

COOK INLET DUNGENESS CRAB
SURVEY PLAN

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Operational Plan

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COOK INLET DUNGENESS CRAB SOFT SHELL SURVEY PLAN

INTRODUCTION

This project is designed to assess and document the molt timing of the male Dungeness crab (Cancer magister) in the Southern District, including Kachemak Bay, of the Cook Inlet Management Area. Catch data may also be used to establish an index of abundance.

During the 1990 Board of Fisheries Meeting for shellfish a new regulation was adopted which in part set the commercial season for Dungeness crabs in upper Kachemak Bay to open sometime between June 1 and October 31. The exact timing of the opening will be determined by a sampling program utilizing a chartered commercial vessel and gear. Once the sampling program identifies the molting event, and the subsequent soft shell percentage of catchable male Dungeness crabs declines to a level of 10 percent or less, the commercial Dungeness crab fishing season will be opened by Emergency Order. Catchable is defined as those crabs that can be retained in a standard Dungeness crab pot with escape rings open.

The department implemented the softshell test fishing program in 1990. Test fishing occurred in both May and June. Although the overall catch of Dungeness crabs was extremely low, less than one crab per pot, the soft shell percentage dropped to below 10 percent in the June survey. The fishery, therefore, was opened east of Homer Spit on June 29. Due to subsequent low catches and generally poor fishery performance the fishery was closed on August 8.

The season opened by regulation west of Homer Spit on June 1, 1991. A few fishermen moved some gear onto the grounds by late June in anticipation of intercepting the Dungeness crabs as they moved into the outer reaches of Kachemak Bay from central Cook Inlet. Both fishermen interviews and historical catch data indicated that if

crabs did not appear in the gear by late August, they would not appear at all. Catches remained extremely low throughout July and August; the fishery, therefore was closed in the entire Cook Inlet Management Area on September 7, 1990.

The total 1990 harvest for Cook Inlet was 29,502 pounds. The Southern District catch was 28,938 pounds. The remaining 564 pounds was taken from the Central District which is immediately north of the Southern District. This was the lowest annual harvest since full development of the fishery in the late 1970's. Average annual harvest from 1978 through 1989 was 1.09 million pounds (Table 1).

Based on the performance of the fishery in 1989 and 1990, the Dungeness stock is in a depressed condition. Neither a commercial nor a sport fish season is anticipated for 1991. The department, however, still needs information to document the status of the stock, particularly in the absence of a commercial fishery. In order to collect data on the stock, the department will continue the soft shell survey in the portion of Kachemak Bay east of Homer Spit adding to this a survey west of the Spit.

OBJECTIVES

1. Identify the annual timing of the molt, or molts, of catchable Dungeness crabs, both male and female.
2. Document the fluctuations in the percentage of soft shell male Dungeness crabs. Determine when this percentage is likely to remain below 10 percent. The molt in a particular segment of the sampling area may continue for a period of a month or more. It may also occur in another section of the area at a different time.

3. Establish an index of abundance by recording the size and shell age of all male Dungeness crabs captured. Document the size, shell age and egg condition of all females caught.
4. Document the incidental catch of king and Tanner crabs as well as fish species.

METHODS/DATA ANALYSIS

This project will use standard commercial Dungeness crab pots currently used by commercial fishermen in Kachemak Bay. The pots will be supplied by the chartered fisherman. Bait will also be supplied by the fisherman. Bait types may include squid and razor clams. Soak time will be either one or two days.

Study Sites

East of Homer Spit

This project will be carried out in two general areas of upper Kachemak Bay: 1) Coal Bay (Mud Bay) to Fritz Creek outlet and, 2) McNeil Canyon outlet to the upper bay and across the Bradley and Fox River mud flats (Figure 1). Sampling in both areas will include depths of less than one fathom extending down to ten fathoms (measured at mean low water).

West of Homer Spit

This segment of the project will be implemented in the area west of Homer Spit traditionally fished by commercial fishermen (Figure 2). Depths will range generally from 15 to 40 fathoms.

Sample Design

East of Homer Spit

Forty five pots will be fished systematically in each of the two sampling sites, Mud Bay and McNeil Canyon. Soak times will be approximately 24 hours, weather permitting. General locations for setting pots has in a large part been determined by information provided by fishermen. Sampling will occur a minimum of once per month beginning in either May or June and extending through September, if necessary.

Mud Bay to Fritz Creek

Three stations approximately 3.5 nautical miles in length spaced between 0.5 and 5.0 fathoms will be fished. Fifteen pots will be fished in each station. Pot spacing in each station will be no greater than 0.25 miles (Table 2 and Figure 1).

McNeil Canyon to the upper bay

Four stations will be fished from McNeil Canyon towards the upper bay in depths ranging from 0.5 to 10.0 fathoms. Twelve pots will be fished at three of the stations and nine pots will be fished at the fourth. The three 12 pot stations will be approximately five miles long (Table 3). The nine pots in the fourth station in the upper extreme of the bay are in three 3 pot strings which are parallel to one another (Table 4). All pots will be fished in three pot strings and spaced no greater than 0.25 miles apart. Distance between strings will be approximately 0.5 miles (Figure 1).

West of Homer Spit

One hundred pots will be fished in a total of ten stations. Each station will be approximately two nautical miles in length running in a straight line (Figure 2). Ten pots will be fished in each station. Pots will be spaced no greater than 0.25 miles apart. Stations will be located in a systematic manner based on fisherman interviews (Table 5). Soak times will be 48 hours, weather permitting. Sampling will occur once in early July, once in early August and finally in late August. Sample dates are based on historical catch information, fishermen interviews and tides.

Data Collection

Station information including location (LORAN C or latitude and longitude), depth in fathoms, date/time and soak time will be documented.

Environmental Samples

No environmental samples will be taken.

Biological Samples

All Dungeness, king and Tanner crabs will be sampled. All fish will be counted and identified to species if possible. Crab sampling information will include: species, sex, size in millimeters (carapace width for Dungeness and Tanners, length for kings), general shell age, egg bearing information and soft shell condition. Egg bearing information will include presence or absence, relative clutch size and eyed condition.

Soft shell condition will be measured by assessing the extent of damage caused by applying physical pressure to the merus of the first or second walking leg. This will be accomplished by

attempting to bend the merus without breaking the exoskeleton. If bending occurs without fracturing the carapace, then the crab is in a biologically soft shell condition. If it will not bend, then the crab is in a biologically hard shell condition. This method has been, and is currently used in the Prince William Sound Management Area to determine soft shell condition.

A second method may be employed to determine crab shell condition. A durometer, manufactured by PTC Instruments, Los Angeles, California, which works on the principal of measuring resistance to pressure, will be used if time and conditions allow. The point of measurement is the ventral portion of the crab's carapace adjacent to the tenth anteriolateral spine. This method has been used for commercial dockside sampling in Cook Inlet. The durometer may not be employed for this survey as it requires two people for measurement and recording which is relatively time consuming. This may delay gear retrieval when time is of essence in pulling pots in shallow water. Previous field experience with the durometer also indicates that the device is likely to crack the shell of the crab if the crab is in a biologically soft shell condition, resulting therefore in a damaged crab and no durometer data collection.

Data Analysis

Data will be reported in two forms. First it will be presented as percentage of soft shell male crabs by size class for both sampling areas. Specific catch per pot, station or string will not be reported until the fishery is closed. To disclose this information before the fishery is closed would be in violation of Alaska Statute Sec. 16.05.815 (c). This report will be of immediate use in determining whether or not the fishery will open.

The second report will be written after all the season's surveys are completed. This document will be a catch summary by string, station and area. This report will also summarize the overall success or failure of the sampling program.

SCHEDULES

East of Homer Spit

<u>Date</u>	<u>Activity</u>
June 3 - 5	Conduct test fishing
July 8 - 10	Conduct test fishing
August 5 - 8	Conduct test fishing
September 3 - 6	Conduct test fishing

West of Homer Spit

July 1 - 3	Conduct test fishing
July 31 - Aug 2	Conduct test fishing
August 19 - 21	Conduct test fishing

- note - Dates may change slightly to facilitate vessel charter.

PROJECT BUDGET

Line Item	Budget
100	0
200	0
300	15.0 k (charter)
400	0
500	0
Total	15.0 k

Table 1. Dungeness commercial crab catch by year, Cook Inlet Management Area, 1961-1990.

Year	Southern district catch (lbs.)	Other districts catch (lbs.)	Total catch (lbs.)	Vessels	Landings
1961	193,683	0	193,683		
1962	530,770	0	530,770		
1963	1,665,599	11,605	1,677,204		
1964	417,005	6,036	423,041		
1965	74,211	0	74,211		
1966	12,523	117,037	129,560		
1967	7,168	0	7,168		
1968	484,452	3,407	487,859		
1969	49,894	0	49,894		
1970	209,819	0	209,819		
1971	97,161	0	97,161		
1972	38,930	0	38,930		
1973	308,777	1,271	310,048		
1974	718,729	2,514	721,243	38	619
1975	361,893	922	362,815	34	402
1976	118,903	395	119,298	19	123
1977	74,195	510	74,705	18	94
1978	1,212,571	3,208	1,215,779	49	668
1979	2,130,963	0	2,130,963	72	1,485
1980	1,875,281	0	1,875,281	54	1,183
1981	1,850,977	0	1,850,977	88	2,047
1982	818,380	505	818,885	108	2,310
1983	746,585	834	747,419	71	1,194
1984	799,638	570	800,208	102	1,687
1985	1,389,891	12,511	1,402,402	106	1,768
1986	550,968	12,894	563,862	83	1,069
1987	761,423	21,753	783,176	100	1,377
1988	677,334	41,941	719,275	84	1,305
1989	170,266	7,798	178,064	43	455
1990	28,938	564	29,502	23	112

Note: Average catch 1978-1989 = 1.09 million pounds per year.

Table 2. Mud Bay - Fritz Creek stations.

<u>Inside String</u>	<u>Middle String</u>	<u>Outside String</u>
1. 59° 36'.90 151° 25'.90	16. 59° 37'.03 151° 25'.39	31. 59° 36'.84 151° 25'.05
2. 59° 37'.15 151° 26'.10	17. 59° 37'.30 151° 25'.50	32. 59° 37'.07 151° 25'.00
3. 59° 37'.35 151° 26'.30	18. 59° 37'.52 151° 25'.62	33. 59° 37'.31 151° 24'.91
4. 59° 37'.60 151° 26'.50	19. 59° 37'.75 151° 25'.76	34. 59° 37'.57 151° 24'.82
5. 59° 37'.82 151° 26'.65	20. 59° 38'.03 151° 25'.95	35. 59° 37'.85 151° 24'.72
6. 59° 38'.06 151° 26'.50	21. 59° 38'.25 151° 25'.63	36. 59° 38'.10 151° 24'.35
7. 59° 38'.30 151° 26'.30	22. 59° 38'.43 151° 25'.39	37. 59° 38'.28 151° 23'.95
8. 59° 38'.52 151° 26'.10	23. 59° 38'.67 151° 25'.12	38. 59° 38'.47 151° 23'.57
9. 59° 38'.80 151° 25'.90	24. 59° 38'.89 151° 24'.78	39. 59° 38'.64 151° 23'.20
10. 59° 38'.92 151° 25'.52	25. 59° 39'.03 151° 24'.40	40. 59° 38'.80 151° 22'.70
11. 59° 39'.10 151° 25'.15	26. 59° 39'.18 151° 23'.98	41. 59° 38'.92 151° 22'.30
12. 59° 39'.28 151° 24'.75	27. 59° 39'.30 151° 23'.51	42. 59° 39'.08 151° 21'.80
13. 59° 39'.45 151° 24'.40	28. 59° 39'.45 151° 23'.11	43. 59° 39'.20 151° 21'.40
14. 59° 39'.60 151° 24'.00	29. 59° 39'.60 151° 22'.70	44. 59° 39'.32 151° 20'.96
15. 59° 39'.72 151° 23'.55	30. 59° 39'.73 151° 22'.26	45. 59° 39'.46 151° 20'.50

Table 3. McNeil Canyon - upper bay stations.

<u>Inside String</u>	<u>Middle String</u>	<u>Outside String</u>
46. 59° 42'.78 151° 13'.35	58. 59° 42'.55 151° 12'.55	70. 59° 42'.01 151° 11'.55
47. 59° 42'.95 151° 12'.90	59. 59° 42'.71 151° 12'.11	71. 59° 42'.23 151° 11'.18
48. 59° 43'.11 151° 12'.45	60. 59° 42'.88 151° 11'.70	72. 59° 42'.45 151° 10'.88
49. 59° 43'.70 151° 10'.97	61. 59° 43'.45 151° 10'.30	73. 59° 43'.05 151° 09'.50
50. 59° 43'.87 151° 10'.51	62. 59° 43'.62 151° 09'.86	74. 59° 43'.25 151° 09'.10
51. 59° 44'.05 151° 10'.10	63. 59° 43'.08 151° 09'.40	75. 59° 43'.48 151° 08'.70
52. 59° 44'.58 151° 08'.70	64. 59° 44'.38 151° 08'.00	76. 59° 44'.11 151° 07'.50
53. 59° 44'.75 151° 08'.21	65. 59° 44'.55 151° 07'.53	77. 59° 44'.30 151° 07'.00
54. 59° 44'.92 151° 07'.80	66. 59° 44'.72 151° 07'.10	78. 59° 44'.43 151° 06'.45
55. 59° 45'.50 151° 06'.30	67. 59° 45'.28 151° 05'.65	79. 59° 44'.80 151° 05'.67
56. 59° 45'.67 151° 05'.89	68. 59° 45'.45 151° 05'.23	80. 59° 45'.02 151° 05'.20
57. 59° 45'.83 151° 05'.40	69. 59° 45'.65 151° 04'.80	81. 59° 45'.24 151° 04'.75

Table 4. Upper bay short string stations.

<u>String One</u>		<u>String Two</u>		<u>String Three</u>	
82.	59° 44'.62 151° 05'.10	85.	59° 44'.75 151° 04'.30	88.	59° 44'.50 151° 04'.68
83.	59° 44'.90 151° 04'.65	86.	59° 45'.00 151° 03'.90	89.	59° 44'.57 151° 04'.08
84.	59° 45'.13 151° 04'.25	87.	59° 45'.23 151° 03'.40	90.	59° 44'.65 151° 03'.42

Table 5. Dungeness crab test fishing stations west of Homer Spit.

Station	Begin (lat., long.)	End (lat., long.)
1	59°32.55 151°43.50	59°31.90 151°47.10
2	59°34.40 151°45.15	59°33.00 151°48.00
3	59°31.00 151°48.80	59°30.40 151°52.70
4	59°32.20 151°51.00	59°31.20 151°54.60
5	59°30.90 151°55.50	59°29.50 151°58.20
6	59°32.50 151°59.00	59°33.30 152°02.75
7	59°33.35 151°55.00	59°34.05 151°58.80
8	59°35.10 151°48.30	59°36.35 151°51.50
9	59°36.30 151°46.50	59°37.70 151°49.40
10	59°38.75 151°45.50	59°39.75 151°48.90

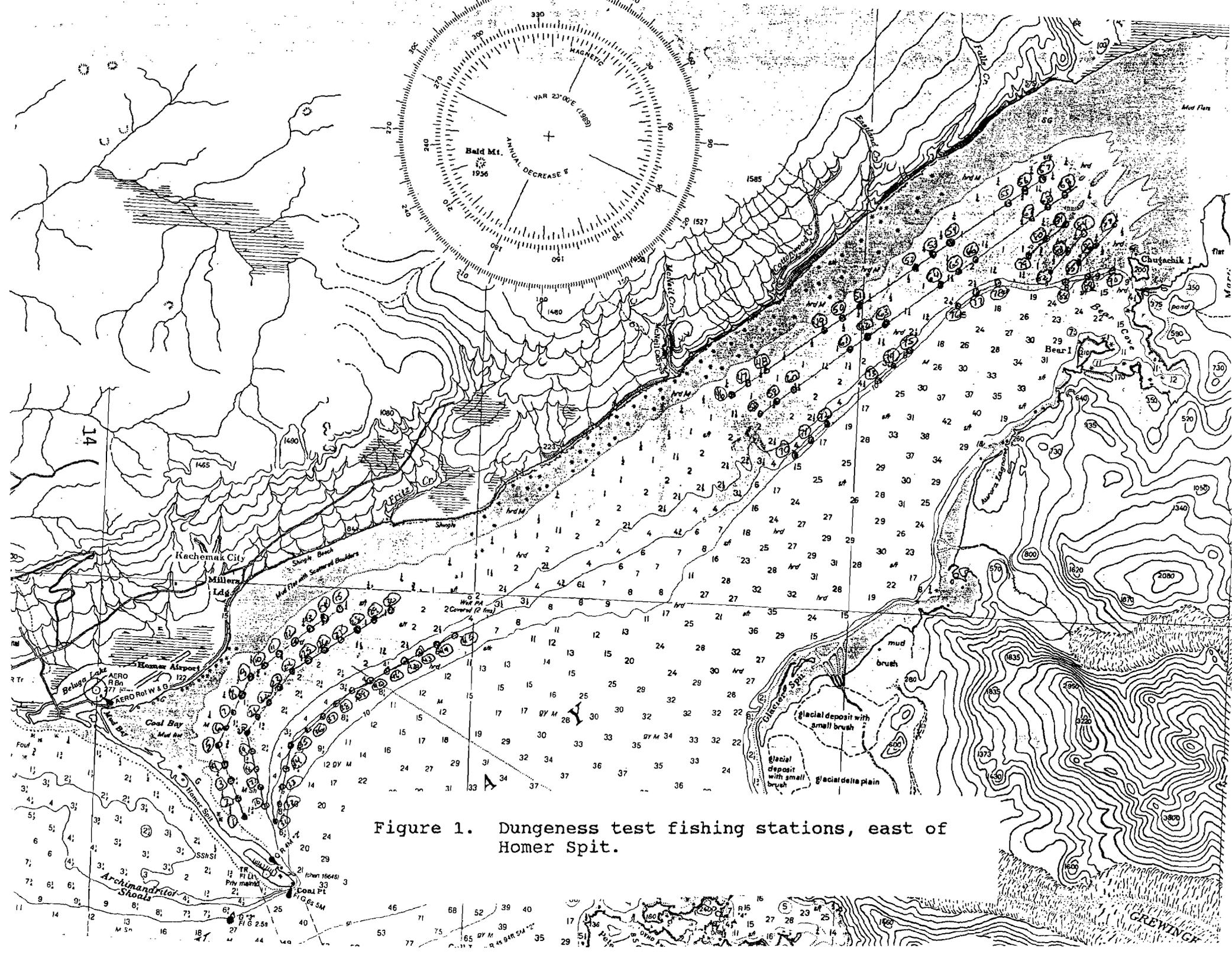


Figure 1. Dungeness test fishing stations, east of Homer Spit.

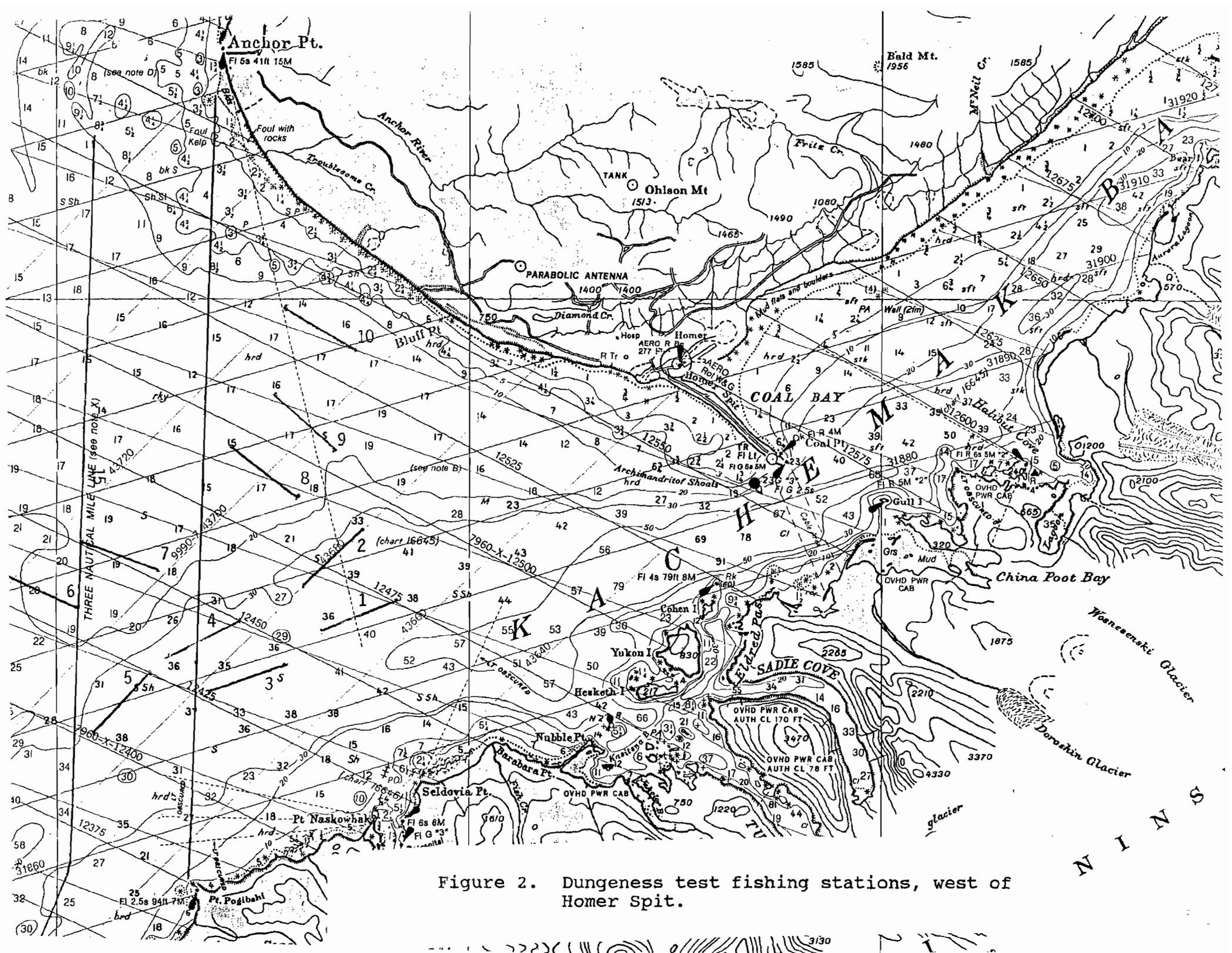


Figure 2. Dungeness test fishing stations, west of Homer Spit.