CRUISE REPORT

NOAA Ship: MILLER FREEMAN
Cruise No: MF 95-11 (FOCI 9MF95)
Area: Eastern Bering Sea Shelf
Itinerary:
Leg 1: Sept. 9, Dutch Harbor
Sept. 19, St. Paul (T&G)
Leg 2: Sept. 19, St. Paul
Sept. 26, Dutch Harbor (T&G)
Leg 3: Sept. 26, Dutch Harbor
Sept. 30, Kodiak

Participating Organizations: NOAA Alaska Fisheries Science Center (AFSC)
NOAA Pacific Marine Environmental Laboratory (PMEL)

Cruise Description and Objectives

Fisheries Oceanography Coordinated Investigations (FOCI) is a joint effort by scientists at PMEL and AFSC to understand the biological and physical processes which cause variability of recruitment to commercially valuable fish and shellfish stocks in Alaskan waters. The Bering Sea FOCI program is presently studying the effects of the biotic and abiotic environment on the early life stages of walleye pollock spawned in the Eastern Bering Sea. There are two aspects to the study: the acquisition and analysis of time-series data, and specific research topics to be covered on a cruise-by-cruise basis.

The objectives of this cruise are (1) to continue acquisition of long-term biological and physical time series; (2) to conduct an acoustic and trawl survey of juvenile walleye pollock for examining horizontal distributions in relation to hydrographic fronts; (3) to collect samples of juvenile pollock for studies on growth, feeding and condition; (4) to examine vertical distribution of juvenile pollock and zooplankton using nets, acoustics, and underwater video cameras on a Remotely Operated Vehicle; (5) to examine the impact of midwater and demersal predators upon juvenile pollock; (6) to examine distribution and feeding of seabird and marine mammal predators in the vicinity of the Pribilof and Bogoslof Islands.

PERSONNEL

Chief Scientist: Richard D. Brodeur (AFSC) Legs 1 and 2
Morgan S. Busby (AFSC) Leg 3

Participating Scientists

Richard Brodeur	Fishery Biologist	NOAA/AFSC	9/9-9/26
Jeffrey Napp	Oceanographer	NOAA/AFSC	9/9-9/19
Morgan Busby	Fishery Biologist	NOAA/AFSC	9/9-9/30
Lisa Britt	Oceanographer	NOAA/AFSC	9/9-9/26
Geoff Lang	Fishery Biologist	NOAA/AFSC	9/9-9/30

Frank Morado	Fishery Biologist	NOAA/AFSC	9/9-9/19
Alonzo Hamilton	Fishery Biologist	NOAA/AFSC	9/9-9/30
William Rugen	Fishery Biologist	NOAA/AFSC	9/18-9/26
Michael Strict	Marine Mammalogist	NOAA/NMML	9/9-9/30
Rod Towell	Marine Mammalogist	NOAA/NMML	9/9-9/26
Janice Waite	Marine Mammalogist	NOAA/NMML	9/18-9/26
Libby Logerwell	Ornithologist	UC/Irvine	9/19-9/26
Susan Draper	Teacher-at-Sea	Virginia	9/9-9/19
Lance Horn	ROV Operator	NOAA/NURP	9/9-9/26

OPERATIONS SUMMARY

Operation	Total
CTD casts	5
MOCNESS tows	27
Methot trawls	29
Anchovy trawls	45
Bottom trawls	25
ROV deployments	30
Acoustic Transects surveyed	24
Bird Predator samples collected	14
Fish Predator samples collected	1197
Juvenile pollock stomach samples	1878
Juvenile condition/genetic samples	9
Juvenile pollock otolith samples	4248
Adult pollock length measurements	901
Juvenile pollock length measurements	6866
Pathology collections	650
Marine mammal prey collections	26
Stable isotope collections	56
Marine mammal genetic samples	58
Prey fatty acid samples	45

Summary of Cruise

The *Miller Freeman* departed Dutch Harbor along with the R/V *Surveyor* on 9 September to begin work around St. Paul Island. We first conducted day and night acoustic transects together with the *Surveyor* and then did plankton tows and nekton trawling on the North side of St. Paul (Line A). We repeated sampling at stations at and on each side of the front using a Methot and anchovy trawl, MOCNESS, ROV, and a bottom trawl. We conducted complete day and night transects and limited sampling at the Middle Shelf Front (Line L) and then did another pass of Front A, followed by Lines B, C, and D. We did several deep ROV deployments and one trawl at the head of Pribilof Canyon. We then conducted one more pass of Line A and embarked personnel from the *Surveyor* before ceasing joint operations and heading into St. Paul for a touch-and-go.

During Leg 2, we started a diel station at the frontal region of Line A but we were forced to curtail operations there due to high winds. We conducted an acoustic survey on the southwest side of the island (Line E) and then proceeded to offshore location to sample where fur seals were foraging. We completed two more

acoustic tracklines (Lines F and G) and some limited trawl sampling on both transects. We next completed a CTD transect on Line E and headed for Pribilof Canyon for deepwater ROV deployments and trawling. We did another acoustic transect along Line D and inshore trawling and ROV in support of marine bird collections. We returned to the Pribilof Canyon area for several ROV deployments and deepwater fish and plankton tows. Inclement weather forced us to curtail these operations and we headed to Bogoslof Island to do fish collections and ROV deployments to provide NMML scientists with information on northern fur seal feeding habitat. While NMML scientists were ashore, we did a MOCNESS, anchovy trawl, and three ROV deployments. We arrived in Dutch Harbor early in the morning of 26 September to end Leg 2.

The *Miller Freeman* departed Dutch Harbor on 26 September and did acoustic surveys and midwater and bottom trawl collections from Sanak Island to Chirikof Island. Finer resolution acoustic surveys were done in Shelikof Sea Valley from the Chirikof Island to the southern end of Kodiak Island. Trawling was done along these transects to identify midwater sign and collect demersal predators on juvenile pollock. The cruise ended in Kodiak on 30 September.

Preliminary Cruise Results

Age-0 pollock were the dominant fish caught in midwater trawls although gelatinous zooplankton were dominated the total catches by weight. They were taken in almost every anchovy trawl made and also in many of the Methot trawls. Age-0 pollock bundances were highest in the frontal region of all transects and were higher at the transects north of the islands. Age-1 and adult pollock were caught in the bottom trawl but flatfishes (rock sole and arrowtooth flounder) were the most abundant fishes caught. Many age-0 pollock were observed by the ROV's video cameras and most were found swimming freely within the tentacles of gelatinous zooplankton.

In the Gulf of Alaska, age-0 pollock were caught in midwater trawls mainly around Kodiak Island, with few age-0 pollock in the western Gulf of Alaska. Age-1 fish were abundant in most of the bottom trawls, especially those made near Kodiak Island.

ACKNOWLEDGEMENTS

We would like to express my thanks and appreciation to Captain John Clary and crew of the *Miller Freeman* for an enjoyable and successful cruise. We was very impressed by the cooperativeness and positive attitude of everyone, from the stewards department to the deck crew, survey department and officers. We also thank Lance Horn for his enthusiastic help and professional skill in piloting the ROV.

Table 1. MF95-11 Summary.

Station No.	Haul No.	Date (GMT)	Time (GMT)	Latitude Deg. N.	Longitude Deg. W.	Gear Depth (m)	Bottom Depth (m)	Operation
1	1	10-Sep	21:44	57.31	170.17	45	45	ROV
1	2	10-Sep	23:46	57.31	170.18	47	50	MOC1
1	3	11-Sep	1:45	57.30	170.18	30	51	Ancho
2	1	11-Sep	2:53	57.28	170.20	0	37	Trans
2	2	11-Sep	6:06	57.68	169.86	0	71	Trans
3	1	11-Sep	6:25	54.69	169.87	67	73	Meth
3	2	11-Sep	8:11	57.69	169.86	65	72	MOC1
3	3	11-Sep	9:33	57.69	169.86	33	71	Ancho
4	1	11-Sep	12:26	57.26	170.20	0	33	Trans
4	2	11-Sep	12:26	57.32	170.16	0	33	Trans
5	1	11-Sep	22:32	57.78	170.72	0	82	Trans
5	2	12-Sep	2:52	57.55	171.72	0	104	Trans
6	1	12-Sep	3:22	57.55	171.69	35	104	ROV
6	2	12-Sep	5:04	57.55	171.71	31	104	Meth
6	3	12-Sep	6:29	57.55	171.69	91	105	MOC1
6	4	12-Sep	8:12	57.54	171.70	33	104	Ancho
7	1	12-Sep	9:57	57.62	171.49	45	99	Meth
8	1	12-Sep	11:30	57.64	171.39	0	97	Trans
8	2	12-Sep	14:16	57.78	170.72	0	85	Trans
9	1	12-Sep	17:09	57.69	169.86	65	72	Meth
9	2	12-Sep	18:16	57.69	169.86	67	72	MOC1
9	3	12-Sep	19:57	57.68	169.86	71	71	Eastern
9	4	12-Sep	21:03	57.67	169.81	60	72	Ancho
9	5	12-Sep	22:19	57.68	169.85	71	71	ROV
10	1	13-Sep	1:27	57.38	170.10	53	60	Meth
10	2	13-Sep	2:41	57.38	170.10	61	61	ROV
10	3	13-Sep	4:26	57.39	170.08	53	61	MOC1
10	4	13-Sep	5:53	57.42	170.09	38	61	Ancho
11	1	13-Sep	7:16	57.29	170.18	0	37	Trans
11	2	13-Sep	10:28	57.69	169.86	0	71	Trans
12	1	13-Sep	11:10	57.69	169.85	30	71	Meth
12	2	13-Sep	12:17	57.68	169.86	67	71	MOC1
12	3	13-Sep	13:49	57.69	169.87	20	71	Ancho
13	1	13-Sep	16:07	57.46	170.04	20	64	Meth
13	2	13-Sep	17:24	57.47	170.04	60	66	MOC1
13	3	13-Sep	18:52	57.47	170.03	30	66	Ancho
13	4	13-Sep	20:21	57.47	170.01	66	66	Eastern
13	5	13-Sep	21:27	57.47	170.01	61	61	ROV
14	1	13-Sep	23:32	57.27	170.20	0	35	Trans
14	2	14-Sep	3:00	57.69	169.86	0	72	Trans
15	1	14-Sep	5:37	57.31	170.17	43	51	Meth
15	2	14-Sep	6:27	57.32	170.18	48	53	MOC1
15	3	14-Sep	7:22	57.32	170.16	38	52	Ancho
15	4	14-Sep	8:15	57.31	170.15	50	52	Eastern
16	1	14-Sep	10:19	57.49	169.98	35	67	Meth
16	2	14-Sep	11:25	57.49	169.99	62	68	MOC1
16	3	14-Sep	12:43	57.48	169.99	30	66	Ancho
17	1	14-Sep	17:15	57.08	170.23	0	33	Trans
17	2	14-Sep	20:26	56.70	170.61	0	113	Trans

Table 1. MF95-11 Summary.

Station No.	Haul No.	Date (GMT)	Time (GMT)	Latitude Deg. N.	Longitude Deg. W.	Gear Depth (m)	Bottom Depth (m)	Operation
18	1	14-Sep	21:14	56.69	170.66	113	113	ROV
18	2	14-Sep	22:59	56.69	170.66	103	112	Meth
18	3	14-Sep	23:53	56.70	170.67	111	112	MOC1
18	4	15-Sep	1:39	56.69	170.67	85	112	Ancho
19	1	15-Sep	5:33	56.95	170.36	83	83	ROV
19	2	15-Sep	5:57	56.94	170.36	76	86	Meth
19	3	15-Sep	6:50	56.96	170.37	81	83	MOC1
19	4	15-Sep	8:03	56.93	170.37	24	89	Ancho
19	5	15-Sep	8:54	56.93	170.36	82	89	Eastern
20	1	15-Sep	10:36	57.09	120.24	0	32	Trans
20	2	15-Sep	13:58	56.70	170.62	0	112	Trans
21	1	15-Sep	14:19	56.70	170.63	28	110	Meth
21	2	15-Sep	16:21	56.70	170.62	16	112	Ancho
21	3	15-Sep	17:37	56.69	170.52	107	111	MOC1
22	1	15-Sep	21:06	56.93	170.37	90	90	ROV
22	2	15-Sep	22:10	56.93	170.38	79	89	Meth
23	1	16-Sep	0:33	57.06	169.71	0	59	Trans
23	2	16-Sep	3:35	56.63	169.59	0	65	Trans
24	1	16-Sep	4:30	56.70	169.60	79	79	ROV
24	2	16-Sep	6:02	56.69	169.59	69	79	Meth
24	3	16-Sep	6:47	56.71	169.60	74	79	MOC1
24	4	16-Sep	8:11	56.70	169.61	37	80	Ancho
24	5	16-Sep	8:50	56.69	169.59	78	78	Eastern
24	6	16-Sep	10:00	56.70	169.61	79	79	ROV
25	1	16-Sep	11:39	56.63	169.59	0	62	Trans
25	2	16-Sep	15:03	57.06	169.70	0	59	Trans
26	1	16-Sep	16:09	56.90	169.65	40	69	Meth
26	2	16-Sep	17:12	56.92	169.67	58	69	MOC1
26	3	16-Sep	18:34	56.94	169.66	25	62	Ancho
27	1	16-Sep	20:51	56.72	169.60	80	80	ROV
27	2	16-Sep	21:51	56.72	169.60	68	80	Meth
27	3	16-Sep	22:40	56.72	169.59	42	80	Ancho
28	1	17-Sep	0:50	56.55	169.50	0	70	Trans
28	2	17-Sep	2:53	56.28	169.44	0	238	Trans
29	1	17-Sep	4:06	56.30	169.44	203	203	ROV
29	2	17-Sep	6:41	56.29	169.47	215	215	Eastern
29	3	17-Sep	7:49	56.29	169.50	23	222	Ancho
29	4	17-Sep	8:58	56.29	169.45	205	214	Meth
29	5	17-Sep	10:32	56.29	169.46	210	216	MOC1
29	6	17-Sep	11:44	56.29	169.46	211	211	ROV
30	1	17-Sep	13:06	56.28	169.44	0	240	Trans
30	2	17-Sep	15:21	56.55	169.50	0	39	Trans
31	1	17-Sep	16:40	56.54	169.49	50	61	Meth
31	2	17-Sep	17:46	56.54	169.52	54	59	MOC1
31	3	17-Sep	19:02	56.54	169.51	35	59	Ancho
32	1	17-Sep	20:35	56.47	169.49	96	96	ROV
32	2	17-Sep	21:43	56.47	169.47	84	97	Meth
32	3	17-Sep	22:28	56.47	169.47	93	97	MOC1
32	4	17-Sep	23:41	56.47	169.46	50	97	Ancho

Table 1. MF95-11 Summary.

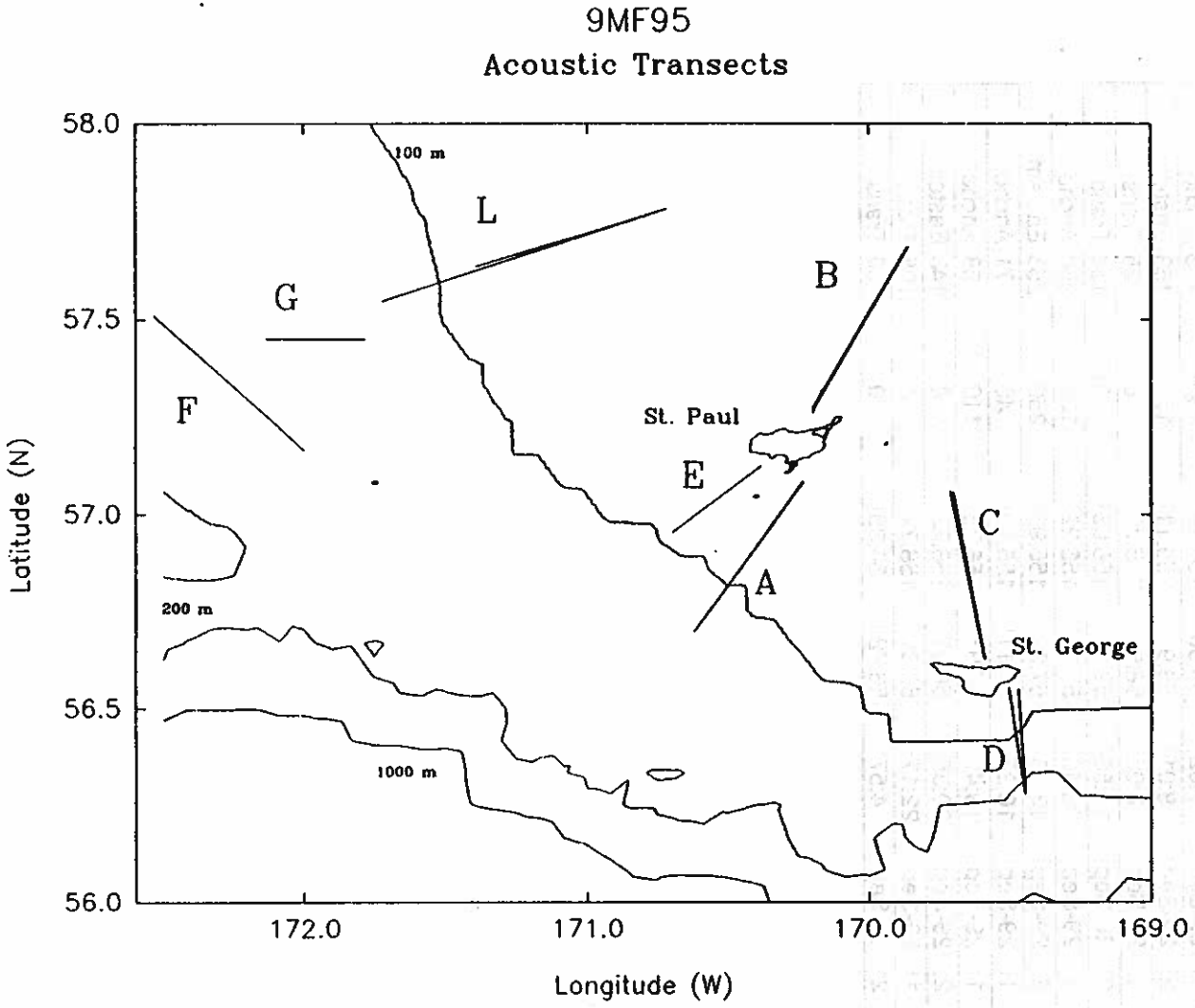
Station No.	Haul No.	Date (GMT)	Time (GMT)	Latitude Deg. N.	Longitude Deg. W.	Gear Depth (m)	Bottom Depth (m)	Operation
33	1	18-Sep	0:36	56.54	169.49	61	61	ROV
34	1	18-Sep	7:02	57.27	170.20	0	36	Trans
34	2	18-Sep	10:33	57.69	169.86	0	72	Trans
35	1	18-Sep	12:19	57.44	170.06	52	63	Meth
35	2	18-Sep	13:28	57.44	170.06	59	64	MOC1
35	3	18-Sep	14:51	57.43	170.06	30	62	Ancho
35	4	18-Sep	18:00	57.43	170.08	62	62	ROV
36	1	18-Sep	18:48	57.28	170.19	36	36	Meth
36	2	18-Sep	19:53	57.28	170.20	37	45	MOC1
36	3	18-Sep	21:05	57.29	170.19	40	40	Ancho
37	1	19-Sep	0:04	57.28	170.19	0	45	Trans
37	2	19-Sep	3:34	57.68	169.86	0	72	Trans
38	1	19-Sep	3:49	57.68	169.86	71	71	ROV
38	2	19-Sep	5:30	57.67	169.85	25	71	Ancho
38	3	19-Sep	6:18	57.67	169.85	63	71	Eastern
39	1	19-Sep	9:09	57.32	170.17	52	52	ROV
39	2	19-Sep	10:38	57.32	170.17	52	52	Meth
39	3	19-Sep	11:14	57.32	170.17	42	52	Meth
39	4	19-Sep	12:03	57.32	170.17	47	53	MOC1
39	5	19-Sep	13:09	57.32	170.17	20	52	Ancho
39	6	19-Sep	14:01	57.32	170.17	46	52	Eastern
40	1	20-Sep	7:28	57.53	169.99	70	70	ROV
40	2	20-Sep	8:53	57.53	169.99	71	71	Eastern
40	3	20-Sep	10:00	57.52	170.00	30	71	Ancho
40	4	20-Sep	11:37	57.53	169.99	65	72	MOC1
40	5	20-Sep	13:21	57.53	170.00	65	70	Meth
40	6	20-Sep	15:54	57.53	169.98	70	70	ROV
40	7	20-Sep	17:33	57.55	170.00	64	72	Eastern
40	8	20-Sep	18:42	57.54	170.00	30	72	Ancho
41	1	20-Sep	22:19	57.12	170.39	0	41	Trans
41	2	20-Sep	23:36	57.05	170.52	0	88	Trans
42	1	21-Sep	6:37	57.11	170.43	60	60	Eastern
42	2	21-Sep	7:46	57.11	170.42	45	59	Ancho
42	3	21-Sep	8:58	57.11	170.42	50	60	MOC1
42	4	21-Sep	10:09	57.12	170.42	48	58	Meth
43	1	21-Sep	10:30	57.13	170.38	0	33	Trans
43	2	21-Sep	12:17	56.96	170.69	0	98	Trans
44	1	21-Sep	13:51	57.03	170.56	80	80	Eastern
44	2	21-Sep	15:10	57.03	170.55	20	79	Ancho
44	3	21-Sep	17:35	57.04	170.60	68	80	MOC1
44	4	21-Sep	18:28	57.04	170.63	73	81	Meth
44	5	21-Sep	19:16	57.04	170.63	82	82	ROV
45	1	21-Sep	23:55	57.17	172.00	0	112	Trans
45	2	22-Sep	3:04	57.51	172.54	0	115	Trans
46	1	22-Sep	4:13	57.37	172.32	111	111	ROV
46	2	22-Sep	6:34	57.37	172.33	26	111	Ancho
47	1	22-Sep	8:00	57.45	172.13	0	109	Trans
47	2	22-Sep	9:25	57.45	171.78	0	106	Trans
48	1	22-Sep	9:48	57.45	171.81	29	107	Ancho

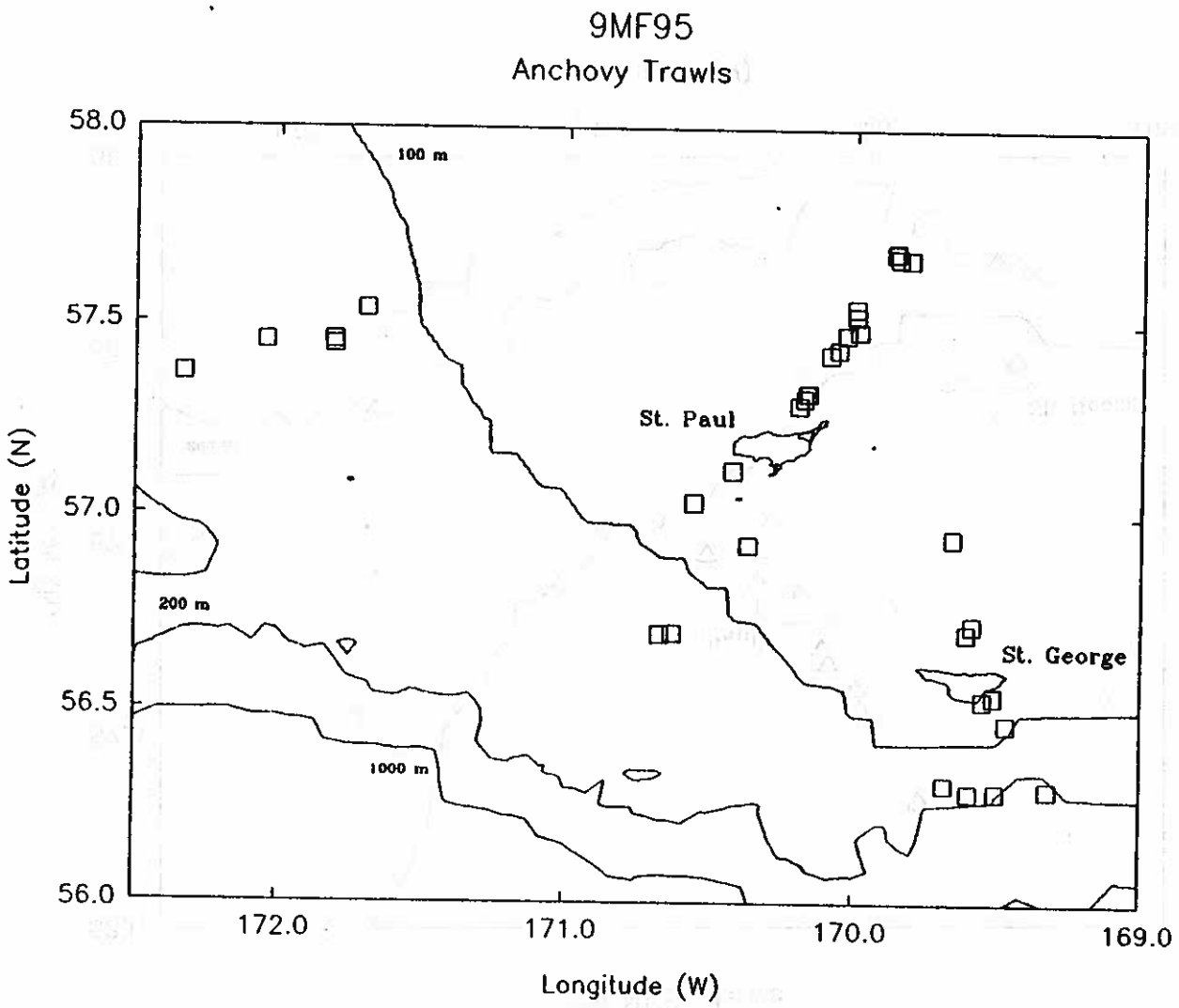
Table 1. MF95-11 Summary.

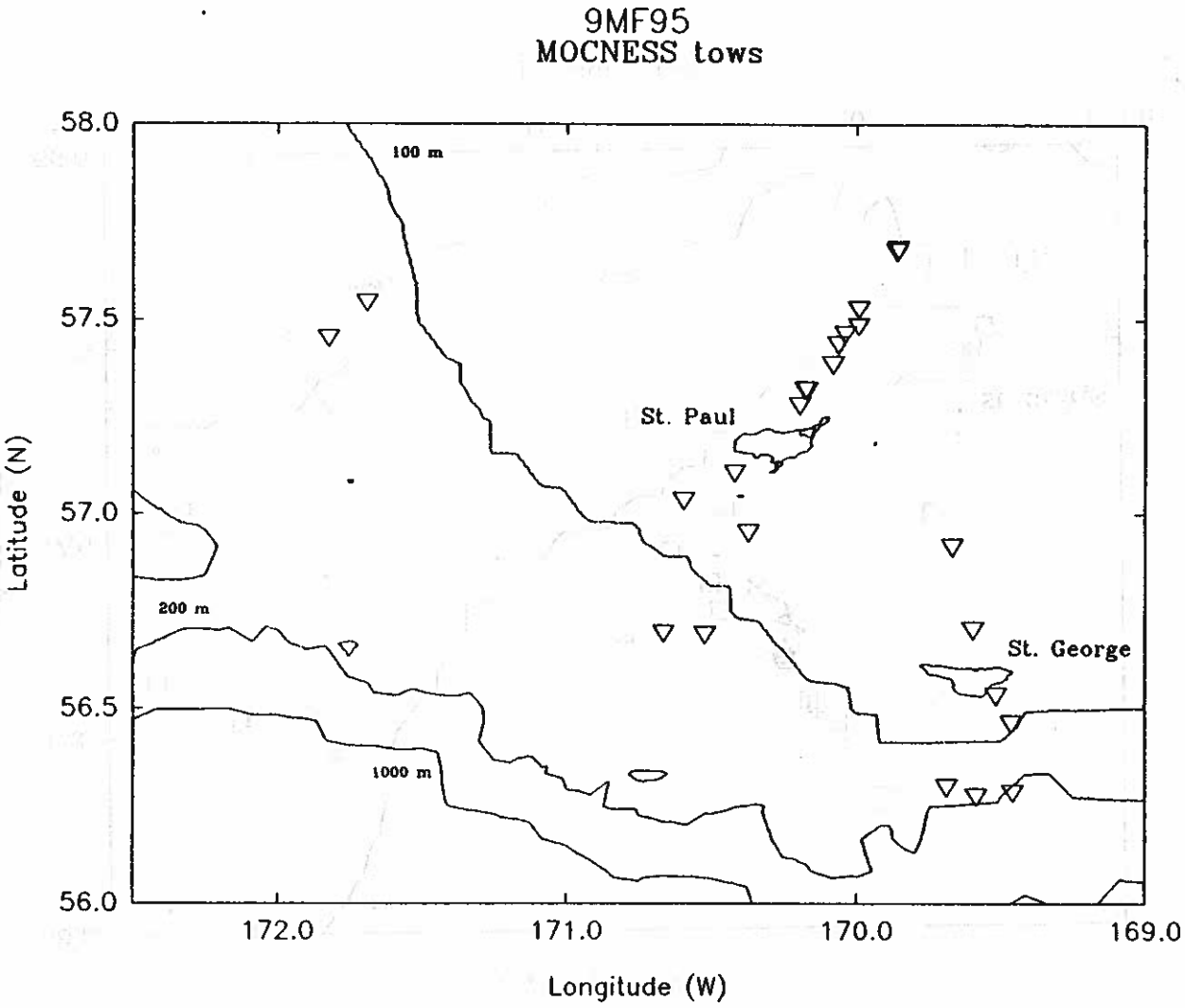
Station No.	Haul No.	Date (GMT)	Time (GMT)	Latitude Deg. N.	Longitude Deg. W.	Gear Depth (m)	Bottom Depth (m)	Operation
48	2	22-Sep	11:04	57.45	171.82	106	106	Eastern
48	3	22-Sep	13:39	57.46	171.83	95	108	MOC1
48	4	22-Sep	16:14	57.45	171.80	101	106	Meth
48	5	22-Sep	17:09	57.45	171.83	108	108	ROV
48	6	22-Sep	18:43	57.44	171.81	25	107	Ancho
48	7	22-Sep	19:34	57.45	171.83	102	107	Eastern
48	8	22-Sep	21:29	57.45	171.81	96	106	Meth
49	1	22-Sep	22:04	57.45	171.79	0	106	Trans
49	2	22-Sep	23:28	57.45	172.14	0	110	Trans
50	1	23-Sep	0:11	57.45	172.05	28	109	Ancho
51	1	23-Sep	6:09	57.12	170.38	30	34	CTD
52	1	23-Sep	6:52	57.08	170.46	43	47	CTD
53	1	23-Sep	7:33	57.04	170.54	76	79	CTD
54	1	23-Sep	8:26	57.00	170.62	83	87	CTD
55	1	23-Sep	9:12	56.96	170.70	94	96	CTD
56	1	23-Sep	16:02	56.28	169.43	236	236	Eastern
57	1	23-Sep	17:14	56.28	169.44	0	230	Trans
57	2	23-Sep	19:15	56.55	169.47	0	54	Trans
58	1	23-Sep	20:29	56.54	169.51	52	52	ROV
58	2	23-Sep	22:17	56.53	169.55	35	58	Ancho
58	3	23-Sep	23:11	56.54	169.51	53	59	Meth
58	4	24-Sep	0:05	56.52	169.56	51	57	Meth
58	5	24-Sep	0:57	56.52	169.56	55	59	Meth
58	6	24-Sep	1:25	56.52	169.56	50	58	Meth
59	1	24-Sep	3:47	56.31	169.68	209	209	ROV
59	2	24-Sep	5:59	56.31	169.68	200	200	Eastern
59	3	24-Sep	7:28	56.31	169.68	22	180	Ancho
59	4	24-Sep	9:00	56.30	169.69	181	195	MOC1
60	1	24-Sep	10:41	56.28	169.60	184	184	ROV
60	2	24-Sep	12:43	56.28	169.60	11	192	Ancho
60	3	24-Sep	13:40	56.28	169.60	205	205	Eastern
60	4	24-Sep	16:34	56.28	169.59	193	207	MOC1
61	1	24-Sep	21:10	56.30	169.31	184	186	Eastern
61	2	24-Sep	22:16	56.29	169.30	197	197	ROV
61	3	25-Sep	1:08	56.29	169.32	54	195	Ancho
62	1	25-Sep	19:20	53.93	168.02	408	90	ROV
62	2	25-Sep	21:16	53.94	168.02	250	383	MOC1
62	3	25-Sep	22:45	53.93	168.02	71	157	Ancho
63	1	26-Sep	1:20	53.95	168.04	140	84	ROV
64	1	26-Sep	3:27	53.92	168.04	250	186	ROV
65	1	27-Sep	16:47	54.60	161.79	81	120	Ancho
65	2	27-Sep	17:53	54.59	161.80	124	124	Eastern
66	1	27-Sep	22:52	55.00	160.74	21	90	Ancho
66	2	27-Sep	23:42	55.00	160.74	72	90	Eastern
67	1	28-Sep	5:04	55.41	159.34	71	148	Ancho
67	2	28-Sep	6:01	55.41	159.34	148	148	Eastern
68	1	28-Sep	10:44	55.59	158.08	25	134	Ancho
69	1	28-Sep	16:06	55.83	156.36	50	243	Ancho
70	1	28-Sep	17:18	55.86	156.15	186	186	Trans

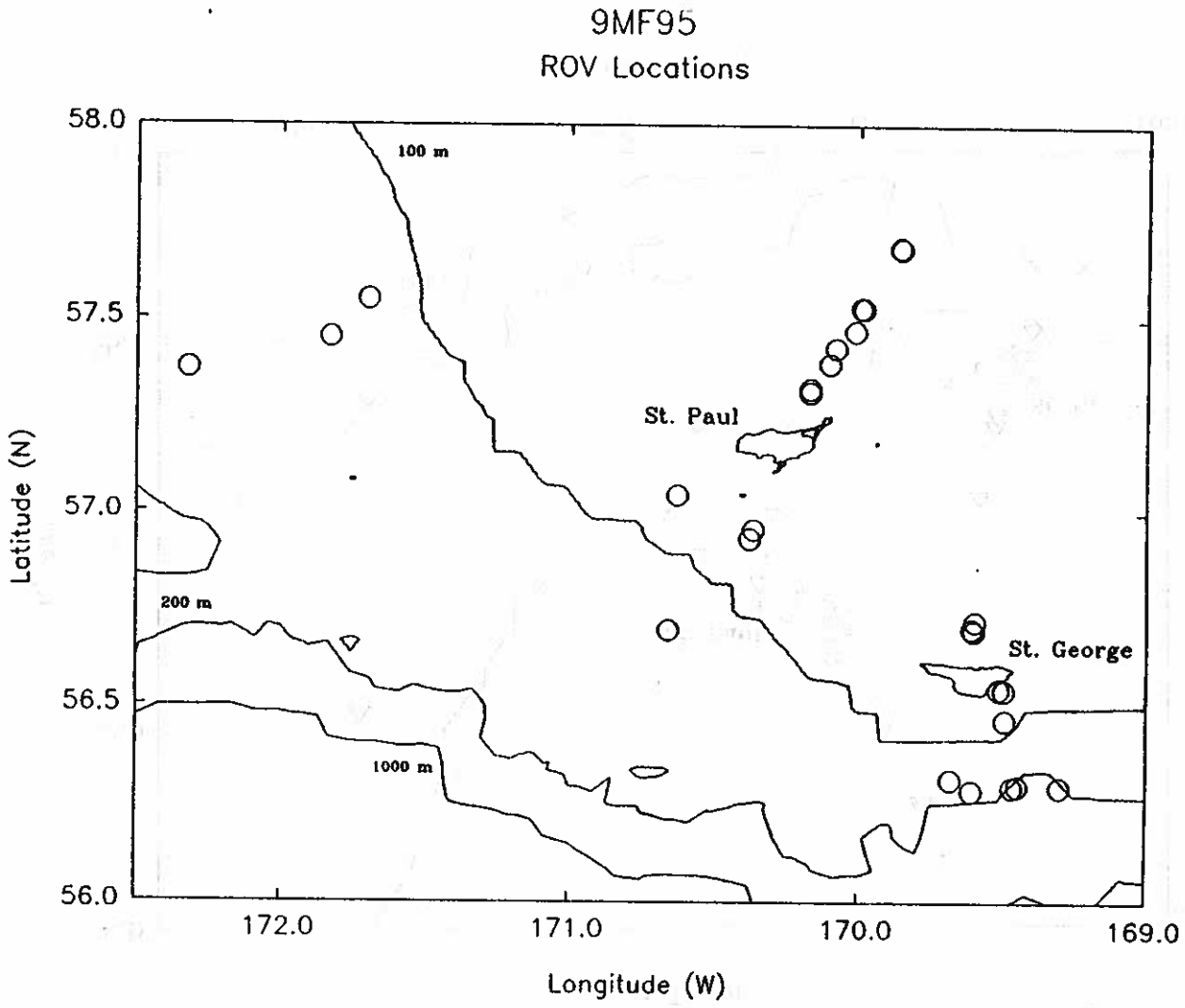
Table 1. MF95-11 Summary.

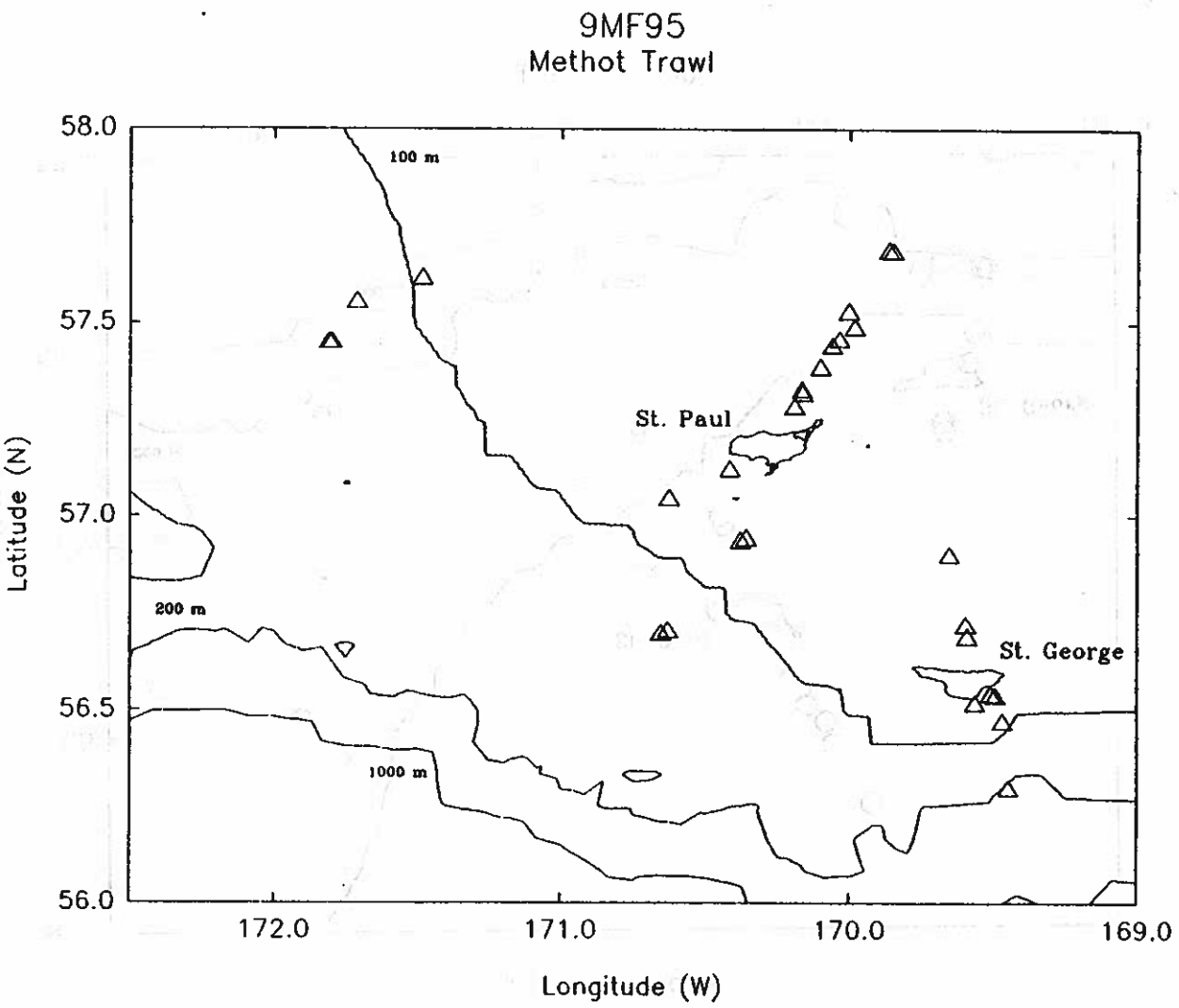
Station No.	Haul No.	Date (GMT)	Time (GMT)	Latitude Deg. N.	Longitude Deg. W.	Gear Depth (m)	Bottom Depth (m)	Operation
70	2	28-Sep	23:07	56.51	156.63	174	174	Trans
71	1	28-Sep	23:34	56.51	156.63	130	179	Ancho
71	2	29-Sep	0:43	56.49	156.64	176	176	Eastern
72	1	29-Sep	1:25	56.46	156.63	184	184	Trans
72	2	29-Sep	6:28	56.60	155.04	0	92	Trans
73	1	29-Sep	7:02	56.90	155.13	130	163	Ancho
73	2	29-Sep	8:01	56.91	155.11	153	153	Eastern
74	1	29-Sep	8:03	56.91	155.08	0	125	Trans
74	2	29-Sep	11:56	57.24	156.06	0	156	Trans
75	1	29-Sep	12:46	57.23	155.92	198	250	Ancho
75	2	29-Sep	13:48	57.22	155.93	250	253	Eastern
76	1	29-Sep	16:27	57.11	156.13	40	71	Ancho
77	1	29-Sep	19:46	56.91	156.73	110	138	Ancho
77	2	29-Sep	20:35	56.91	156.72	148	148	Eastern
78	1	29-Sep	22:17	56.91	156.72	0	105	Trans
78	2	30-Sep	4:57	56.72	154.38	0	30	Trans

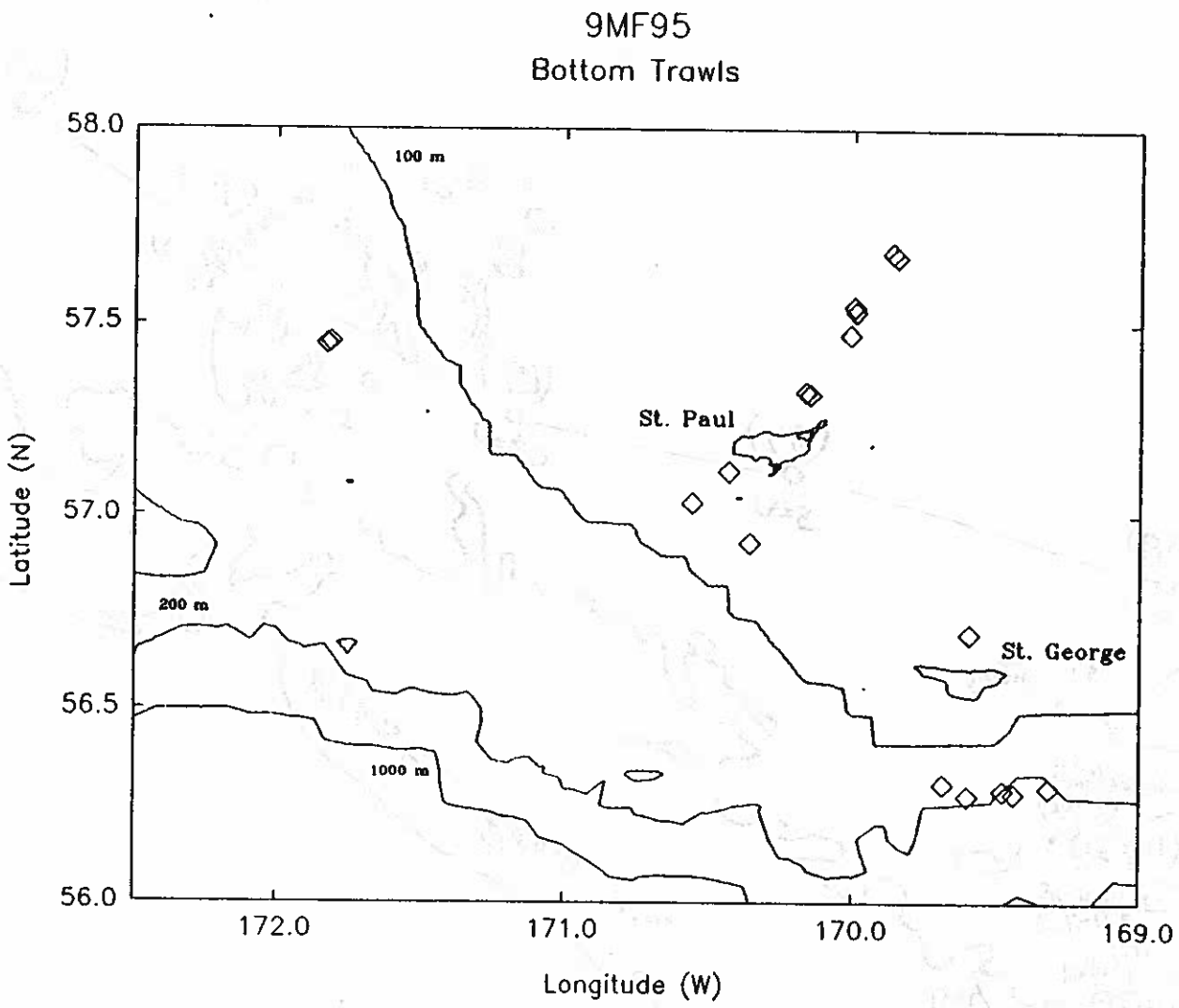

9MF95
Acoustic Transects
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
L
G
F
B
E
A
C
D
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)


9MF95
Anchovy Trawls
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)


9MF95
MOCNESS tows
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)


9MF95
ROV Locations
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)


9MF95
Methot Trawl
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)


9MF95
Bottom Trawls
58.0
57.5
57.0
56.5
56.0
Latitude (N)
100 m
200 m
1000 m
St. Paul
St. George
172.0
171.0
170.0
169.0
Longitude (W)

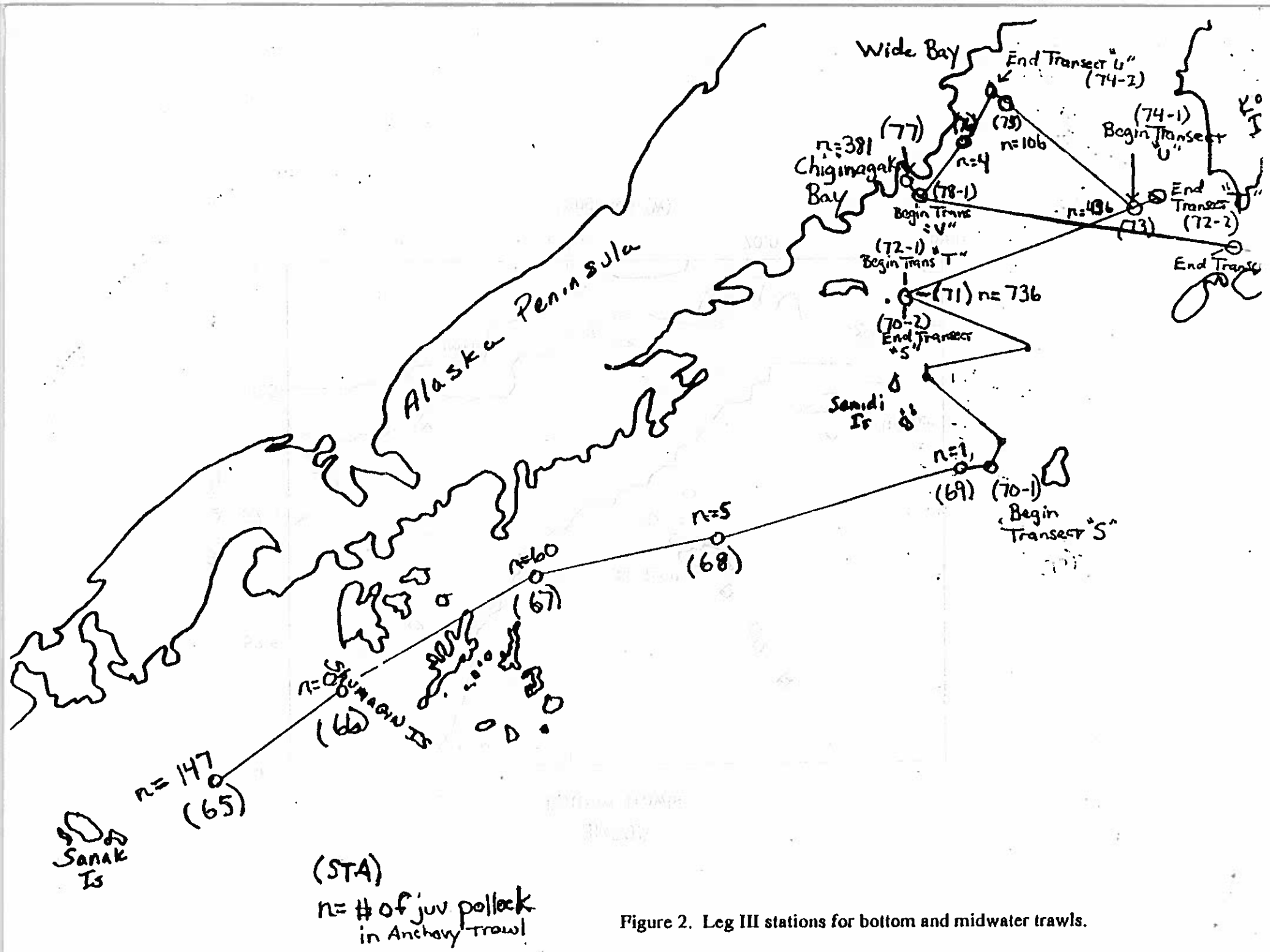


Figure 2. Leg III stations for bottom and midwater trawls.