UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Auke Bay Laboratory
P. O. Box 210155, Auke Bay, Alaska 99821
907 789 7231
Western Union Telex II (TWX) 5101000492

CRUISE REPORT

F/V Let's Go Cruise 87-02
F/V Nore-Dick Cruise 87-02

1987 Triennial Groundfish Survey of the Eastern Gulf of Alaska

Prepared by David M. Clausen

From 12 July to 11 September 1987, the National Marine Fisheries Service, Northwest and Alaska Fisheries Center (NWAFC) Auke Bay Laboratory (ABL) conducted a trawl survey of the groundfish resources of the eastern Gulf of Alaska. Two chartered commercial fishing vessels, the F/V Let's Go and the F/V Nore-Dick, were used to survey waters of the continental shelf and upper continental slope from near Cape St. Elias southeastward to the U.S./Canada boundary in Dixon Entrance. The 1987 survey was the third triennial groundfish survey in this area, and followed previous surveys in 1981 and 1984. The survey was a cooperative effort with the NWAFC Resource Assessment and Conservation Engineering Division (RACE); in 1987, RACE conducted a similar survey in the central and western Gulf of Alaska using the same two vessels along with the Fisheries Agency of Japan charter vessel Taisei Maru No. 35.

OBJECTIVES

1. Determine the distribution, abundance, and size composition of major groundfish species inhabiting the continental shelf and upper slope of the eastern Gulf of Alaska.

2. Collect ancillary biological information from selected species, including otoliths for age determination and stomach samples for food habit studies.

3. Trawl selected stations on the continental shelf to detect possible sablefish nursery areas and upcoming strong year classes of sablefish.

ITINERARY

Let's Go Cruise 87-02

12 July	Departed Seward, AK
13 July	Completed hauls 1-2 E of Cape St. Elias
14 July	Completed hauls 3-4 E of Cape St. Elias
15 July	Completed hauls 5-8 off Cape Yakataga
16 July	Completed hauls 9-11 off Icy Bay
17 July	Completed hauls 12-15 off Icy Bay
18 July	Completed hauls 16-19 off Icy Bay
19 July	Completed hauls 20-22 off Yakutat Bay
20 July	Completed hauls 23-24 off Yakutat Bay Gear damaged, traveled to Yakutat in P.M.
21 July	In Port, Yakutat, AK, repairing gear
22 July	Completed hauls 25-29 W of Alsek Strath
23 July	Completed hauls 30-34 off Yakutat Bay
24 July	Completed hauls 35-38 in vicinity of Alsek Strath
25 July	Completed hauls 39-43 in Yakutat Valley
26 July	Completed hauls 44-45 off Yakutat Bay
27 July	Completed hauls 46-49 off Icy Bay
28 July	Completed hauls 50-51 off Cape Suckling
29 July	Arrived Seward; end cruise.

Nore-Dick Cruise 87-02

Leg I

4 August	Departed Auke Bay, AK; started Leg I
5 August	Completed hauls 1-4 near Spencer Gulley
6 August	Completed hauls 5-6 SW of Lituya Bay
7 August	Completed hauls 7-10 at "W" Grounds
8 August	Completed hauls 11-14 SW of Yakutat Bay
9 August	Completed hauls 15-16 SW of Yakutat Bay
10 August	Completed haul 17 SW of Yakutat Bay and arrived Yakutat Bay to overnight
11 August	Completed hauls 18-21 off Dry Bay
12 August	Completed hauls 22-26 off Lituya Bay
13 August	Anchored in Palma Bay due to weather
14 August	Completed hauls 27-28 W of Cross Sound
15 August	Completed hauls 29-30 W of Cross Sound
16 August	Completed hauls 31-34 W of Cape Cross
17 August	Completed hauls 35-38 off Salisbury Sound
18 August	Completed hauls 39-41 off Cape Edgecumbe
19 August	Traveled to Sitka, AK
20 August	End Leg I

Leg II

21 August	Port Call, Sitka
22 August	Departed Sitka; started Leg II. Completed hauls 42 and 43 off Baranof Island
23 August	Completed hauls 44-47 off Baranof Island

24 August	Completed hauls 48-52 offshore of Cape Ommaney
25 August	Completed hauls 53-55 off Coronation Island
26 August	Completed hauls 56-59 offshore of Cape Addington
27 August	Port call at Craig, AK, in A.M. to pick up net mending materials; completed hauls 60-61 off Baker Island
28 August	Completed hauls 62-64 off Baker Island
29 August	Completed haul 65 off Baker Island; weathered in at Port Santa Cruz, Suemez Island in P.M.
30 August	Completed hauls 66-68 off Dall Island
31 August	Weathered in at Port Santa Cruz, Suemez Island
1 September	Completed hauls 69-70 off Dall Island
2 September	Completed hauls 71-73 in Dixon Entrance
3 September	Completed hauls 74-75 off Dall Island
4 September	Completed haul 76 off Cape Addington; weathered in at Warren Cove, Warren Island in P.M.
5 September	Completed hauls 77-80 off Coronation Island
6 September	Completed hauls 81-83 offshore of Cape Ommaney
7 September	Completed haul 84 off S Baranof Island; weathered in at Port Banks, Baranof Island in P.M.
8 September	Completed haul 85 off S Baranof Island; weathered in at Port Banks in P.M.
9 September	Weathered in at Port Banks
10 September	Completed haul 86 S of Cape Edgecumbe; en route to Sitka
11 September	Arrived Sitka; end Leg II.

VESSELS AND GEAR

The F/V Let's Go and F/V Nore-Dick were both commercial stern trawlers designed with the "house" forward, and equipped with 565 and 500 horsepower main engines, respectively. The Let's Go was 25.9 m. (85 ft.) in length, and the Nore-Dick 23.5 m (77 ft). Each vessel carried a crew of four.

A high opening, polyethylene Nor'eastern trawl was used on each vessel. This net was originally tested during the 1984 triennial in the Gulf of Alaska, and was selected as the most appropriate standard for a multi-species bottom trawl survey in this region. The net was constructed of polyethylene webbing and measured 26.5 m along the headrope and 36.5 m along the footrope. Triple dandylines, 54.9 m long, attached the net to a pair of steel "V" doors, measuring 1.8 by 2.7 m and weighing 727 kg each. Rubber bobbin roller gear was attached to the footrope of the net to facilitate towing over rough bottoms.

METHODS

The area surveyed extended from the 144° 30' line of longitude near Cape St. Elias to the U.S./Canada boundary in Dixon Entrance, and from 0 to 700 m. depth. This area encompassed most of the Yakutat INPFC[1] area and all of the Southeastern INPFC area. Original plans called for sampling down to 1000 m, but neither vessel was equipped to trawl deeper than about 650 m. Only outside waters of the Gulf of Alaska were sampled in the survey; no stations were made in bays or inside passages.

The survey area was divided into 17 subareas by depth and geography (Table 1), and trawl stations were allocated amongst the subareas. The number of stations in each subarea was determined based on three criteria: 1) the expected maximum number of fishing days in the survey, assuming good weather; 2) the areal size of each subarea; and 3) the expected variability of catches in the subarea's depth stratum. Results from the 1984 triennial survey in the eastern Gulf of Alaska were used to estimate the expected variability of catches in a depth stratum. Generally, variability in the 1984 survey was highest in the depth strata with the greatest density of fish, so in the present survey more stations were allocated to subareas in these depth strata. Using the above criteria, a maximum of 194 stations was planned for the survey area (Table 1).

Within each subarea, the location of stations was randomly selected. Each subarea was divided into a grid of squares 5 nautical miles on each side. After the number of stations in the subarea was determined, a random number generator was used to select a grid square corresponding to each station. The actual geographic coordinates of the station were at the point in the center of the square.

Fourteen additional, non-random stations were included in the survey design to detect upcoming strong year classes of sablefish. These stations were located at positions where relatively large concentrations of juvenile sablefish (<60 cm fork length) were caught in the 1984 triennial survey.

Standard trawl hauls at each station were 30 minutes in duration. Towing speed of the Let's Go averaged 3.2 knots and averaged 2.6 knots for the Nore-Dick. At some stations, because of rough bottom, net hang-ups, or expected large catches of fish, hauls were shorter than 30 minutes. Tows less than 10 minutes long were not considered to be valid, and results from these short tows were not included in the survey analysis. If no trawlable bottom was located at a station's position, other areas within the grid square surrounding the station were searched

[1] International North Pacific Fishery Commission statistical area.

using the vessel's fathometer. If trawlable bottom was not found after approximately an hour's searching, the station was omitted and the vessel proceeded to the next station.

Catches less than ~2,500 lb were processed in their entirety. The catch was sorted, weighed and counted by species. For abundant or important species, sex was determined and the fish were measured for length frequency distributions. When a species was very abundant in a catch (>200-300 individuals), a random subsample of the species was taken for the sex determinations and length measurements. Some species were also subsampled for otolith extractions, and stomach samples were collected from most sablefish caught. Catches >2,500 lb were split, and a 1000-2000 lb subsample was retained and processed in the above manner; the remainder of the catch was weighed without processing and discarded overboard.

Initial survey plans called for measuring the width and height of the net opening during each haul using a SCANMAR sonar system. However, the SCANMAR systems on each vessel proved to be inoperable because of electronic failures. Measurements taken during the central and western Gulf of Alaska survey, when the system was functional, showed the net opening ranged from 14.1-15.4 m, and these measurements were used for the data analysis in our survey.

After each successful haul, an expendable bathythermograph (XBT) cast was made to determine a water temperature profile from the surface to the bottom.

RESULTS

A total of 137 trawl hauls were made during the survey, 51 by the Let's Go and 86 by the Nore-Dick (Table 2). 126 of the hauls were considered to be successful, i.e., valid for survey analysis. The 11 other hauls were unsuccessful because either the net was severely ripped during the tow, or the net hung up on the bottom, resulting in a tow of less than ten minutes duration. The Let's Go fished only in the Yakutat area at stations <300m depth (Figure 1), whereas the Nore-Dick fished at all depths in both the Yakutat and Southeastern areas (Figure 2). Of the 50 successful hauls made by the Let's Go, 45 were randomly located survey stations, and 5 were juvenile sablefish stations. Of the 76 successful hauls made by the Nore-Dick, 69 were randomly located survey stations, 3 were juvenile sablefish stations, and 4 were non-randomly located survey stations. The 4 non-random survey stations were added to the cruise at the discretion of the chief scientist when trawlable bottom could not be located at many of the pre-planned random stations in some subareas.

One hundred fifty-five of the random stations in the survey were actually visited by either vessel (Table 1). Time constraints caused by poor weather or mechanical problems did not allow all 194 random stations to be visited. At many stations,

fathometer recordings indicated the bottom was untrawlable, and no hauls were made at these stations.

Most of the survey region in the Yakutat area was trawlable, but many locations in the Southeastern area were not. In the Yakutat area, only 10% of the randomly located stations visited were determined to be untrawlable (Table 1). Most subareas there had a high percentage of trawlable stations, with the exception of the 501-700 m slope. In the Southeastern area, however, 43% of the random stations proved to be untrawlable. Only two subareas in Southeastern had a high percentage of trawlable stations: the 201-300 m slope north of Cape Ommaney, and the 301-500 m gullies.

Relatively few sablefish were caught at the 8 juvenile sablefish stations that were repeated from the 1984 survey. Average catch of sablefish at these stations was 102 kg/hr, as compared to 614 kg/hr in 1984. These results do not indicate any particular abundance of young sablefish in the survey area in 1987.

Summaries of the fish measured for length frequency distributions in the survey and summaries of the otolith samples collected are listed in Tables 3 and 4, respectively. Stomach samples were collected from approximately 600 sablefish throughout the survey area.

Pacific ocean perch was the predominate species caught in both the Yakutat and Southeastern areas (Tables 5 and 6). In both areas, arrowtooth flounder was by far the most abundant flatfish, followed by Pacific halibut. The large mean catch rate of Pacific herring in the Yakutat area was caused by large catches of herring in just two hauls, with only sparse catches elsewhere. Relatively large numbers of sharpchin, harlequin, and redstripe rockfish were caught in the Southeastern area. Catches of walleye pollock and Pacific cod, which are usually caught in abundance in the central and western Gulf of Alaska, were quite sparse in the area of this survey.

More detailed analyses of the catch rates by depth will be completed at a later date, when the results of this survey are combined with results of the survey conducted in the central and western Gulf of Alaska by the RACE division. A fishing log with positions and detailed catch records for each haul is presently being prepared and will be available from the Auke Bay Laboratory by April, 1988.

SCIENTIFIC PERSONNEL

Let's Go Cruise 87-02

12-29 July	John Karinen	Chief Scientist	ABL
	Nancy Maloney	Fishery Biologist	ABL
	Michael Brown	Bio. Technician	REFM*, Seattle
	Christy Johnson	Bio. Technician	RACE, Seattle

Nore-Dick Cruise 87-02

4-20 August	Tom Rutecki	Chief Scientist	ABL
	Ellen Varosi	Fishery Biologist	ABL
	Nancy Maloney	Fishery Biologist	ABL
	Rae Baxter	Fishery Biologist	RACE, Kodiak
21 Aug-11 Sept	David Clausen	Chief Scientist	ABL
	Richard Haight	Fishery Biologist	ABL
	Lincoln Freese	Fishery Biologist	ABL
	Rae Baxter	Fishery Biologist	RACE, Kodiak

*Resource Ecology and Fisheries Management Division, NWAFC, Seattle

---

For more information concerning cruises Let's Go 87-02 and Nore-Dick 87-02, contact:

Dr. George Snyder, Director
Auke Bay Laboratory
National Marine Fisheries Service
P. O. Box 210155
Auke Bay, Alaska 99821 ph. (907) 789-6000

Table 1. -- Summary of subareas and trawlable and untrawlable stations in the 1987 triennial groundfish survey in the eastern Gulf of Alaska. (Includes only stations that were randomly located).

Subareas	No. of planned stations	No. of stations visited	No. of stations successfully trawled[a]	No. of untrawlable stations[b]	Percent of stations untrawlable
Yakutat INPFC Area (east of 144°30'W longitude)					
0-100 m, shelf	6	5	5	0	0
101-200 m, shelf, 144°30' to Yakutat Valley	18	15	15	0	0
101-200 m, shelf, Yakutat Valley to Alsek Strath	29	15	13	2	13
101-200 m, shelf, Alsek Strath to 137°00'W	27	14	13	1	7
201-300 m, gullies	10	9	9	0	0
201-300 m, slope	6	6	5	1	17
301-500 m, gullies	6	6	6	0	0
301-500 m, slope	5	4	3	1	25
501-700 m, slope	6	5	2	3	60
Total, all subareas	113	79	71	7	10

(Table continued on next page)

Table 1 (Continued). -- Summary of subareas and trawlable and untrawlable stations in the 1987 triennial groundfish survey in the eastern Gulf of Alaska. (Includes only stations that were randomly located).

Subareas	No. of planned stations	No. of stations visited	No. of stations successfully trawled[a]	No. of untrawlable stations[b]	Percent of stations untrawlable
		Southeastern INPFC Area			
0-100 m, shelf	5	5	0	5	100
101-200 m, shelf north of Cape Ommaney	15	15	6	9	60
101-200 m, shelf south of Cape Ommaney	21	20	12	8	40
201-300 m, slope north of Cape Ommaney	5	5	5	0	0
201-300 m, slope south of Cape Ommaney	15	12	8	4	33
301-500 m, gullies	10	10	9	1	10
301-500 m, slope	5	4	1	3	75
501-700 m, slope	5	5	2	3	60
Total, all subareas	81	76	43	33	43

[a] Includes stations where the net hung-up, but the catch was still judged to be a good sample.

[b] Includes stations determined to be untrawlable according to fathometer recordings (no haul was made), and stations where the net hung-up severely or ripped.

Table 2. Summary of trawl hauls completed during cruises Let's Go 87-02 and Nore-Dick 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska. Includes all hauls made, both randomly and non-randomly located.

Vessel	No. of successful hauls	No. of unsuccessful hauls	Total hauls
Let's Go	50	1	51
Nore-Dick	76	10	86

Table 3.-- Number of fish measured for length frequency distributions, by species, during cruises Let's Go 87-02 and Nore-Dick 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska.

Species	Yakutat Area	Southeastern Area
Arrowtooth Flounder	2,686	1,492
Pacific halibut	243	265
Flathead sole	626	0
English sole	88	0
Dover sole	792	369
Rex sole	768	665
Starry flounder	20	0
Rock sole	18	0
Butter sole	41	0
Sablefish	945	345
Pacific herring	232	0
Pacific tomcod	68	0
Pacific cod	35	122
Walleye pollock	1,317	421
Shortspine thornyhead	1,400	1,757
Rougheye rockfish	565	221
Pacific ocean perch	1,673	2,035
Dusky rockfish	417	0
Rosethorn rockfish	56	0
Northern rockfish	27	0
Redstripe rockfish	96	430
Harlequin rockfish	322	1,035
Sharpchin rockfish	533	1,715
Shortraker rockfish	104	68
Total	13,072	10,940

Table 4. Number of fish sampled for otoliths during cruises Let's Go 87-02 and Nore-Dick 87-02, 1987 triennial groundfish survey in the eastern Gulf of Alaska.

Species	No. sampled	Area
Let's Go Cruise 87-02		
Pacific ocean perch	420	Yakutat
Dusky rockfish	60	Yakutat
Rougheye rockfish	30	Yakutat
Nore-Dick Cruise 87-02		
Pacific ocean perch	544	Southeastern
Shortspine thornyhead	112	Southeastern
Arrowtooth flounder	168	Southeastern

Table 5.--Major species caught in the Yakutat area[a] during cruises Let's Go 87-02 and Nore-Dick 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska.

Rank	Species	Mean CPUE[b] (kg/hr)
1	Pacific ocean perch	178.8
2	Arrowtooth flounder	129.0
3	Pacific herring	83.4
4	Sablefish	64.3
5	Sharpchin rockfish	60.1
6	Pacific halibut	52.2
7	Dusky rockfish	49.1
8	Flathead sole	44.9
9	Harlequin rockfish	38.9
10	Walleye pollock	29.4
11	Dover sole	27.8
12	Shortspine thornyhead	24.0
13	Rougheye rockfish	22.8
14	Shortraker rockfish	13.3
15	Rex sole	12.8
16	Giant grenadier	12.4
17	Lingcod	8.9
18	Pacific cod	8.7
19	Skates	6.5
20	Spiny dogfish	6.0
21	Eulachon	5.8
22	Pacific tomcod	5.3
23	Sponges	5.3
24	Silvergrey rockfish	4.0
25	Jellyfish	3.2
26	Redstripe rockfish	2.2
27	Redbanded rockfish	2.0
28	Northern rockfish	1.7
29	Rosethorn rockfish	1.6
30	Starry flounder	1.5
	Other species	10.7
	TOTAL	916.8

[a] Yakutat INPFC area east of 144°30' longitude.

[b] Catch per unit effort, regardless of depth = total weight for all successful hauls combined/total hours of effort.

Table 6.--Major species caught in the Southeastern area[a] during cruise Nore-Dick 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska.

Rank	Species	Mean CPUE[b] (kg/hr)
1	Pacific ocean perch	254.1
2	Sharpchin rockfish	165.9
3	Arrowtooth flounder	125.3
4	Harlequin rockfish	75.6
5	Pacific halibut	73.8
6	Redstripe rockfish	53.9
7	Shortspine thornyhead	40.5
8	Sablefish	37.1
9	Pacific cod	22.1
10	Rougheye rockfish	19.8
11	Dover sole	17.3
12	Shortraker rockfish	14.5
13	Canary rockfish	14.1
14	Rex sole	11.9
15	Walleye pollock	11.5
16	Giant grenadier	9.7
17	Silvergrey rockfish	9.7
18	Spotted ratfish	7.5
19	Lingcod	4.9
20	Yelloweye rockfish	4.3
21	Dusky rockfish	2.8
22	Rosethorn rockfish	2.3
23	Pacific herring	2.1
24	Alaska coral	2.1
25	Redbanded rockfish	2.1
26	Sponges	1.9
27	Sea anemones	1.7
28	Spiny dogfish	1.5
29	Skates	1.3
30	Red squid	1.3
	Other species	8.6
	TOTAL	1,001.2

[a] Southeastern INPFC area.

[b] Catch per unit effort, regardless of depth = total weight for all successful hauls combined/total hours of effort.

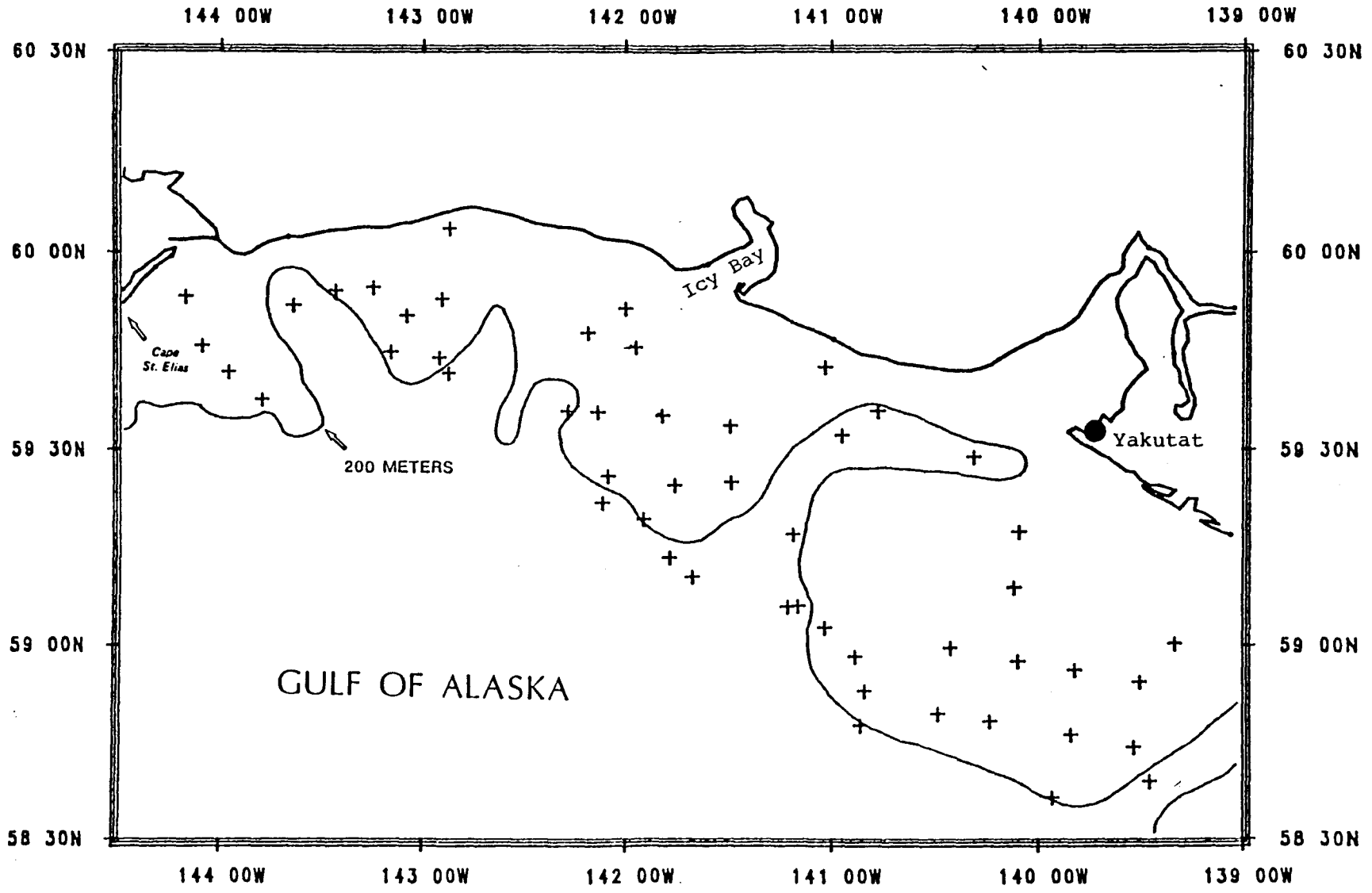

Figure 1. Location of trawl hauls made during cruise Let's Go 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska.

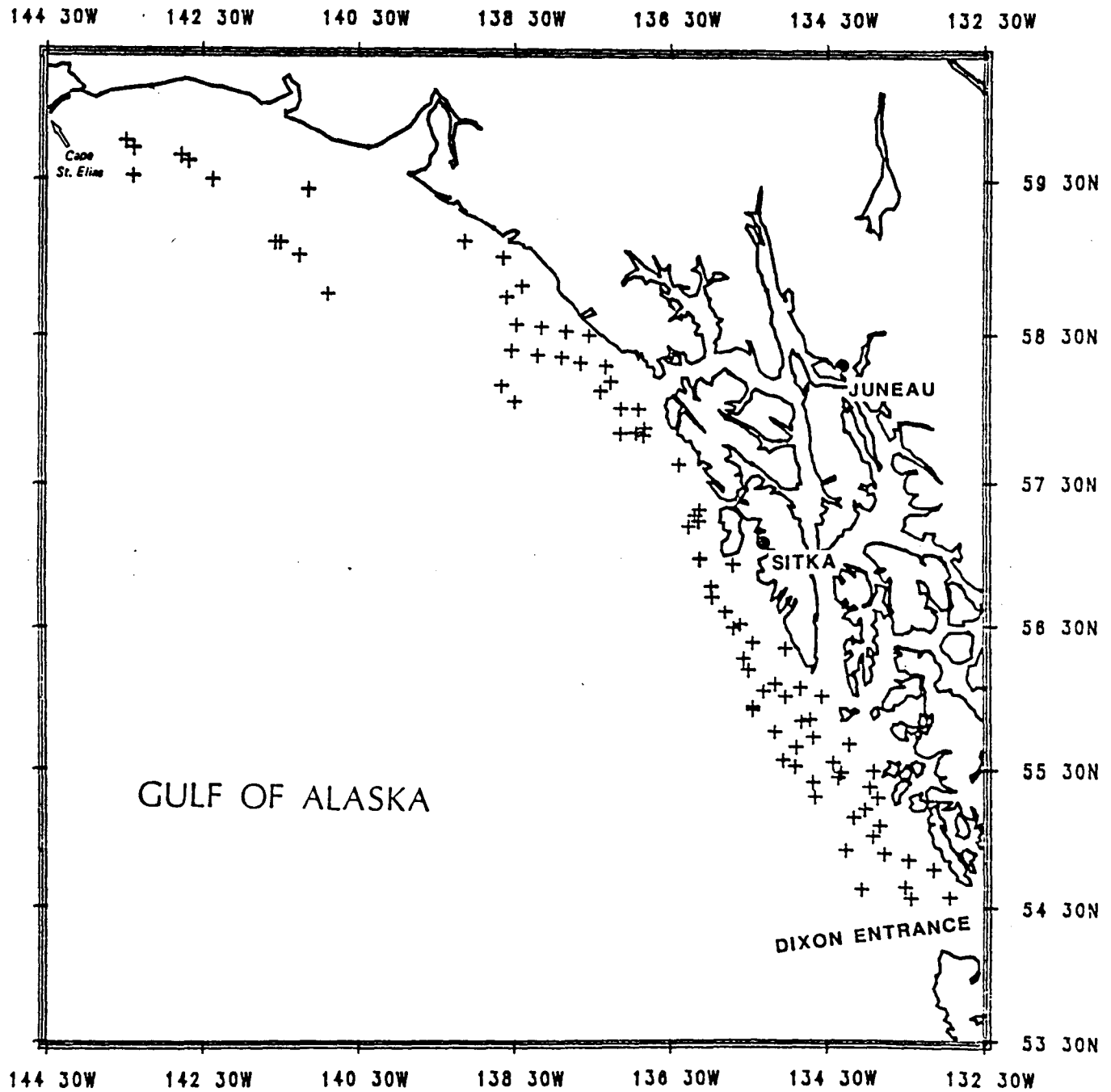

Figure 2. Location of trawl hauls made during cruise Nore-Dick 87-02, 1987 triennial groundfish survey of the eastern Gulf of Alaska.