Project No 83/50

FINAL REPORT

SOUTH AUSTRALIAN DEEP WATER LINE FISHING DEVELOPMENTS

February 1985

FOREWARD

During November and December 1983 and February to May 1984, the Commonwealth funded South Australian Deep Water Line Fishing Survey investigated the viability of droplining and trotlining on the continental slope off southeast Australia.

At present many south Australian fishermen rely heavily on rock lobster and the establishment of a trot/dropline fishery would provide a valuable alternative for this fishery, and could prove to be a substantial benefit to local fishermen.

In April 1983, the Minister for Primary Industry approved the expenditure of $83,500 from the Fishing Industry Research Trust Account towards a project aimed at providing an alternative fishery to the already established rock lobster and shark fisheries.

The Fisheries Division wishes to acknowledge the willing efforts of Greg Howard, owner/skipper of the chartered vessel, "Opal Star", and his crew during the survey, and the co-operation of officers of the South Australian Department of Fisheries who compiled the statistical data.

BACKGROUND

A dropline/trotline survey of the continental slope off southeast South Australia was undertaken by the Fisheries Division of the Department of Primary Industry, with the co-operation of the South Australian Department of Fisheries. The survey was in response to submissions from the South Australian branch of the Australian Fishing Industry Council and local fishermen.

During the 1950's trevalla and ling were caught by longline methods on the edge of the continental shelf off South Australia during the CSIRO line Fishing Survey by the FRV "Derwent Hunter", despite the fact that their gear was primitive compared to that now available.

South Australian fishermen have since attempted to fish these waters on occasions but again have been hampered by problems with fishing gear, a lack of knowledge of the techniques involved and of the location of suitable fishing grounds.

Around Tasmania, the trotline and dropline methods have proven an effective method of fishing for deep water species such as trevalla and ling in conditions similar to those encountered in South Australia.

During March 1982 the South Australian Branch of Australian Fishing Industry Council (AFIC) arranged a meeting of AFIC representatives at Millicent, SA, attended by officers from the South Australian Department of Fisheries and the Commonwealth Department of Primary Industry. The trotline and dropline

techniques were explained to the meeting, chances of a fishery being developed off the southeast of South Australia were discussed, and strong support for a development program for these methods in the area was expressed.

The survey was undertaken in three phases: -

November/December	1983	(15 fishing days)
February/March	1984	(15 fishing days)
April/May	1984	(25 fishing days)

VESSEL

Tenders were called for a suitable vessel by the Department of Administrative Services Purchasing Division and the vessel "Opal Star" owned and skippered by Mr Greg Howard was selected. The cost of fuel was met by the charterer.

The "Opal Star" was built at Footscray, Melbourne in 1981 for shark and scallop fishing.

The general description and specifications of the "Opal Star" are as follows: -

Length	17.86m
Beam	6.1m
Draught	2.2m
Construction material	Steel
Main engine	Caterpillar T-3406 250HP @ 1800 revs
Hold capacity	10 tonnes
Minimum holding temperature	ice temperature ($0^{o}C$)
Hydraulics	Pot winch and drum
Electronics	Furuno colour echosounder dual frequency 200 and 50 khz Furuno paper echosounder dual frequency 200 and 50 khz Furuno 72 mile radar Shipmate satellite navigator

The initial tender schedule included the charter of two vessels - one 18 metre vessel for 30 days, and one 13 metre vessel for 20 days. This was agreed to by the Fishing Industry Research Committee "on the condition that the engagement of a 13 metre vessel, at a cost of $20,000, should await satisfactory results from the earlier engagement of the 18 metre vessel."

However, it was not until the latter part of the survey that catches became encouraging on more distant grounds. It was felt that a smaller vessel would be severly restricted in its operations due to weather conditions, and the distance of the more productive grounds from ports (more than 20 hours). For

these reasons the "Opal Star" was re-employed under charter for a further 25 days operations.

GEAR

The fishing gear was made and supplied by the Department of Primary Industry. The droplines were constructed from 360 fathoms (688m) of 8mm polyethylene rope, anchored by weights of approximately 25kg, and supported by one inflatable buoy of 67 inch circumference. Fifty hooks per line were used, with either 10/0 double or 11/0 single shark hooks, on a 3mm diameter braided monofilament snood. The snoods were 10-15cm in length, and attached to the line by A/K shark clips, with stoppers on the mainline (see diagram 1).

The trotlines differed in that the mainline was 9mm diameter polyethylene rope, with ten 40 fathom droppers (8mm diameter polyethylene rope) spaced at 60 fathom intervals. A 5kg weight anchored the droppers and a 25kg weight anchored each end of the mainline. The deep-water floats were 203mm (8in) in diameter and were clipped to the top of each dropper. Thirty hooks were used on each dropper, and both ends of the mainline were buoyed (see diagram 2).

Three main types of bait were used in the surveys - frozen octopus, whole frozen salmon, and fresh frostfish. There was no noticeable difference in catch rates for the fresh or frozen bait.

BIOLOGICAL DATA

Data on the feeding habits, size at first maturity, length frequencies of all fish species and growth rates were collected by research personnel from the South Australian Fisheries Department. Portions of these results have been included in this report (refer Fig 3, tables 1, 2 and 3).

FISHING OPERATIONS

Fishing was carried out from the Victorian border westward to an area south of Kangaroo Island (see diagram 3). Initially some moderately encouraging catches were obtained, however the suitable bottom was limited, and catches were not sustained. Much of the continental slope was searched as the vessel moved west and was generally found to be gently sloping and muddy. Some areas of good bottom were located in the areas indicated on the chart (refer diagram 3), but the resultant catch was generally disappointing.

It was not until the areas south of Kangaroo Island were reached that hard, rough bottom with steep slopes was consistently found. These grounds appeared the most promising, however, on only a few occassions was the catch rate encouraging.

Fishing operations were often hampered by strong currents, particularly during February and March. This initially created problems with positioning of the lines and later with fouling of the ropes and weights. Considerable time was often spent attempting to release fouled gear and resulted in several breakages and losses.

All fish caught were sold locally or at Adelaide and Melbourne Markets.

RESULTS

Fishing effort and catch rates for each survey plus the combined results are seen in Table 1. Highest catch rates for trevalla occurred in the 400-600 metre depth range (1.4 - 8.5 fish per 100 hook-lifts), and best catch rates occurred during April, in the waters south of Kangaroo Island. It was during this time that fish were found to be in spawning condition.

DISCUSSION

Based on observed catch rates and current market prices for trevalla at Melbourne and Adelaide ($3.50/kg in Melbourne; $2.10/kg in Adelaide) and fuel costs (especially when operating in waters south of Kangaroo Island), the present survey has indicated little likelihood of a commercial single species oriented fishery in South Australian waters. However, it could provide a valuable by-catch for shark longline fishermen.

Table 1: Summary of fishing effort (hook-lifts, hook-hrs) and catch rates of trevalla and all species for each survey

DEPTH RANGE (m)	No. Lines	No. Hook - Lifts	No. Hook - Hrs	TREVALLA No. fish/ 100Hk lift	TREVALLA No. fish/ 100Hk hr	ALL SPECIES No. fish/ 100Hk lift	ALL SPECIES No. fish/ 100Hk hr
	SURVEY 1						
300-399	6	300	600	0	0	0.33	0.71
400-499	42	2075	4700	2.41	1.1	7.04	3.11
500-599	42	2100	4625	2.05	0.93	5	2.27
600-699	10	750	823	0	0	4.8	4.37
700-799	3	150	225	0	0	8	5.33
800-899	2	100	210	0	0	16.67	2.86
TOTAL	105	5175	11183	1.8	0.85	5.91	2.74
	SURVEY 2						
400-499	22	651	1433	1.38	0.63	2.3	1.05
500-599	53	1712	6672	5.84	1.5	7.01	1.8
600-699	27	879	2324	3.53	1.33	5.12	1.94
TOTAL	102	3242	10429	4.32	1.34	5.55	1.73
	*SURVEY 3						
400-499	55	1695	3570.5	3.48	1.65	5.07	2.41
500-599	33	1009	2018	8.52	4.26	15.46	7.73
TOTAL	88	2704	5588.5	5.36	2.59	8.95	4.33
	*SURVEY 4						
200-299	12	345	690	0.29	0.14	1.74	0.87
300-399	2	57	114	0	0	3.51	1.75
400-499	38	1090	2387.5	5.41	2.47	6.2	2.89
500-599	83	2359	5276.2	2.92	1.31	3.6	1.61
600-699	16	394	758.3	1.78	0.92	1.78	0.92
TOTAL	151	4245	9226	3.2	1.47	4.31	1.98

SUMMARY

SURVEY	No. Hook - Lifts	No. Trevalla	Wt (kgs) Trevalla		Catch	Rate
			Live	Gutted	No. fish/ 100hk lifts	Wt (gutted)/ 100hk lifts
1	5175	93	425	370	1.8	7.1
2	3242	140	790	689	4.32	21.3
3	2704	145	1063	927	5.36	34.3
4	4245	136	767	669	3.2	15.8
COMBINED	15365	514	3045	2655	3.35	17.3

*Survey 3 has been analysed as 2 separate surveys due to the break between operations

Table 2 Species Composition from Drop-line Survey. (November, 1983 - May 1984)

No. Fish Caught		
	Teleosts:	
464	Deep-Sea Trevalla	Hyperoglyphe porosa
13	Hapuka	Polyprion oxygeneios
3	Gemfish	Rexea solandri
2	Knifejaw	Ostorhinchus conwai
1	Jackass Morwong	Nemadactylus macropterus
8	Ling	Genypterus blacodes
19	Ribaldo	Mora dannevigi
1	Black-Spotted Gurnard Perch	Neosebastes migropunctatus
1	Barracouta+	Leionura atun
3	Ray's Bream+	Brama brama
	Elasmobranches:	
318	Piked Dogfish	Squalus megalops
22	Endeavour Dogfish	Centrophorus scalpratus
3	Long-snouted Dogfish	Deania quadrispinosa
8	School Shark	Galeorhinus australis
2	Gummy Shark	Mustelus antarcticus
1	Blue Whaler*	Prionace glauca
1	Sawtail Shark	Galeus boardmani
1	Melbourne Skate	Raja whitleyi

* Species not caught during drop-lining survey; however, observed near surface while drop-lines were being hauled.

\+ Species caught on surface troll lines while travelling between drop-line grounds.

Table 3 Deep Water Dropline Survey. Positions and Catch Compositions for each set (November, 1983 - May, 1984)

MONTH	DATE	YEAR	LATITUDE	LONGITUDE	CATCH COMPOSITION
SURVEY 1					
NOV	7	1983	38 24.85'S	140 42.92'E	-
	7	"	38 28.50'S	140 52.80'E	22 TRD, 3 LIG, 2 HAP
	10	"	38 25.00'S	140 41.00'E	
	10	"	38 29.50'S	140 52.90'E	1 GEM, 1 HAP, 3 LIG
	11	"	38 28.66'S	140 49.60'E	1 COD
	11	"	38 27.43'S	140 52.00'E	12 TRD
	11	"	38 27.00'S	140 49.00'E	
	19	"	37 54.10'S	139 50.97'E	9 TRD, 1 SH
	20	"	37 48.82'S	139 39.72'E	1 LIG, 1 SKM
	21	"	37 57.00'S	139 54.00'E	1 LIG
	21	"	38 02.33'S	140 06.86'E	
	26	"	38 20.91'S	140 26.98'E	14 COD
	27	"	38 29.61'S	140 35.23'E	
	28	"	37 11.17'S	138 41.96'E	
	29	"	37 14.54'S	138 36.87'E	
DEC	4	"	37 35.12'S	139 28.40'E	1 HAP
	4	"	37 35.36'S	139 28.53'E	24 TRD, 1 HAP
	5	"	37 34.78'S	139 28.95'E	1 MOW
	5	"	37 36.31'S	139 30.98'E	1 SHS
	6	"	38 01.48'S	140 00.29'E	1 COD
				TOTAL:	67 Trevalla, 5 Hapuku, 8 Ling, 1 Gemfish, 16 Cod, 1 Gummy Shark, 1 School Shark, 1 Skate
SURVEY 2					
F[illegible]	15	1984	37 29.60'S	139 29.80'E	-
	15	"	37 41.20'S	139 35.45'E	10 TRD
	16	"	37 40.00'S	139 32.50'E	9 TRD
	17	"	37 09.70'S	138 28.00'E	-
	17	"	37 06.27'S	138 12.24'E	-
	17	"	37 07.46'S	138 05.34'E	-
	18	"	37 03.40'S	138 05.10'E	7 TRD
	18	"	37 04.47'S	137 47.45'E	1 TRD
	18	"	37 02.57'S	137 44.60'E	6 TRD, 1 HAP, 1 GEM
	19	"	36 50.37'S	137 23.48'E	14 TRD, 1 HAP
	26	"	36 22.42'S	136 32.15'E	2 TRD, 1 HAP
	26	"	36 46.75'S	137 11.08'E	-
MAR	2	"	36 44.81'S	137 06.39'E	59 TRD, 1 COD
	3	"	36 44.53'S	137 11.79'E	32 TRD, 4 HAP
	4	"	38 18.55'S	140 25.58'E	-
	5	"	38 30.18'S	140 53.02'E	-
				TOTAL:	140 Trevalla, 7 Hapuku, 1 Gemfish, 1 Cod

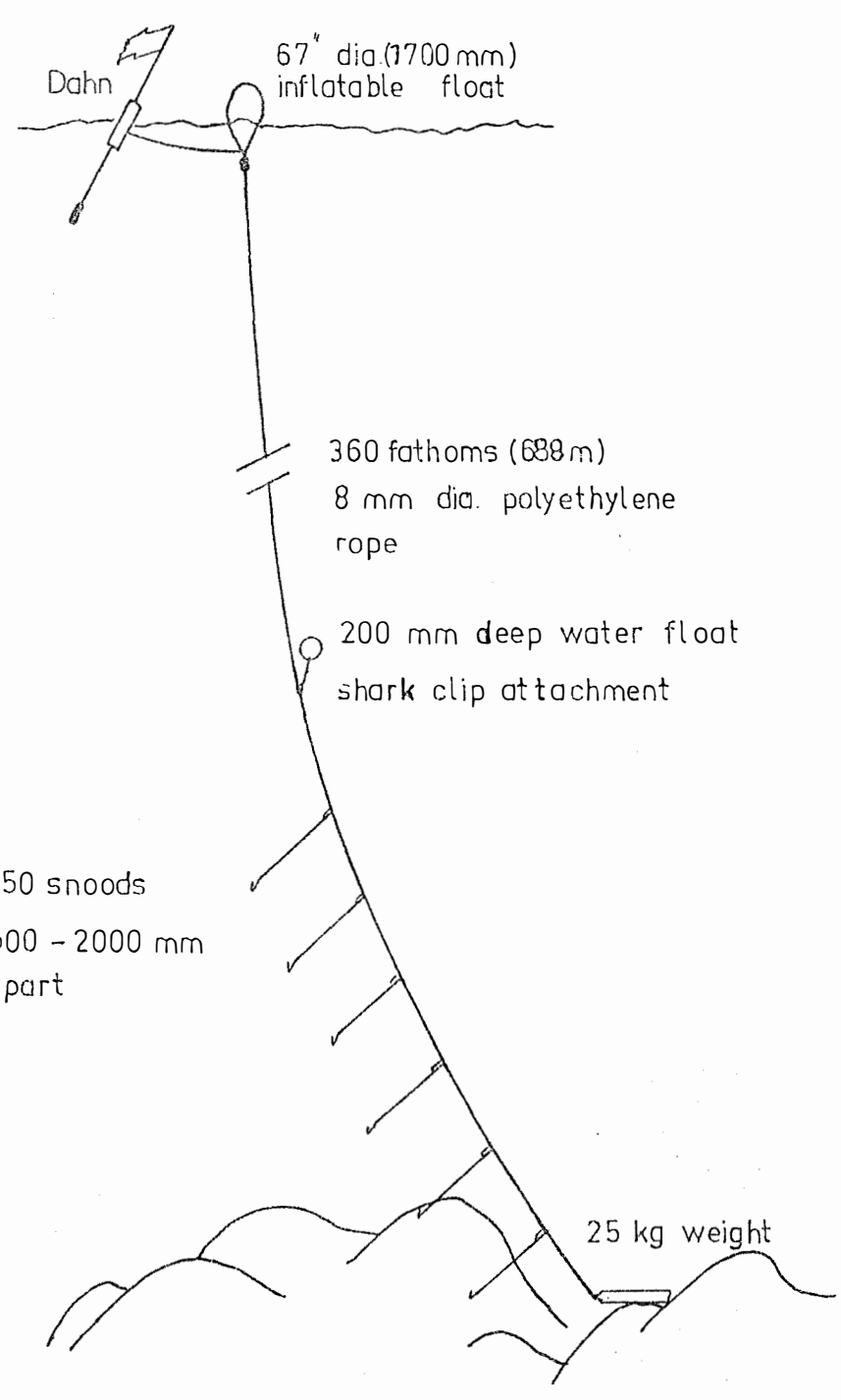
SURVEY 3

APR	11	1984	36 44.21'S	137 10.00'E	31 TRD, 1 SHS
	11	"	36 44.30'S	137 09.50'E	14 TRD, 1 SHS
	11	"	36 44.40'S	137 11.50'E	
	12	"	36 46.05'S	137 13.08'E	1 TRD
	12	"	36 44.40'S	137 09.05'E	6 TRD
	12	'	36 43.50'S	137 07.09'E	7 TRD
	13	"	36 43.50'S	137 07.09'E	22 TRD
	13	"	36 42.50'S	137 06.00'E	35 TRD
	14	'	36 44.50'S	137 05.50'E	15 TRD
	14	'	36 42.50'S	137 07.00'E	6 TRD
	14	"	36 42.30'S	137 03.00'E	1 COD
	15	"	36 42.20'S	137 02.50'E	9 TRD, 1 COD
				TOTAL:	146 Trevalla, 2 Cod, 2 School Shark

SURVEY 4

APR	30	1984	36 43.96'S	137 10.07'E	14 TRD
	30	"	36 43.05'S	137 05.05'E	7 TRD
	30	"	36 42.79'S	137 04.47'E	
MAY	8	"	36 35.00'S	136 47.00'E	1 SHS, 1 SHG
	8	"	36 36.00'S	136 46.00'E	1 TRD
	8	"	36 36.00'S	136 47.00'E	
	8	"	36 40.00'S	136 46.00'E	3 TRD
	9	"	36 31.00'S	136 18.00'E	
	15	"	36 44.00'S	137 11.00'E	16 TRD, 1 HAP
	15	"	36 45.00'S	137 12.00'E	3 TRD
	15	"	36 44.00'S	137 12.00'E	
	15	"	36 42.00'S	137 08.00'E	7 TRD
	15	"	36 41.00'S	137 07.00'E	
	16	"	36 42.00'S	137 07.00'E	5 TRD
	16	"	36 43.00'S	137 04.00'E	
	16	"	36 42.00'S	137 03.00'E	1 TRD
	17	"	36 43.00'S	137 09.00'E	3 TRD
	17	"	36 46.00'S	137 13.00'E	
	25	"	36 35.47'S	139 28.40'E	17 TRD, 4 SHS
	25	"	37 34.00'S	139 25.07'E	10 TRD
	25	"	37 33.40'S	139 23.30'E	
	28	"	37 39.50'S	139 34.00'E	10 TRD, 1 GEM
	28	"	37 38.00'S	139 32.50'E	14 TRD
				TOTAL:	111 Trevalla, 1 Hapuku, 1 Gemfish, 5 School Shark, 1 Gummy Shark

1203v



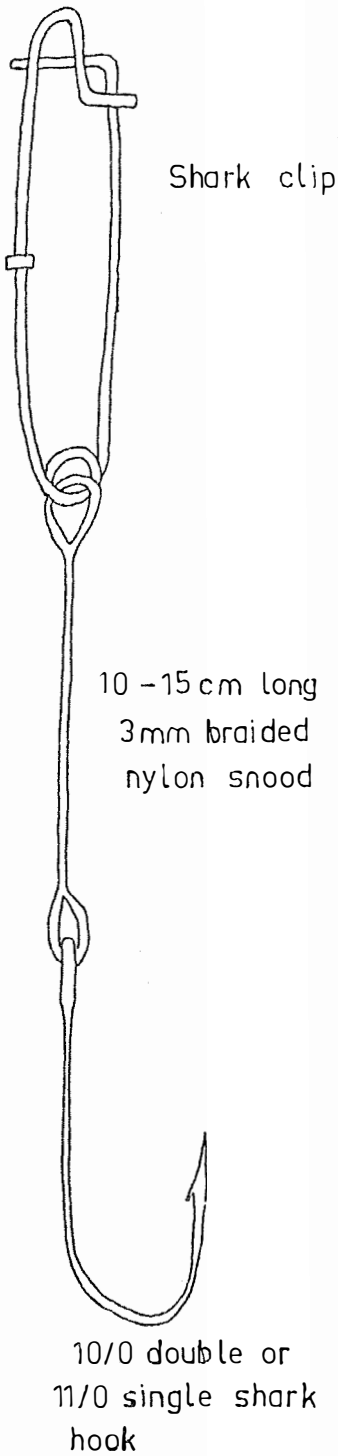


Diagram 1: Gear used in dropline survey

M.L.E.

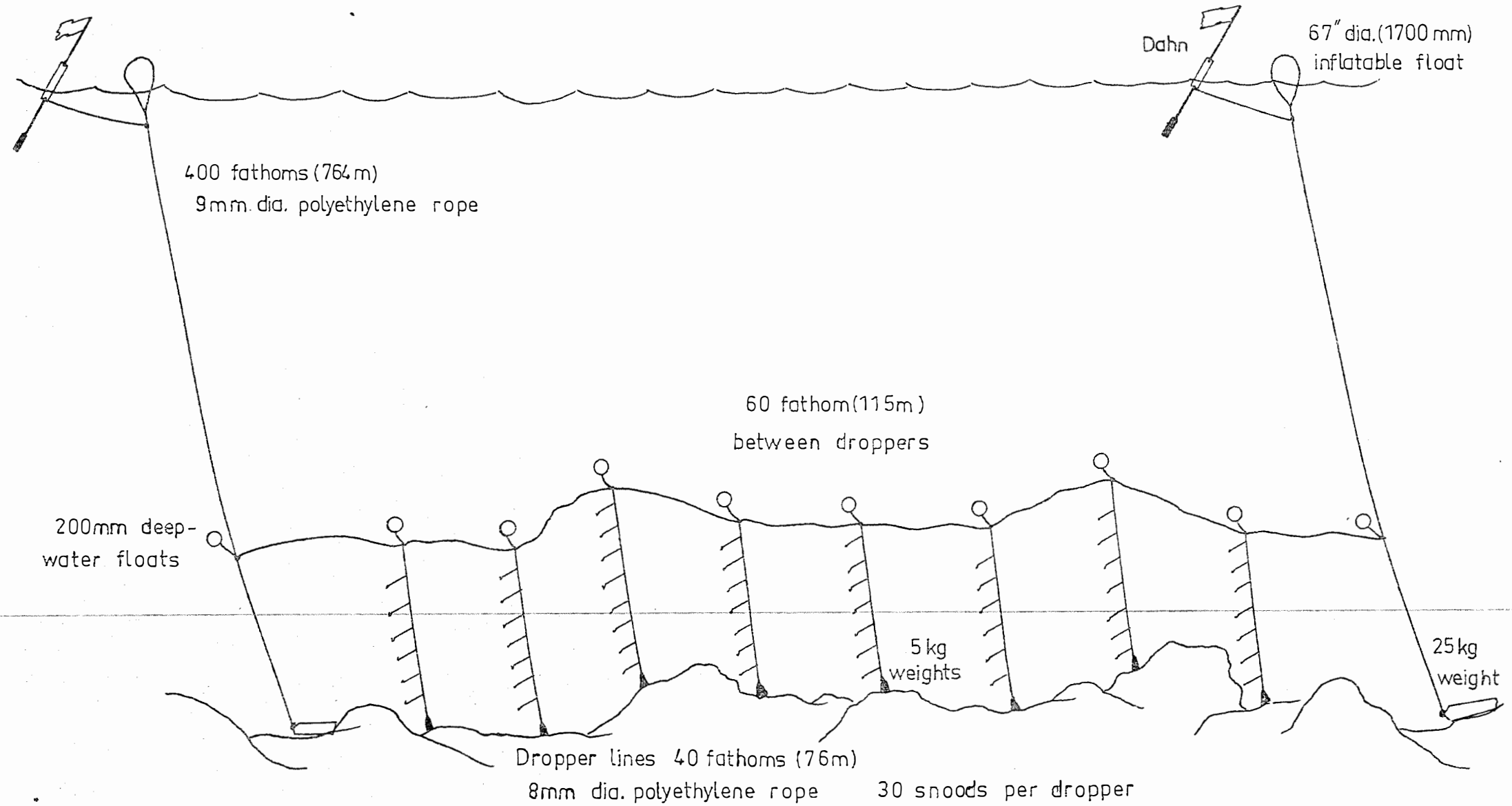


Diagram 2: Trotline gear used in survey

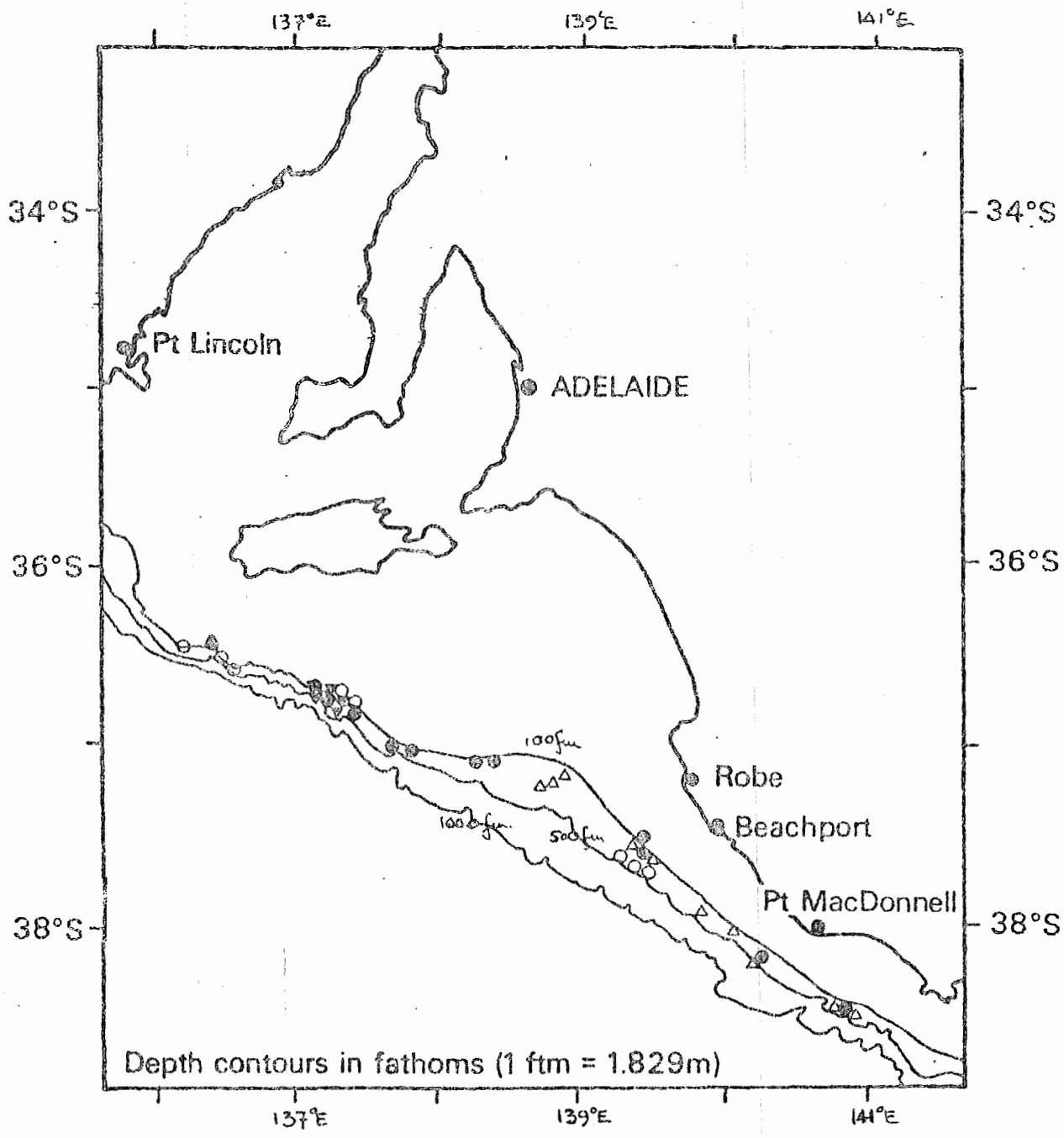


Figure 3: Locations of drop-line sets for the four surveys undertaken.

△ Nov.-Dec.; ◉ Feb.-March; ▽ April; ○ May.