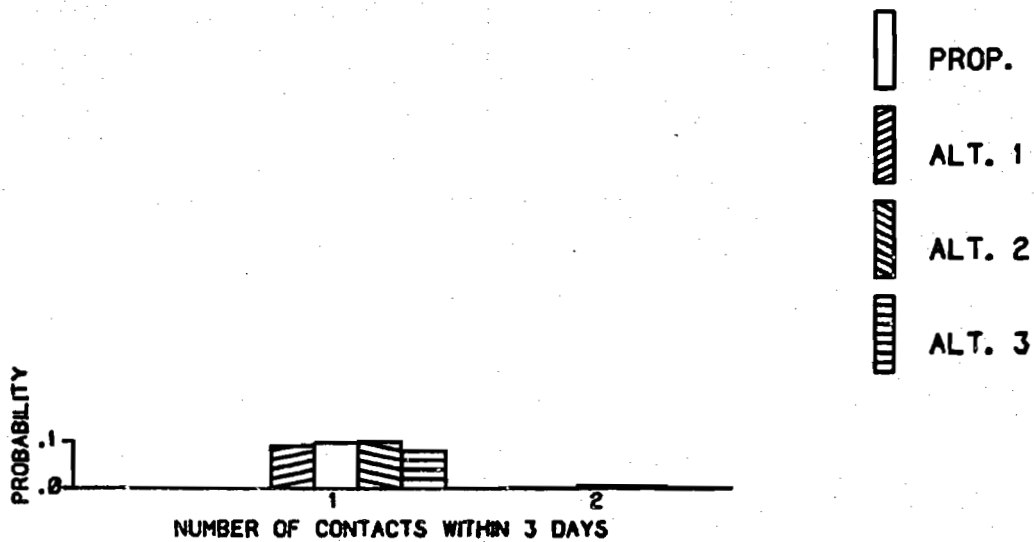


Figure B.10.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting areas of high biological cover within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

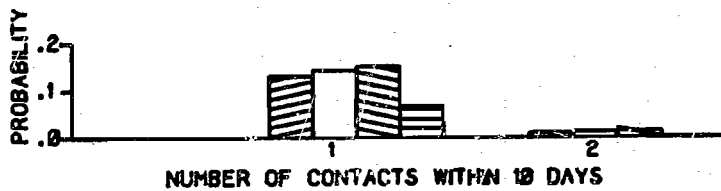
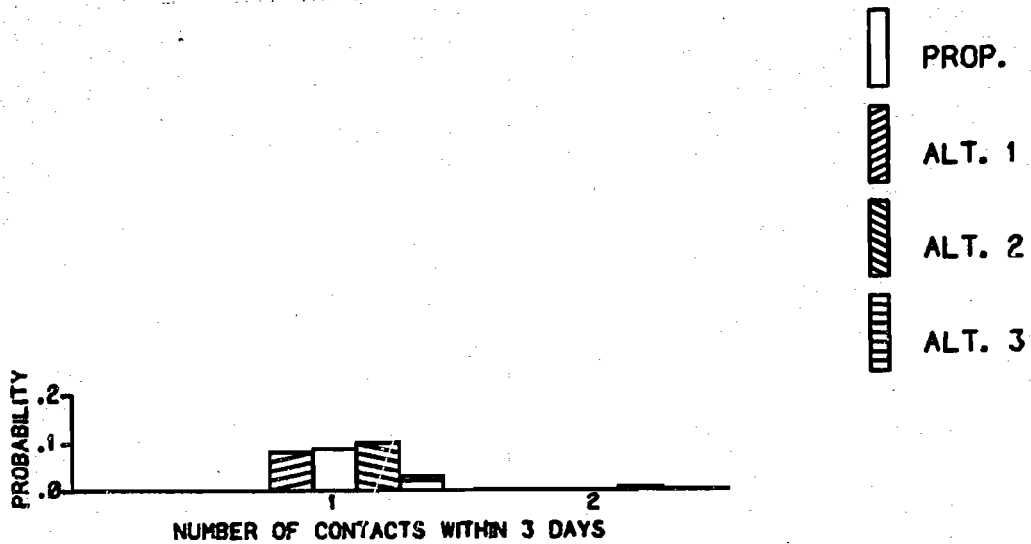


Figure B.11.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting nearshore habitats within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

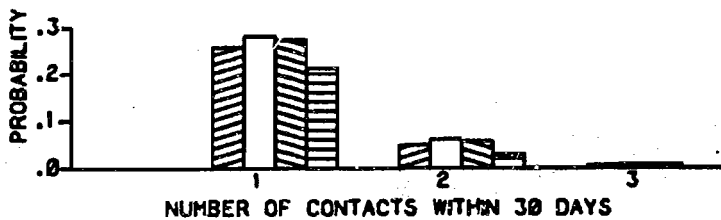
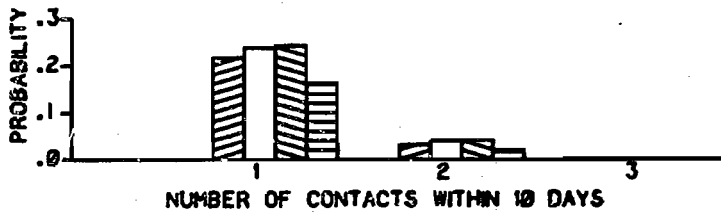
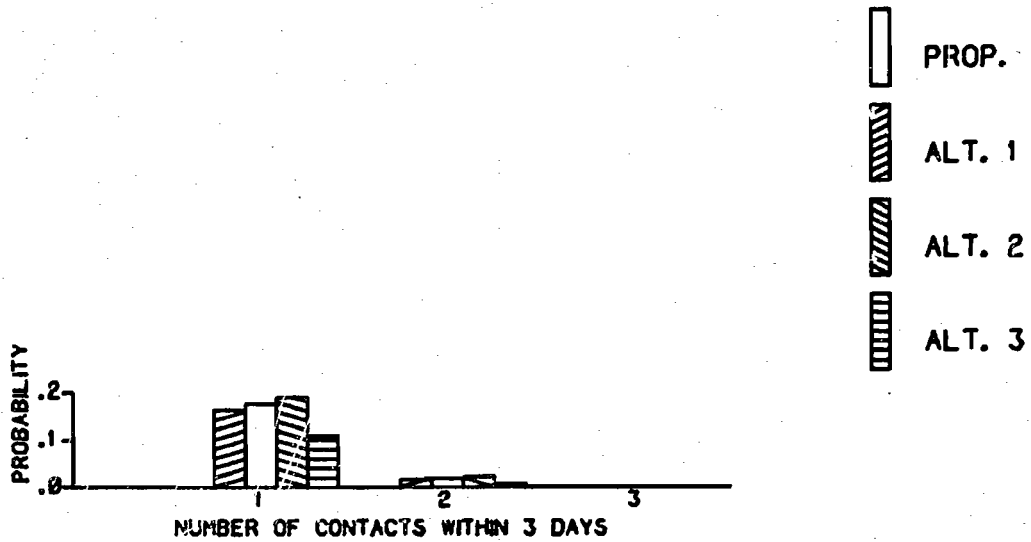


Figure B.12.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting dungeness crab reproduction and catch areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

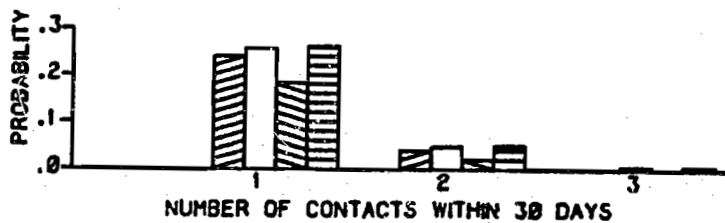
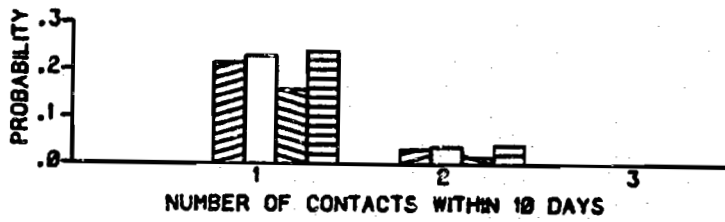
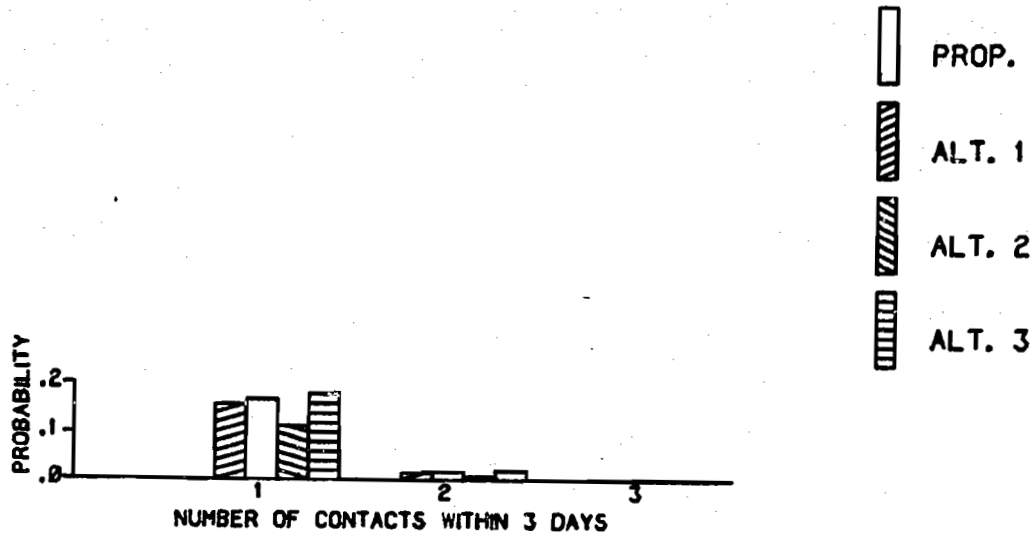


Figure B.13.--Histograms showing the probability of 1, 2, or 3 oilspills occurring and contacting shrimp reproduction and rearing areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

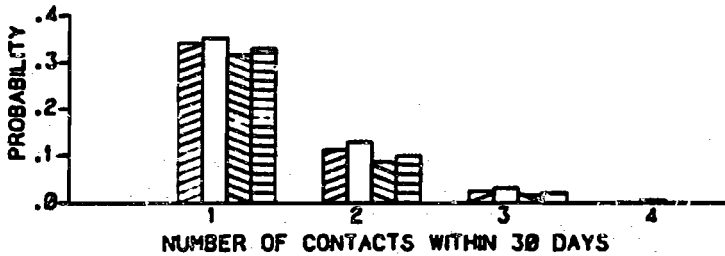
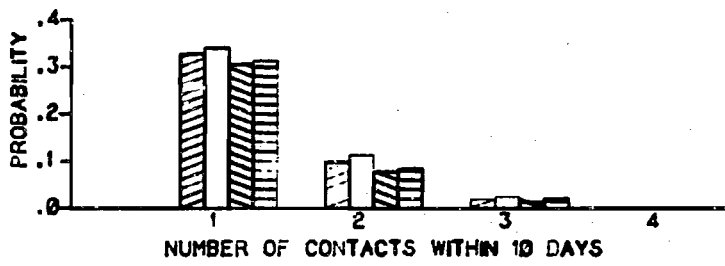
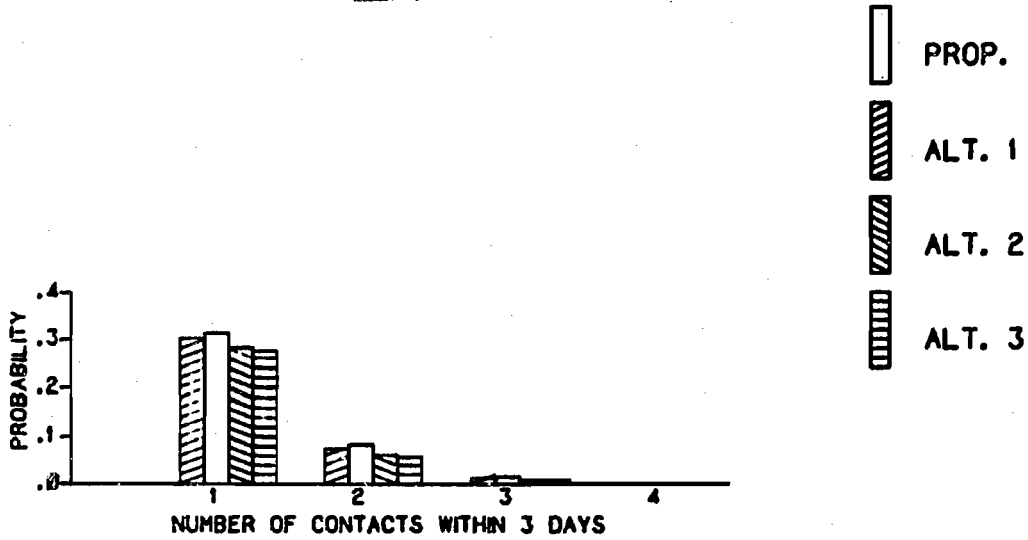


Figure B.14.--Histograms showing the probability of 1, 2, 3, or 4 oil spills occurring and contacting shrimp catch areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

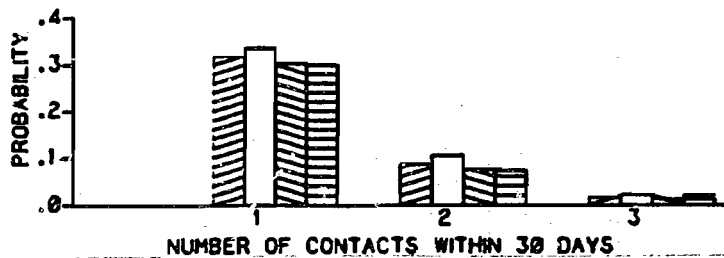
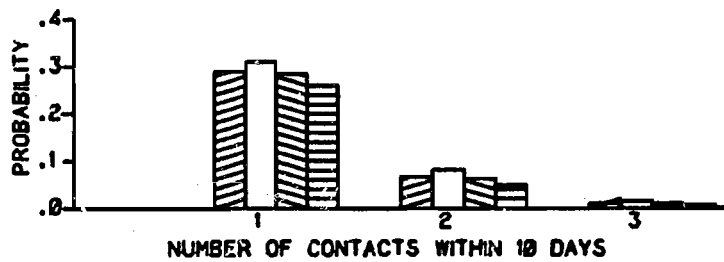
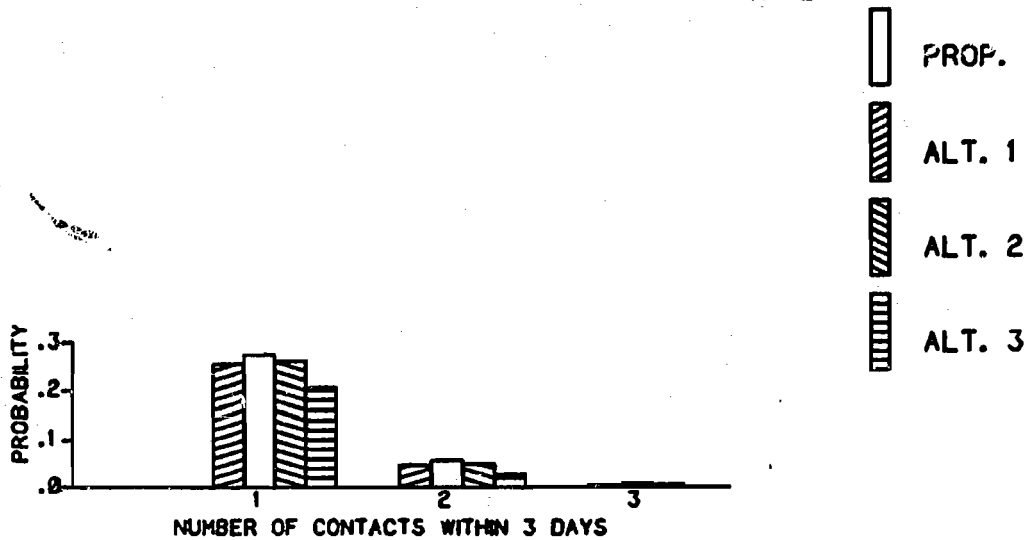


Figure B.15.--Histograms showing the probability of 1, 2, or 3 oil spills occurring and contacting king crab vital reproduction areas within 3, 10 or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

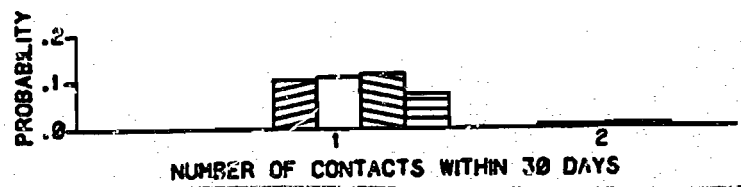
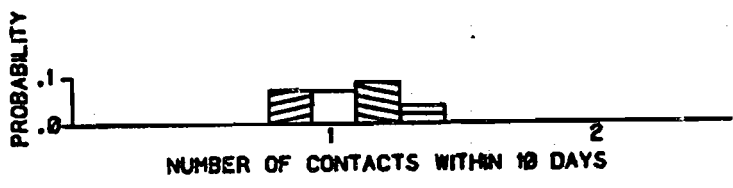
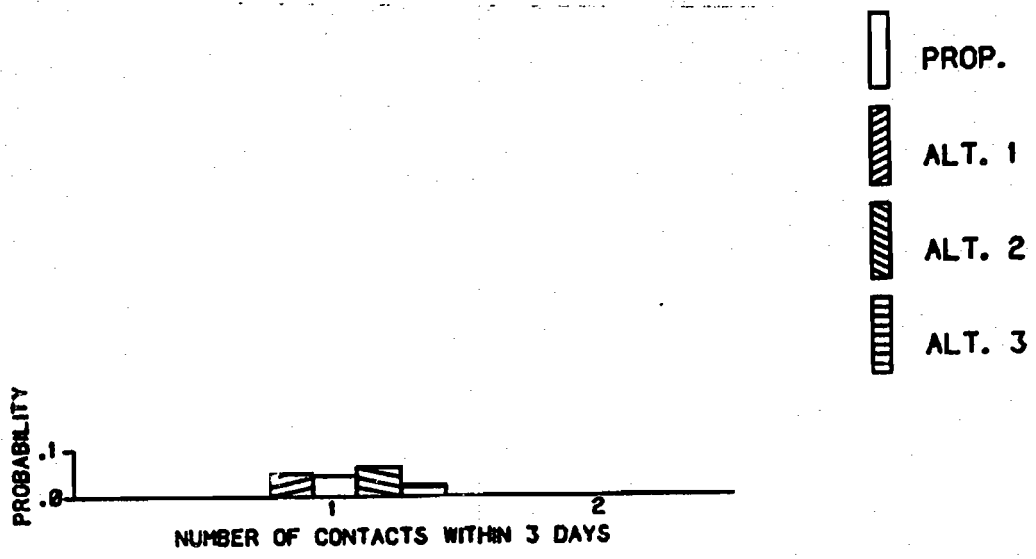


Figure B.16.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting king crab vital rearing areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

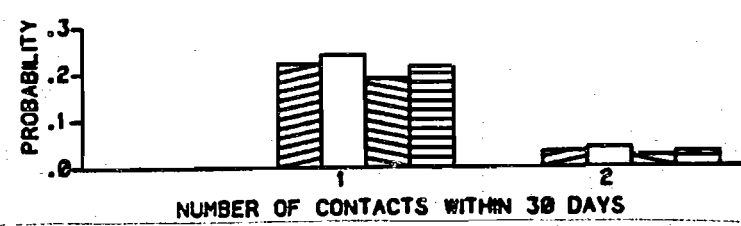
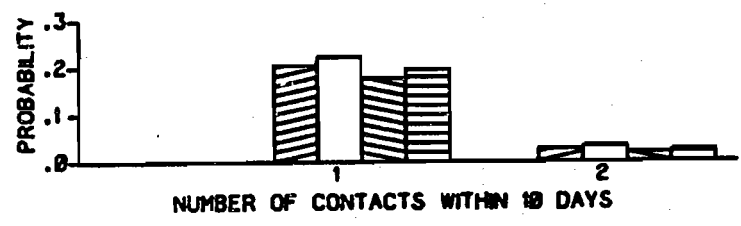
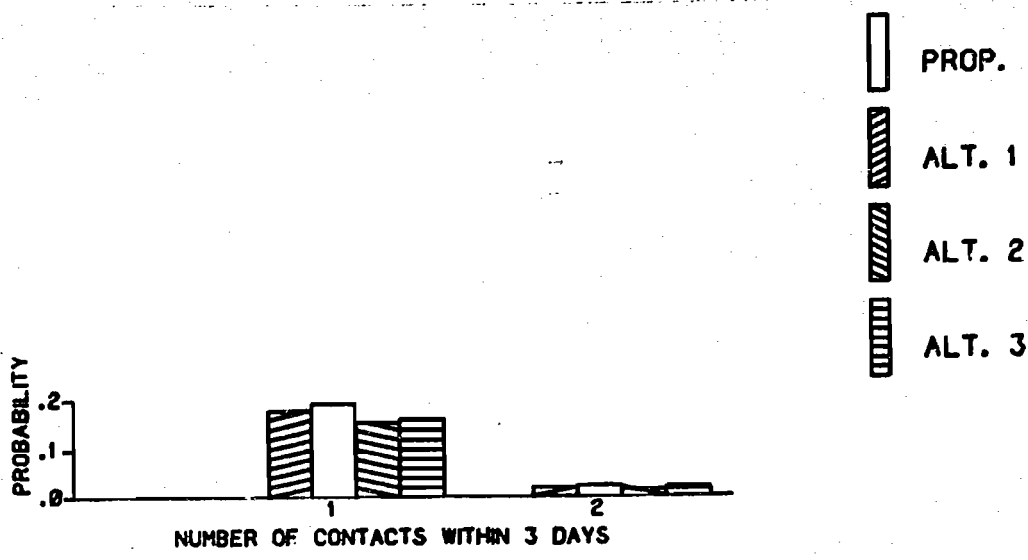


Figure B.17.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting king crab major catch areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

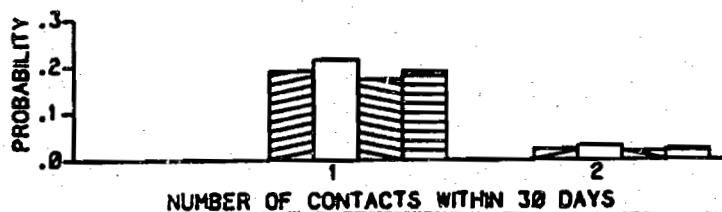
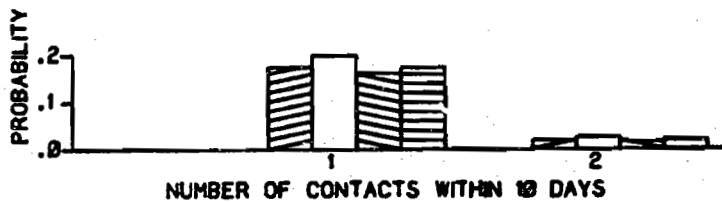
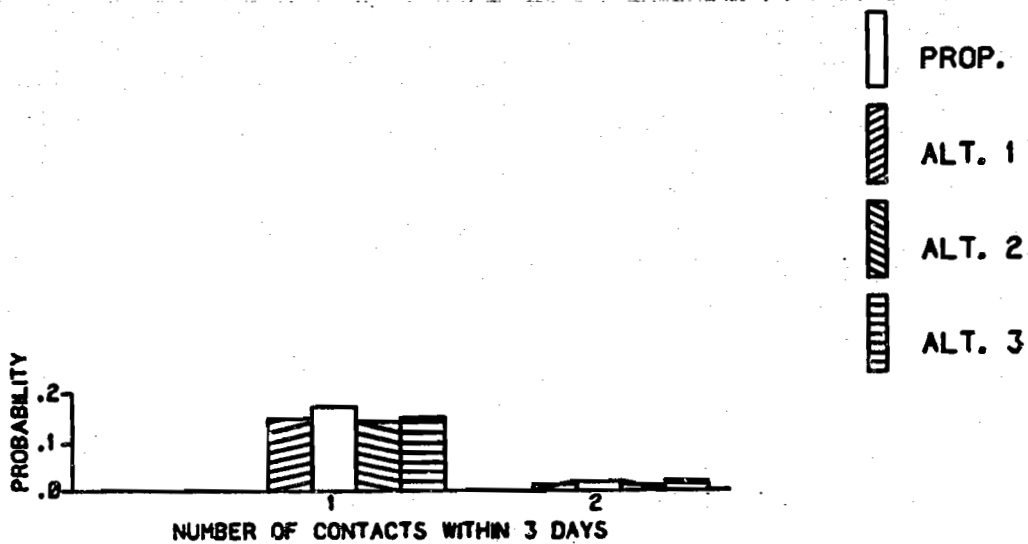


Figure B.18.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting tanner crab vital reproduction and catch areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

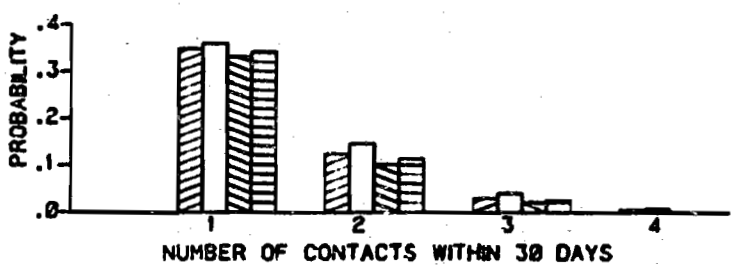
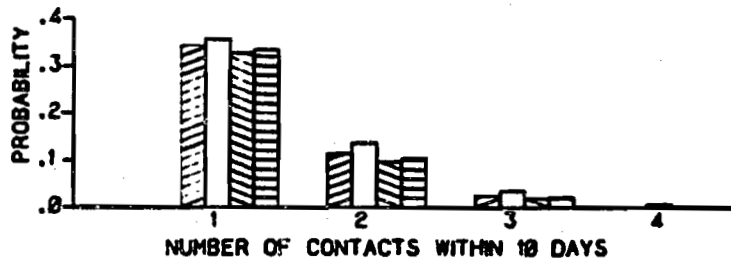
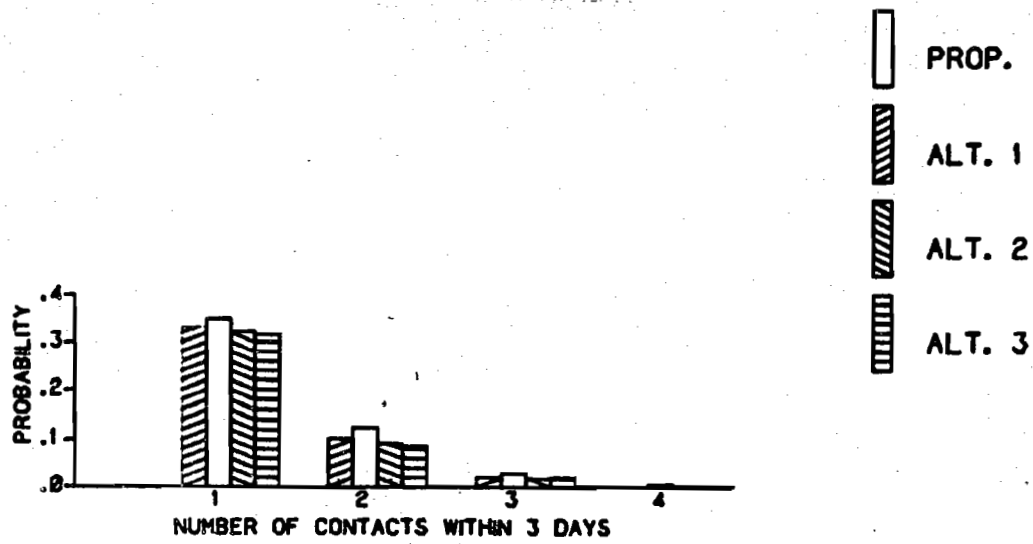


Figure B.19.--Histograms showing the probability of 1, 2, 3, or 4 oilspills occurring and contacting tanner crab major catch areas within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

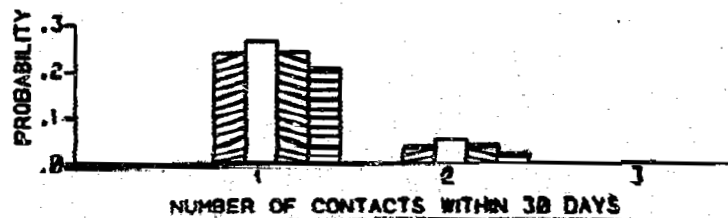
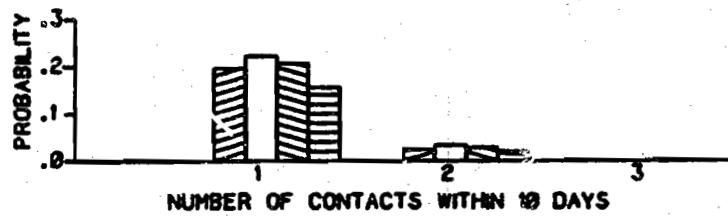
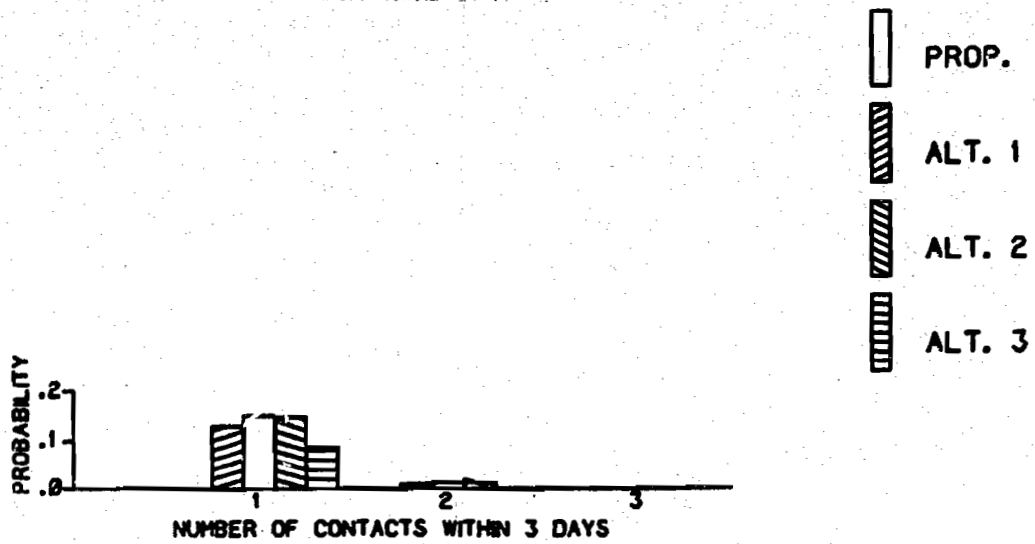


Figure B.20.--Histograms showing the probability of 1, 2, or 3 oil spills occurring and contacting cultural resources, Alaska Heritage Resources Survey, within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

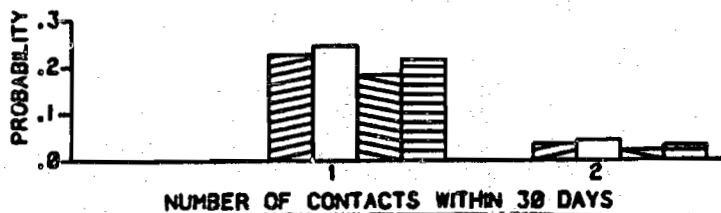
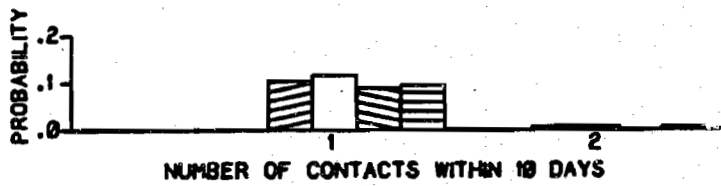
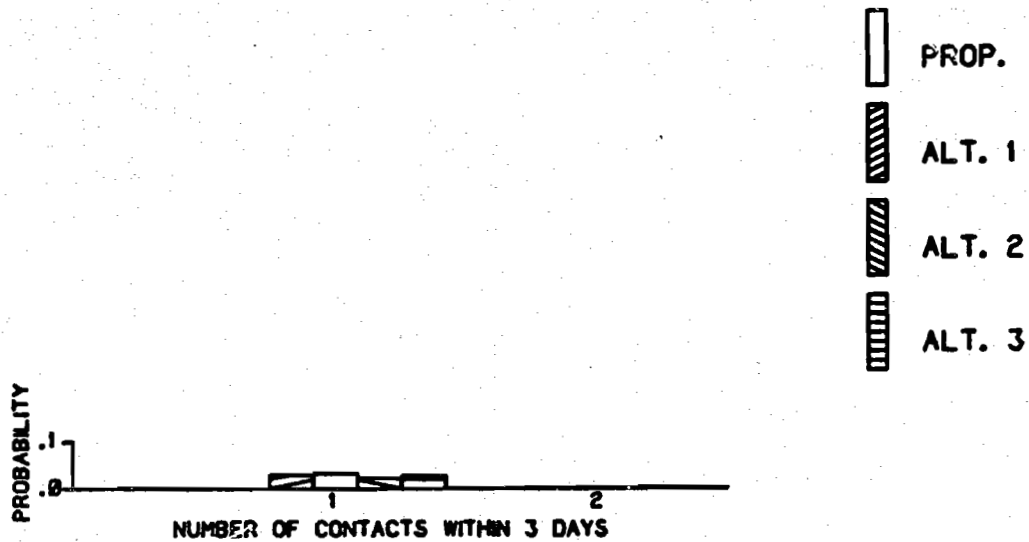
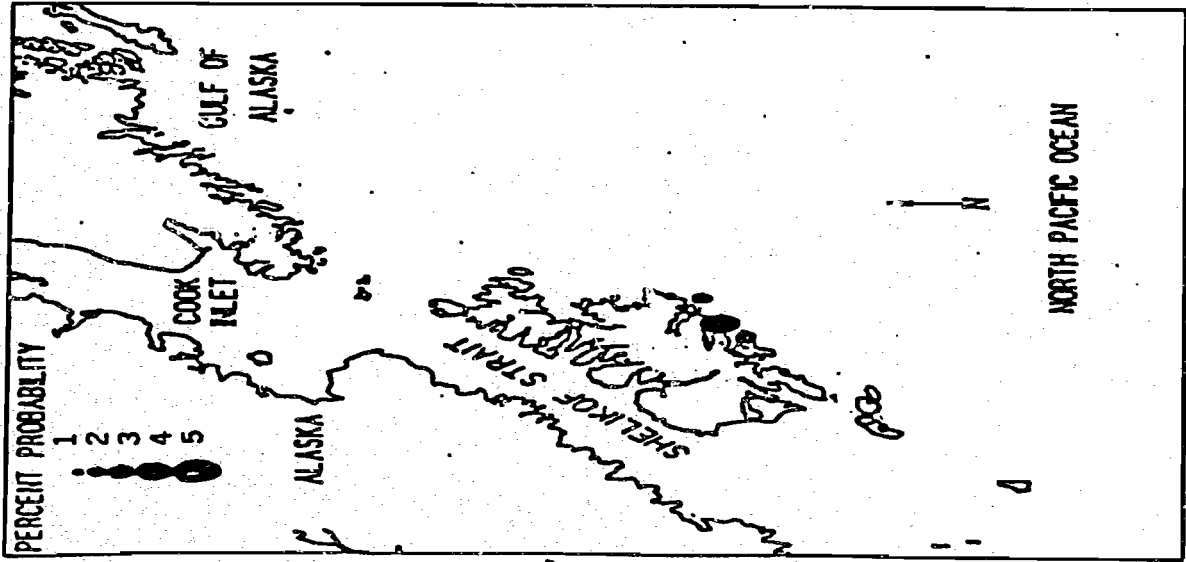
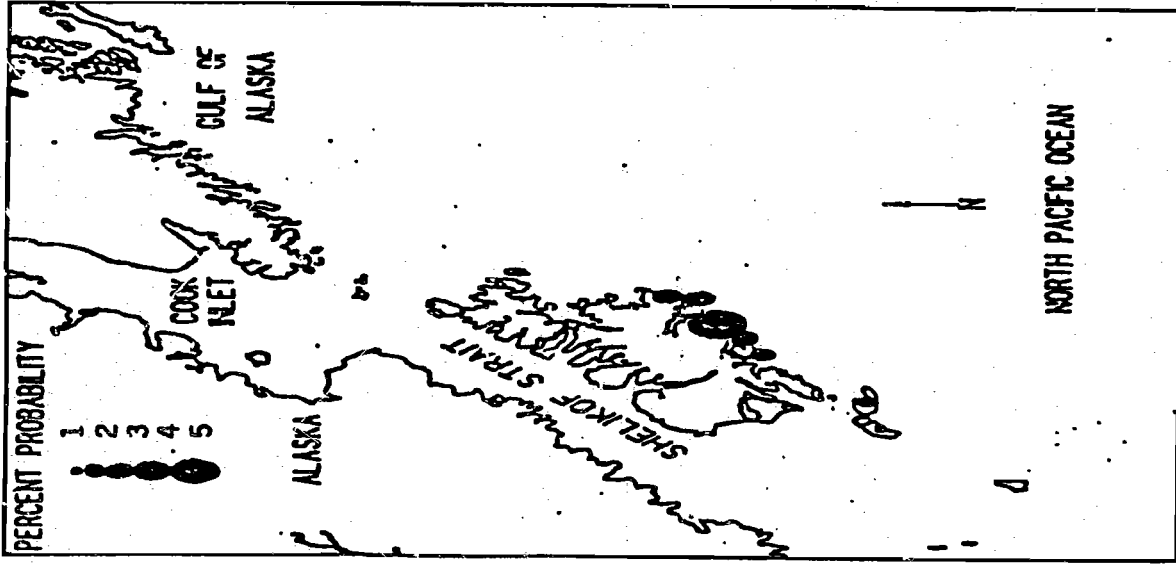


Figure B.21.--Histograms showing the probability of 1 or 2 oilspills occurring and contacting the eastern and southern boundaries of the study area within 3, 10, or 30 days, due to the proposed Kodiak Island OCS Lease Sale 46 or the three alternatives.

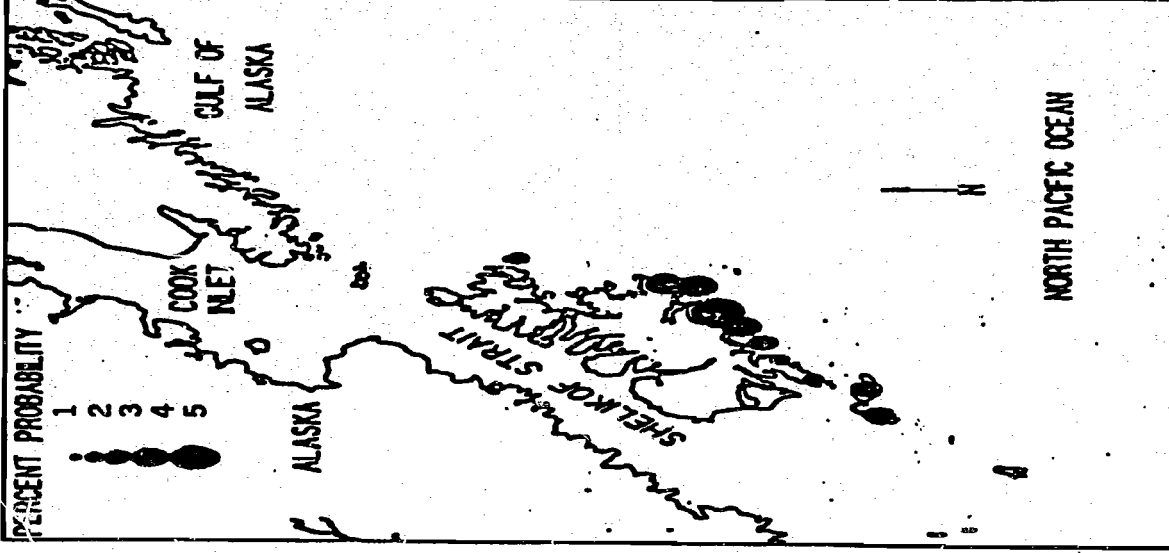
Appendix C



DAY3



DAY10



DAY30

Figure C-1.--Maps showing the probability (percent chance) of one or more spills occurring and contacting sections of the coastline (set 2) for 3, 10, and 30 day travel times (proposal).

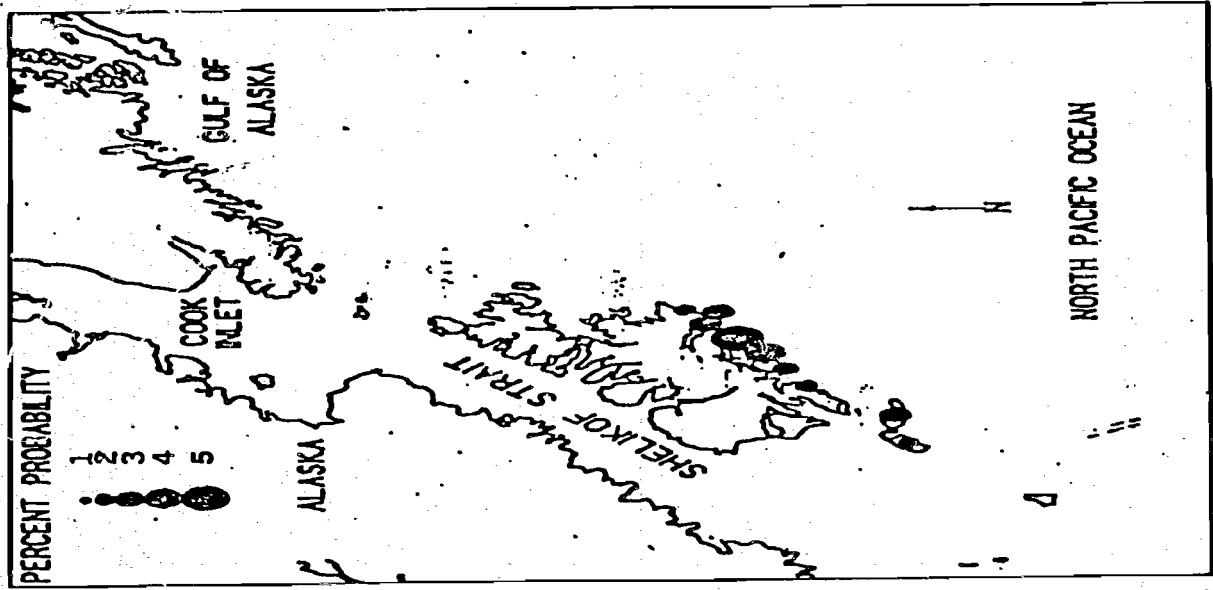


Figure C-2.--Maps showing the probability (percent chance) of one or more spills occurring and contacting sections of the coastline (set 2) for 3, 10, and 30 day travel times (alternative 1).

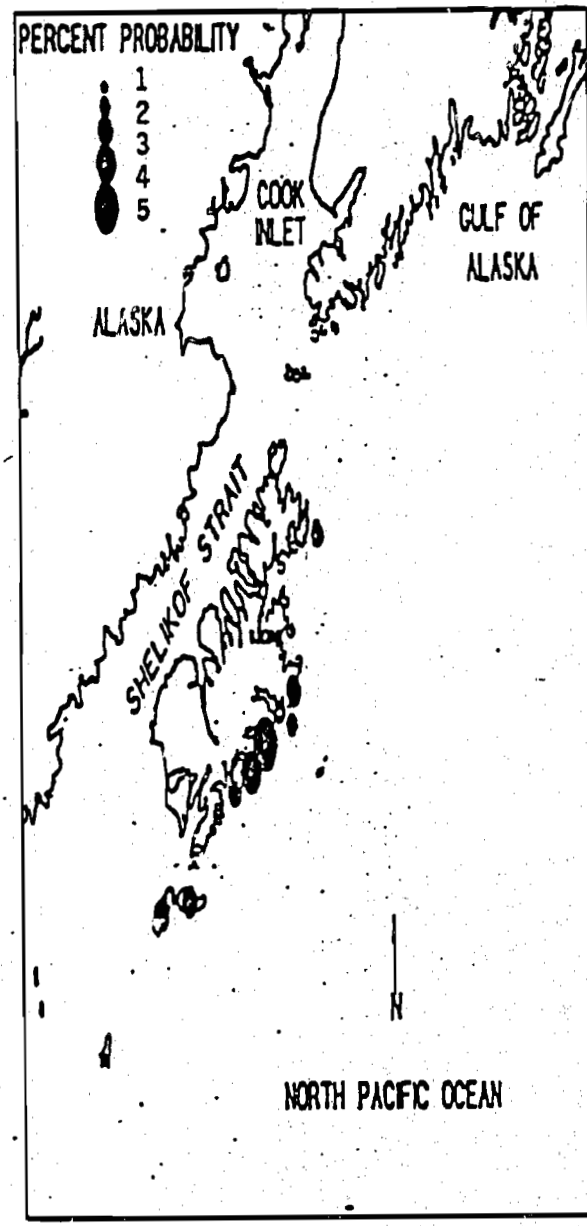
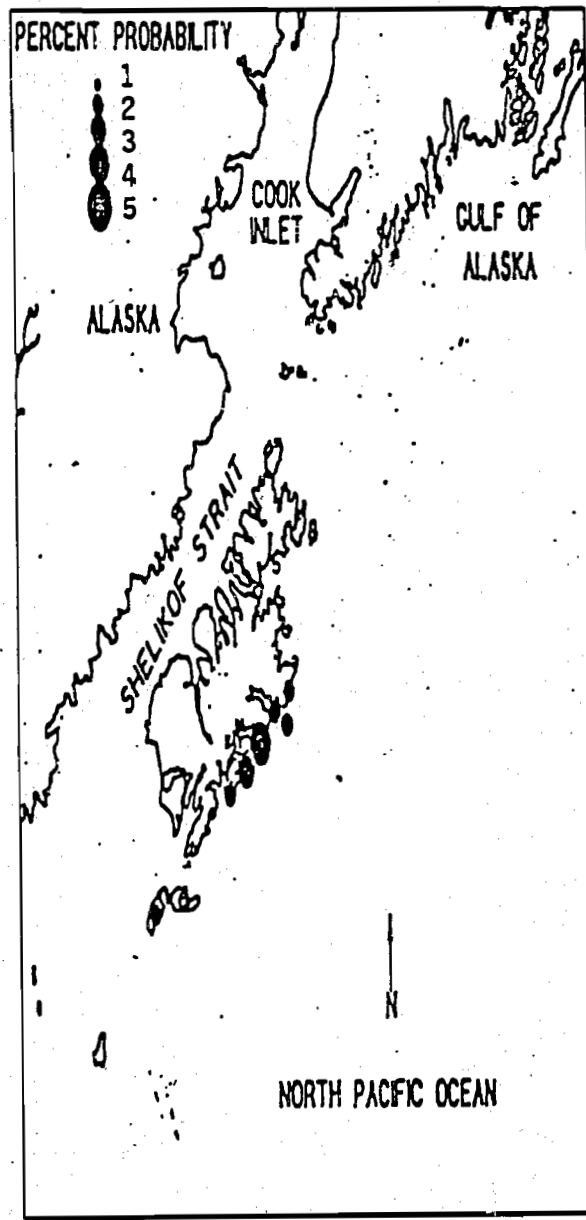
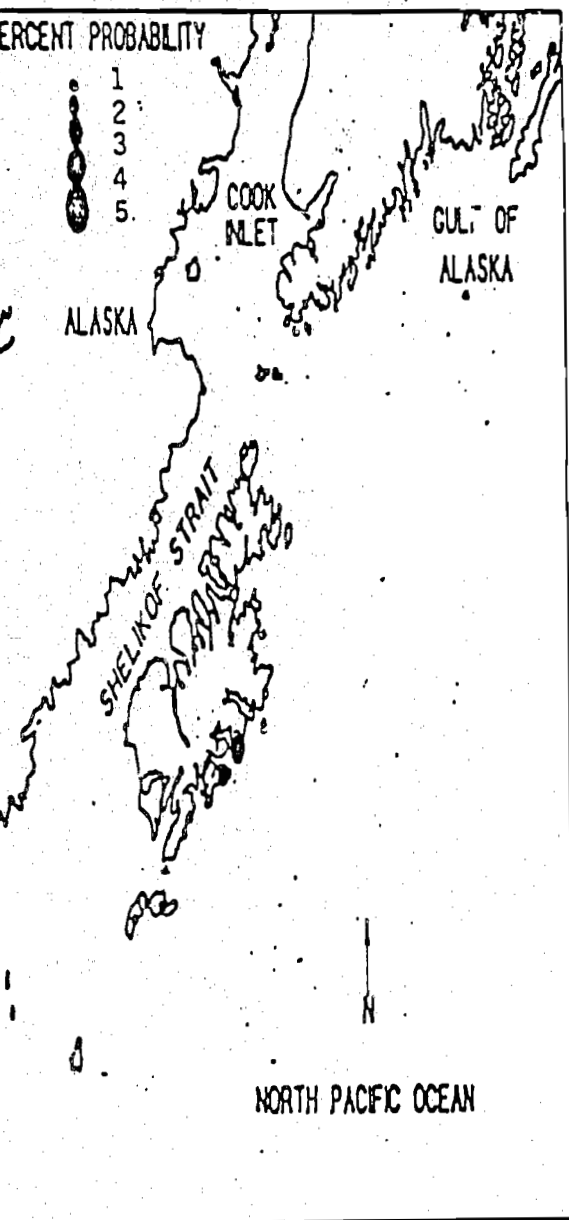
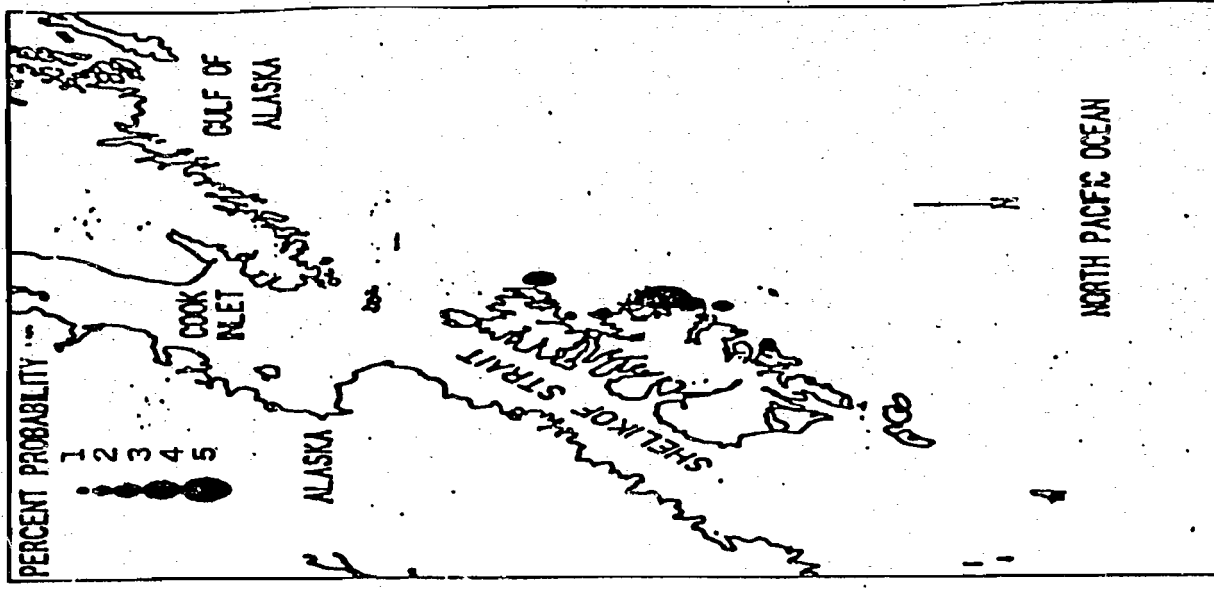
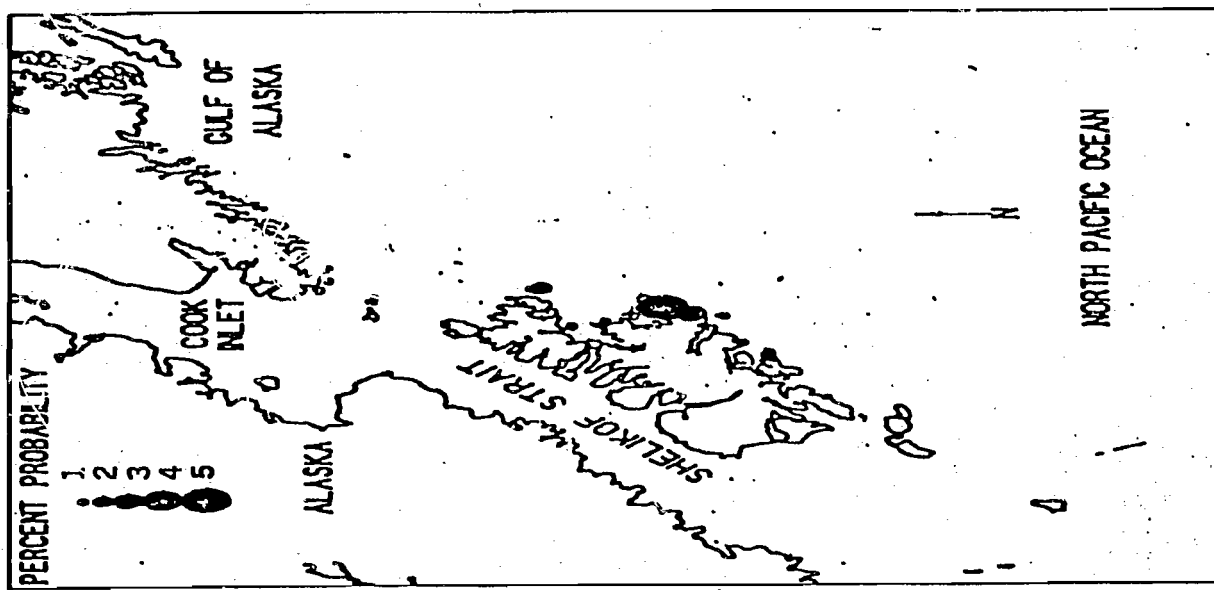


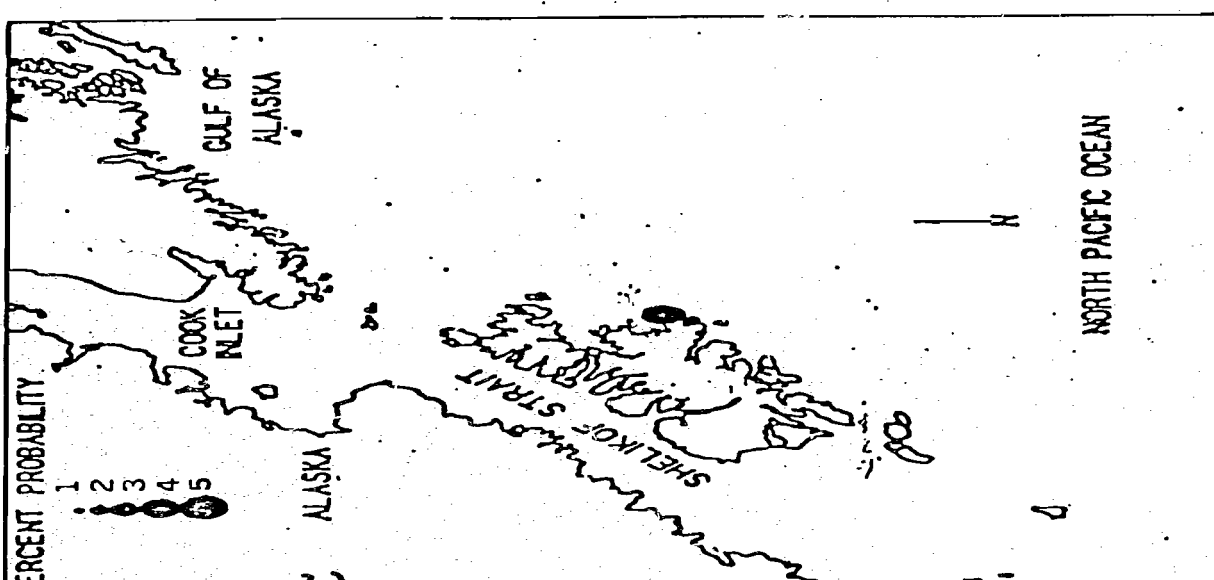
Figure C-3.--Maps showing the probability (percent chance) of one or more spills occurring and contacting sections of the coastline (set 2) for 3, 10, and 30 day travel times (alternative 2).



DAY30



DAY10



DAY30

Figure C-4.--Maps showing the probability (percent chance) of one or more spills occurring and contacting sections of the coastline (set 2) for 3, 10, and 30 day travel times (alternative 3).