

DEPARTMENT OF CONSERVATION, FORESTS AND LANDS
FISHERIES AND WILDLIFE SERVICE

SCALLOP STUDIES AT LAKES ENTRANCE, SEPTEMBER 1986 TO JUNE 1987

FINAL REPORT TO THE FISHING INDUSTRY RESEARCH

COMMITTEE (FIRTA 86/38)

N. Coleman

June 1987

Internal Report No. 157

(Not for citation without permission)

ABSTRACT

Coleman, N. (1987). Scallop studies at Lakes Entrance, September 1986 to June 1987. Final report to the Fishing Industry Research Committee (FIRTA 86/38). Mar. Sci. Lab. Internal Rep. No. 157.

The aims of the Lakes Entrance scallop work were threefold: to monitor the period and abundance of spat settlement at sites east and west of Lakes Entrance; to survey scallop grounds for the distribution and abundance of juvenile and commercial sized scallops; and to determine the growth rate of scallops off Lakes Entrance.

Spat collectors were set out to the east and west of Lakes Entrance from September 1986 to February 1987 and were retrieved from February to May 1987. All collectors contained spat of the commercial scallop (Pecten alba). The collectors set out to the west of Lakes Entrance collected the most spat.

Spatfall during the summer of 1985/6 resulted in a small scallop bed about 16 miles to the west of Lakes Entrance. In November 1986 the modal size of these scallops (measured as shell height) was 52 mm and had increased to 70 mm by May 1987; it was still 70 mm in June 1987. Between April 1987, when scallops were approaching fishable size, and June 1987, when the scallop season opened, the number of meats per kilo dropped from 175 to 126.

Marine Resources Management Branch, Fisheries and Wildlife Service,
Department of Conservation, Forests and Lands, PO Box 114,
Queenscliff, Victoria 3225, Australia.

INTRODUCTION

During the early 1980's recruitment to populations of the commercial scallop, Pecten alba Tate, 1886, on the grounds near to Lakes Entrance failed. As a result of this failure, plus the depletion of pre-existing stocks, fishing of the Lakes Entrance grounds became uneconomic. Except for a small scallop bed to the east of Lakes Entrance that was fished for a short period during 1984-85, fishing of the grounds off Lakes Entrance virtually ceased after 1982.

In response to requests from local scallop fishermen, staff from the Marine Science Laboratories (MSL) began research at Lakes Entrance in 1984. The scallop beds to the east of Lakes Entrance were surveyed for the size composition and condition of stock, and spat collectors were placed at sites off Lake Tyers, east of Lakes Entrance, and towards the Seahorse Buoy, to the west (Gwyther and Burgess 1984, 1985a,b).

Sampling of the scallop grounds showed a population in rather poor condition and dominated by large individuals (70mm+ in shell height). The condition of these scallops improved between November 1984 and April 1985 and gave rise to a limited period of scallop fishing. Few juvenile scallops were found even though a small mesh (1 cm diameter) was attached to the scallop dredge specifically to catch juveniles.

Although few juveniles were collected in dredge samples during 1984-85, spat were found in the collectors set out over the summer of 1985-86 (Gwyther et al. 1986; B. Sause, MSL, unpublished) The occurrence of these spat suggested that scallops could be recruited and become commercially exploitable within the next 12 - 18 months.

The present report describes work on the Lakes Entrance scallop beds carried out during the period September 1986 to June 1987. The aims of the work were threefold (Coleman 1986):

1. To monitor the period and abundance of scallop settlement in spat collectors at sites east and west of Lakes Entrance.
2. To survey the scallop grounds off Lakes Entrance for the distribution and abundance of juvenile and commercial sized scallops.
3. To determine the growth rate of juvenile scallops off Lakes Entrance (which is essentially to follow the fate of the spat settled during summer 1985-86).

The research was in part funded by a grant (FIRTA 86/38) from the Fishing Industry Research Committee.

MATERIALS AND METHODS

All the reseach was carried out off a commercial scallop boat which was chartered to set out and to retrieve spat bags and to undertake survey work.

Each spat collector (Fig.1) consisted of a line anchored to the bottom by a 150 kg concrete block and supported in the water column by buoys. Six mesh bags (89 x 59 cm, 3 mm square mesh) were attached to the line, one above another, at 3.6 m intervals starting from the bottom. The bags were numbered 1 to 6, number 6 being nearest the bottom. Each bag contained 1100 - 1300 g of monofilament net. The collectors were set out in 18 - 23 fathoms of water.

Five spat collectors were placed off Lake Tyers and five near the Seahorse Buoy (Fig. 2). The original intention was to place one collector a month at each locality from September 1986 to January 1987 and to retrieve each collector after 3 months immersion (i.e. one a month from December 1986 to April 1987). However, because of bad weather, the collectors due out in January were not placed out until February and were retrieved in May instead of in April (Table 1).

After spat collectors had been retrieved the contents were washed through a 2 mm mesh sieve. The contents of the sieve were sorted and the commercial scallop spat were removed and counted.

Dredge samples were taken around and offshore from the sites of the spat collectors; between Lakes Entrance and Lake Tyers; and between Lakes Entrance and the Seahorse Buoy. The sites to the east of Lakes Entrance that were sampled during 1984-85 (Gwyther and Burgess 1984, 1985a,b) were resampled. A commercially exploitable scallop bed located about 16 nautical miles to the west of Lakes Entrance was surveyed in May 1987, just before the opening of the scallop season at Lakes Entrance. Thirty stations, arranged in a grid pattern over an area of 5 x 6 nautical miles (Fig. 3), were sampled by taking a 5 minute drag at each. A bed reported to exist about 9.5 nautical miles offshore from the Omega Tower was surveyed in June 1987 using 5 - 10 minute drags (Fig.5). During survey work, small mesh (2.4 cm) inserts were placed inside 2 sections of the scallop dredge to improve the chances of collecting juvenile scallops.

Groups of 200 - 300 scallops from the survey samples were measured for shell height (the distance perpendicularly from the hinge to the margin of the flat valve). Groups of 100 scallops were split and the meats weighed and converted to number of scallops per kilo. During June the approximate number of scallops per crate was calculated.

RESULTS

Scallop spat were present in all the bags retrieved and were most abundant in the bags from around the Seahorse Buoy (Table 1). At Lake Tyers the highest numbers of spat were found in bags immersed from November 1986 to February 1987 whereas at Seahorse Buoy the numbers were highest in bags immersed from February to May 1987.

Dredging to the east of Lakes Entrance produced only the occasional scallop. Many of the dredges carried out to the west of Lakes Entrance also failed to produce more than the occasional scallop. One commercially significant patch of scallops was found near the oil pipelines about 16 nautical miles to the west of Lakes Entrance. (Figs. 2, 3). During the period November 1986 to May 1987 the proportion of scallops in the population of less than 60 mm in shell height decreased and modal size increased from 52 mm to 70 mm (Fig. 4). Modal size was still 70 mm in June 1987. Meat weights were measured from April 1986 when scallops were starting to approach commercial size. In April there were 175 meats/kilo and by May this had decreased to 115 meats/kilo. A subsample of the commercial catch made in June gave 126 meats/kilo.

The approximate size of the bed 16 miles to the west of Lakes Entrance (Figs. 2, 3) was found to be 3 x 4 nautical miles. Within this areas dredge samples consisted mainly of live scallops although empty shells were also present. Dredge samples taken offshore from the Omega Tower, about 60 nautical miles west of Lakes Entrance (Fig. 5) contained large amounts of 'rubbish' (i.e. stones, large sponges,

ascidians, starfish). Few scallops were present in these samples, the most productive dredge producing only half a (56 litre) rubbish bin full.

DISCUSSION

The scallop population currently being fished to the west of Lakes Entrance consists of one year group and results from the spat settlement of 1985-86 (Table 2). While spat were collected both east and west of Lakes Entrance, only spat settlement to the west resulted in a commercially fishable bed. A number of explanations might account for the lack of commercially fishable beds to the east of Lakes Entrance. Fewer scallop spat were collected here than to the west, which might indicate a relatively light settlement of scallops to the east. Water currents may have carried scallop larvae eastwards beyond the area investigated in the present work. Water currents may have dispersed larvae over a wide area, hence the larvae did not settle out into discrete scallop beds. Larvae may have failed to survive to the east of Lakes Entrance. With present information it is not possible to choose between these explanations.

During the summer of 1986-87 scallop larvae were again caught to the east and to the west of Lakes Entrance and, as before, settlement was highest in collectors to the west. Precise comparisons of larval settlement in spat collectors from 1985-86 and 1986-87 are not possible because of the number of missing bags and because at the beginning of 1986 spat bags were collected only over the period January to April. However, given these provisos, the abundance of spat collected in 1986-87 is comparable with that collected in 1985-86 (Table 2).

If the pattern of 1985-86 is repeated, the collection of spat near to the Seahorse Buoy indicates the settlement of larvae to form a discrete scallop bed to the west of Lakes Entrance, and this bed should be fishable from about June of 1988. To date, sampling has not indicated such a bed to be present although during the pre-season survey of the bed now being fished just a few scallops of about 30 - 40 mm shell height, resulting from this year's settlement, were collected. The presence of these small individuals is perhaps the first indication that a new fishable bed will be formed. However, if settlement has occurred in the area currently being fished, there should be some concern about the effects of present dredging on future recruitment to the commercially fishable population. Japanese scallop farmers consider that dredging causes high mortality amongst juvenile scallops (Bull 1984).

Fishing of the bed 16 nautical miles to the west of Lakes Entrance began on June 1st 1987 with a limit of 10 crates per day. In mid - June the number of scallops per crate was estimated to be 3000 and there were an estimated 126 scallops meats per kilo. Yield should therefore be in the order of 24 kg per crate. Fishermen report yields of 20 - 22 kg per crate from the processors. It seems likely, however, that the maximum potential yield from this bed will not be realised. Initially the 10 crate limit was being achieved in 3 - 4 hours, but by mid - June many boats were taking 15 - 20 hours to reach the limit. Thus it seems that the bed will be largely depleted by the time at which scallops might be expected to reach peak condition. In Bass Strait, as in Port Phillip Bay, maximum condition is achieved over the period July - December, in association with the development of the gonad prior to spawning (Gwyther et. al 1984; Gwyther 1986).

Because of the depletion of the bed near to Lakes Entrance, a few boats have fished the area off the Omega tower (Fig. 6). Reports from fishermen working the area show a situation consistent with the results reported here. Dredges are full of 'rubbish' which adds considerably to the task of sorting. Yields do not appear to be great in

terms of crates per hour, although the condition of the scallops is good. The one reliable report received (M. Proebstl, personal communication) is of 7.5 crates from 14 hours fishing with a meat yield of 25 kg per crate.

FUTURE RESEARCH

Scallop studies in Port Phillip Bay (Gwyther 1986) show that the rational management of the scallop fishery requires reliable data on: the strength of scallop spatfall; scallop growth rate; strength of recruitment to the commercially fishable population; and monthly changes in condition. These data are almost entirely lacking for the scallop population at Lakes Entrancs. Only during the last two years has a spatfall and the subsequent time required for growth to commercial size been monitored; and even this work, because it ceased in June 1987, has not fully monitored the changes in condition associated with development of the gonad and subsequent spawning

In order to expand on the data gained over the last two years, and to provide data basic to rational management of the Lakes Entrance scallop fishery, the following research is necessary.

1. Continued monitoring of spatfall and the relationship between spatfall and the subsequent strength of recruitment to the commercial fishery.
2. Measurement of growth rates and the time elapsing between spatfall and the attainment of commercial size.
3. Monitoring of monthly changes in condition. By concentrating fishing effort (e.g. by increasing bag limits) during periods when condition is at its peak, scallop yield may be maximised.
4. Continued survey work to look for new commercial beds and to estimate the area of, and abundance of scallops within, any such beds as are found.

While the approximate time from settlement to commercial size is known (about 18 months, as shown in the present study) this will be subject to annual variation, depending on the exact conditions experienced at and after settlement. Similarly, variations from year to year in environmental condition will cause variations in the months during which condition will be at its peak. No prediction of the strength of future recruitment to the fishery can be made other than by continued monitoring of spatfall and/or by continued survey work. The most rational management of the Lakes Entrance scallop fishery will require continuous assessment of scallop spatfall, growth rate, abundance and condition. Thus a commitment to rational management of the industry is also a commitment to long-term research and monitoring.

ACKNOWLEDGEMENTS

Thanks are due to John Free and the crew of the Temptation for their interest and help throughout the study. Dave Burgess constructed the spat collectors and he, Arnold Jahnecke, Terry Marsh and John Webb gave invaluable assistance in the field and in the laboratory. Drs David Gwyther, Doug Bulthuis and Darwin Evans gave useful criticism of the original manuscript.

REFERENCES

- Bull, M. (1984). Golden Bay scallop seeding - phase 1 finished. Shellfisheries Newsletter 23, 1 - 2. In: Catch 84, 11 (8).
- Coleman, N. (1986). Program CO7 Lakes Entrance Scallops. Research Proposal September 1986. Mar. Sci. Lab. Program Review Series No. 62. 3 pp.
- Gwyther, D. (1986). Port Phillip Bay and Bass Strait scallop research. Final Report to Fishing Industry Research Committee (FIRTA 83/32). Mar. Sci. Lab. Internal Rep. No. 143 25 pp.
- Gwyther, D. and Burgess, D.C. (1984). Report of the survey of scallop size composition and condition from within the closed area of the Lakes Entrance scallop grounds, 19 - 26 November, 1984. Mar. Sci. Lab. Internal Rep. N. 92. 9 pp.
- Gwyther, D. and Burgess, D.C. (1985a). Reassessment of scallop size and condition from within the closed of the Lakes Entrance scallop grounds, 7 - 8 March 1985. Mar. Sci. Lab Internal Rep. No. 97 7 pp.
- Gwyther, D. and Burgess, D.C. (1985b) Third survey of scallop grounds off Lakes Entrance, 26 April 1985. Mar. Sci. Lab. Internal Rep. N. 106. 5 pp.
- Gwyther, D., McShane, P., Sause, B., Burgess, D.C. and Foley, S. (1984). The Victorian Scallop Research Program. Progress to September 1984. Mar. Sci. Lab. Internal Rep. No. 82. 28 pp.
- Gwyther, D., Sause, B. and Burgess, D.C. (1986). Scallop stocks low in Victoria. Aust. Fish. 45 (10): 14 -17.

Table 1. Numbers of commercial scallop spat (*Pecten alba*) from spat bags at Lakes Tyers and Seahorse Buoy, Lakes Entrance, 1986-87.

Figures are for numbers of spat retained on a 2 mm mesh. Months of immersion and retrieval are shown. Missing values indicate lost bags.

Bag No.	Numbers of spat obtained from collectors immersed during:				
	Sept-Oct	Oct-Feb	Nov-Feb	Dec-Mar	Feb-May
LAKE TYERS					
1			59		3
2				1	6
3			97	1	27
4		53	111	7	40
5				10	15
6			245		37
SEAHORSE BUOY					
1	18	34	68	85	239
2	8			137	414
3	7			155	601
4			176	182	306
5	5	34	214	248	281
6	3		277	107	166

Table 2. Numbers of commercial scallop spat (Pecten alba) from spat bags at Lakes Tyers and Seahorse Buoy, Lakes Entrance, 1985-86. (From Sause unpublished data).

Figures are for numbers of spat retained on a 2 mm mesh. Months of immersion and retrieval are shown. Missing values indicate lost bags.

Bag No.	Numbers of spat obtained from collectors immersed during:			
	Oct-Jan	Nov-Feb	Dec-Mar	Jan-Apr
LAKE TYERS				
1		47	90	12
2		75	136	3
3		57	157	11
4		54	121	17
5		39	139	21
6			129	25
SEAHORSE BUOY				
1	184		234	3
2	220		179	3
3	271		305	7
4	293		223	6
5	300		305	5
6	107		400	2

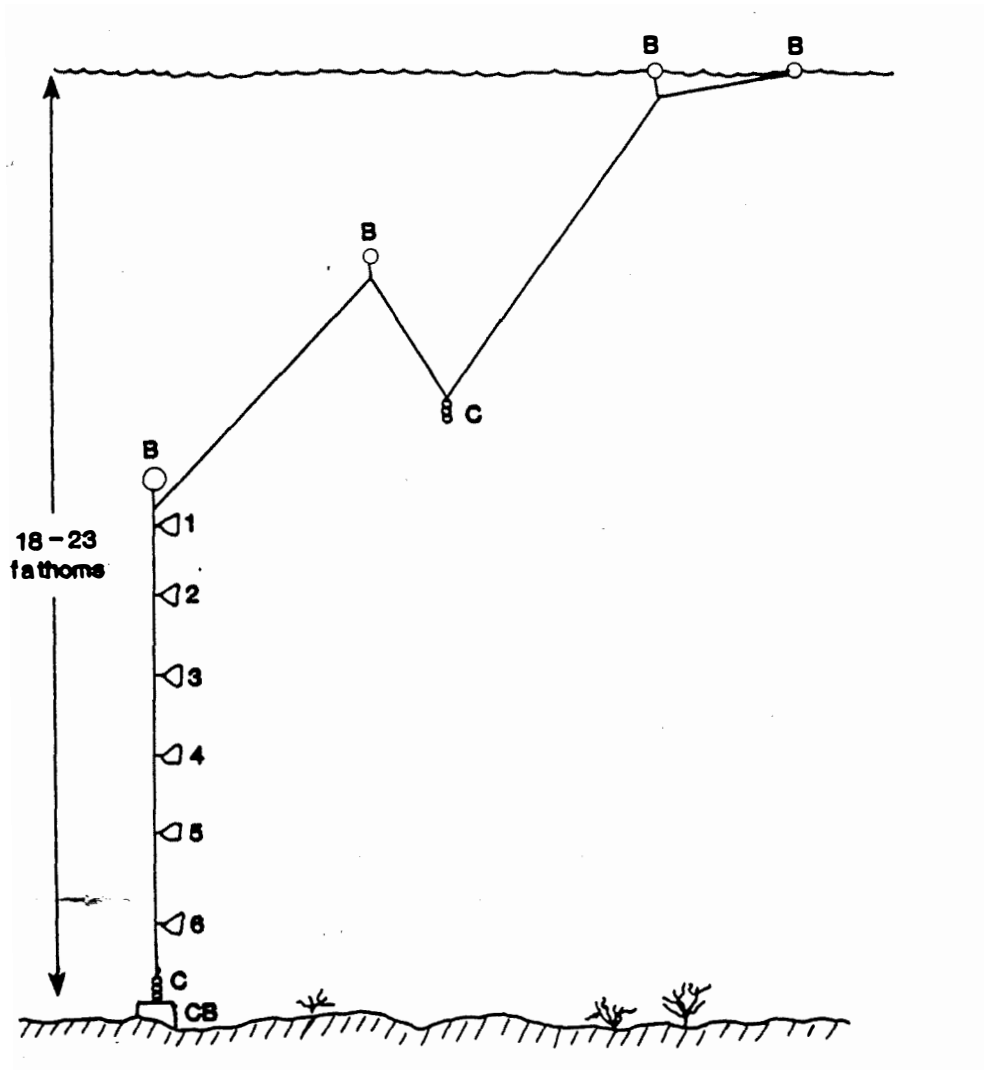


Figure 1. Diagram of spat collectors.
 B, buoys; C, chain; CB, concrete block;
 1 - 6, mesh bags filled with monofilament net.

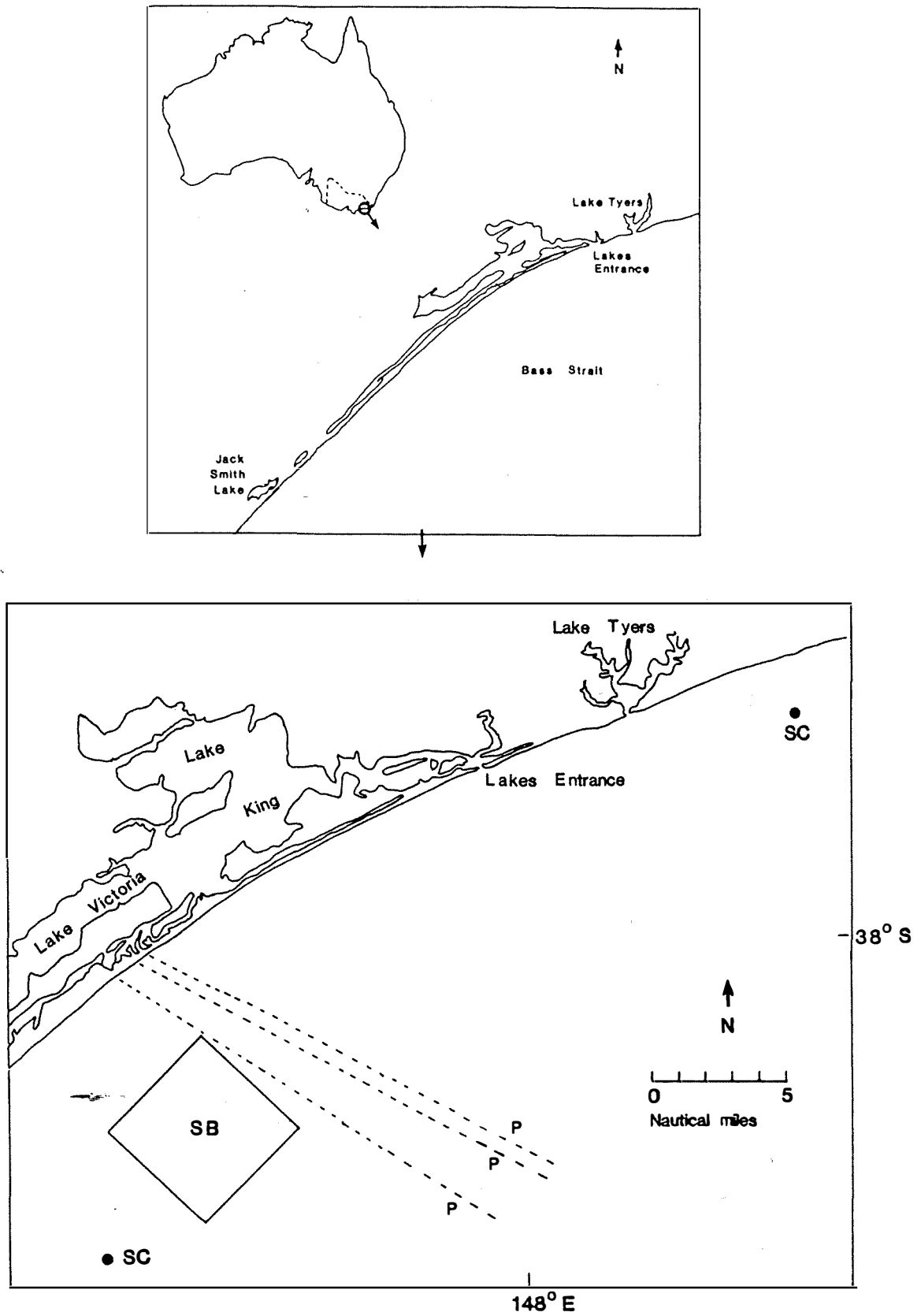


Figure 2. Location of spat collectors and of commercial scallop bed off Lakes Entrance.
 SC, spat collector; SB, commercial scallop bed;
 P, pipeline.

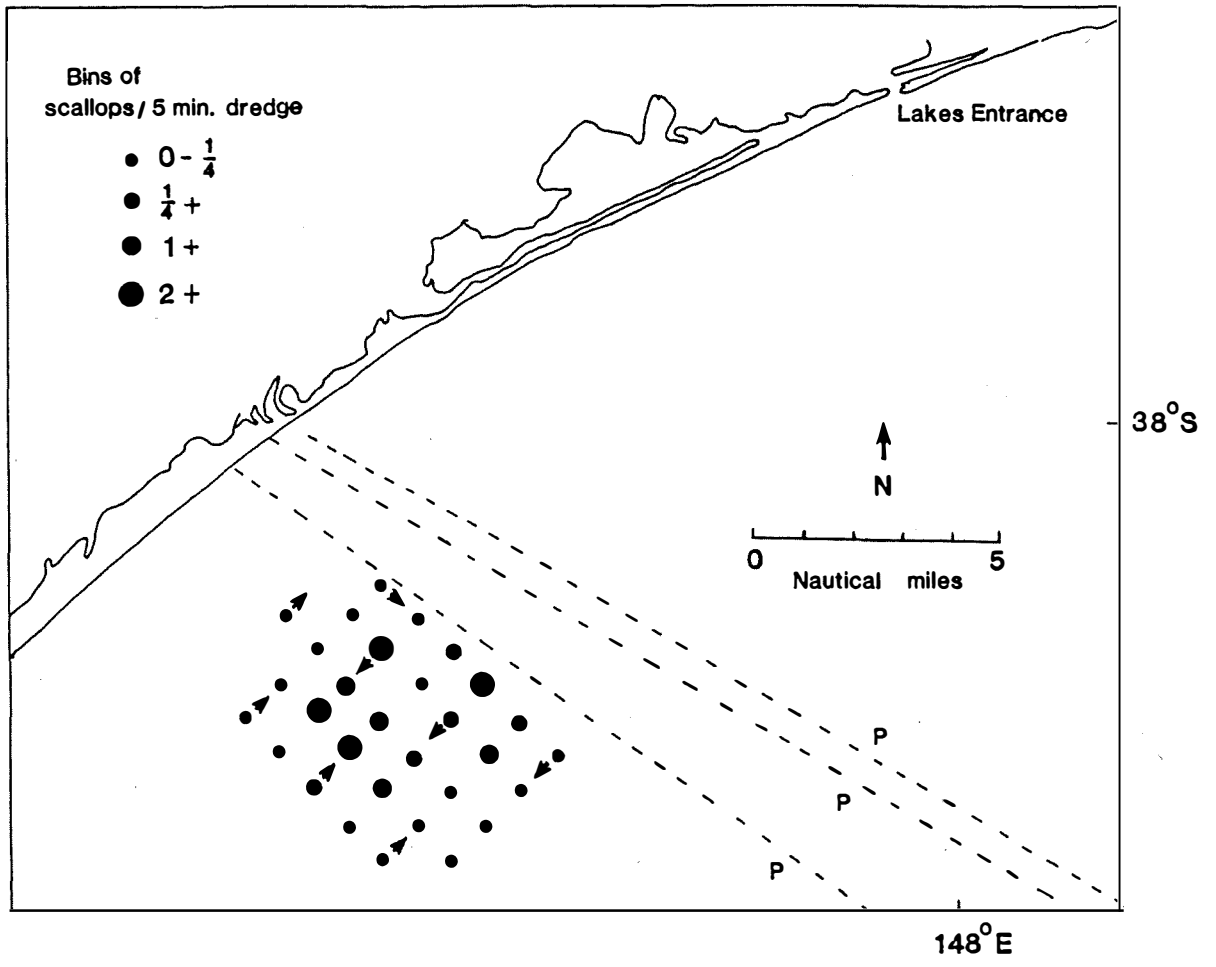


Figure 3. Results of the pre-season survey of the scallop bed off Lakes Entrance (May 1987).
 Dot size indicates abundance of scallops per 5 minute dredge measured as number of 56 litre rubbish bins full. Arrowheads indicate direction of tow. P, pipeline.

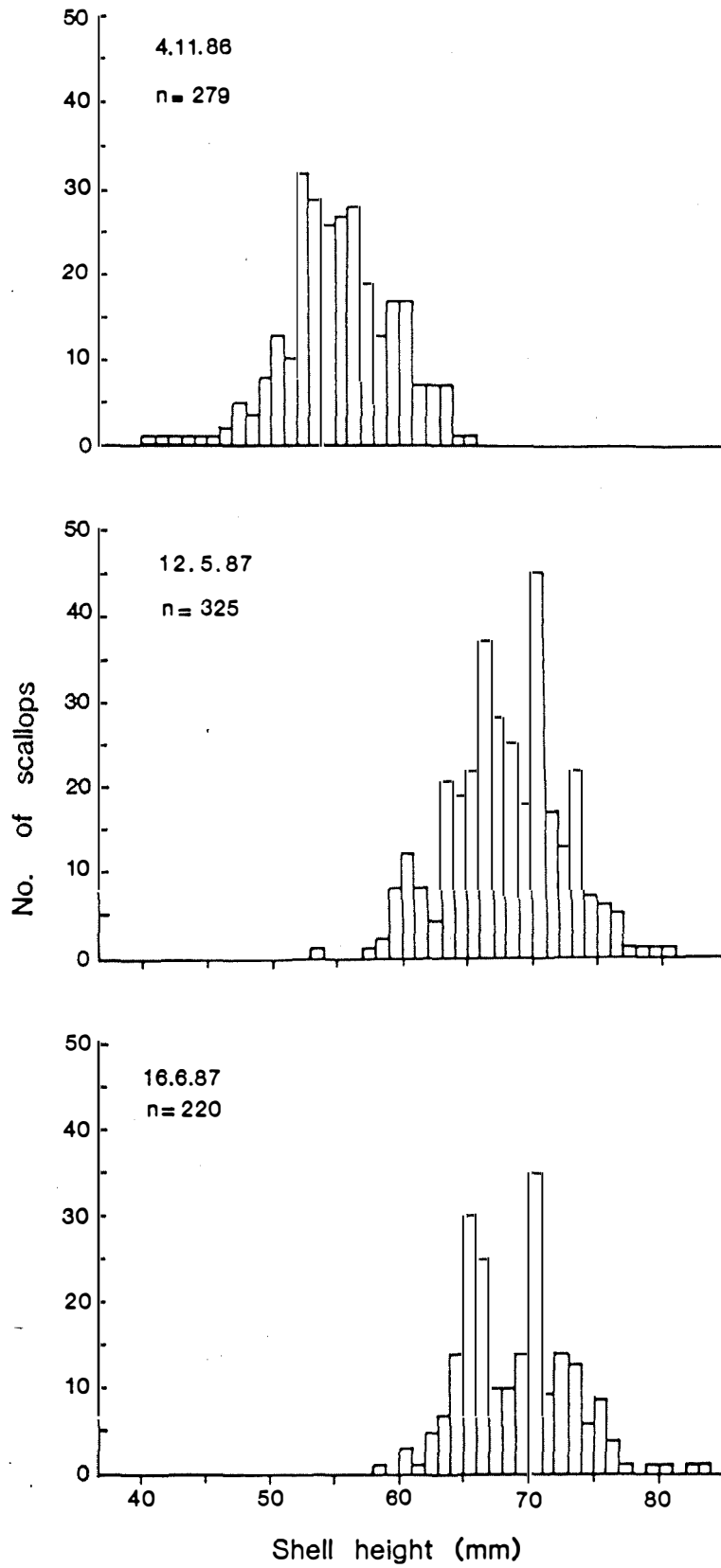


Figure 4. Size frequency histograms for scallops from the bed off Lakes Entrance.

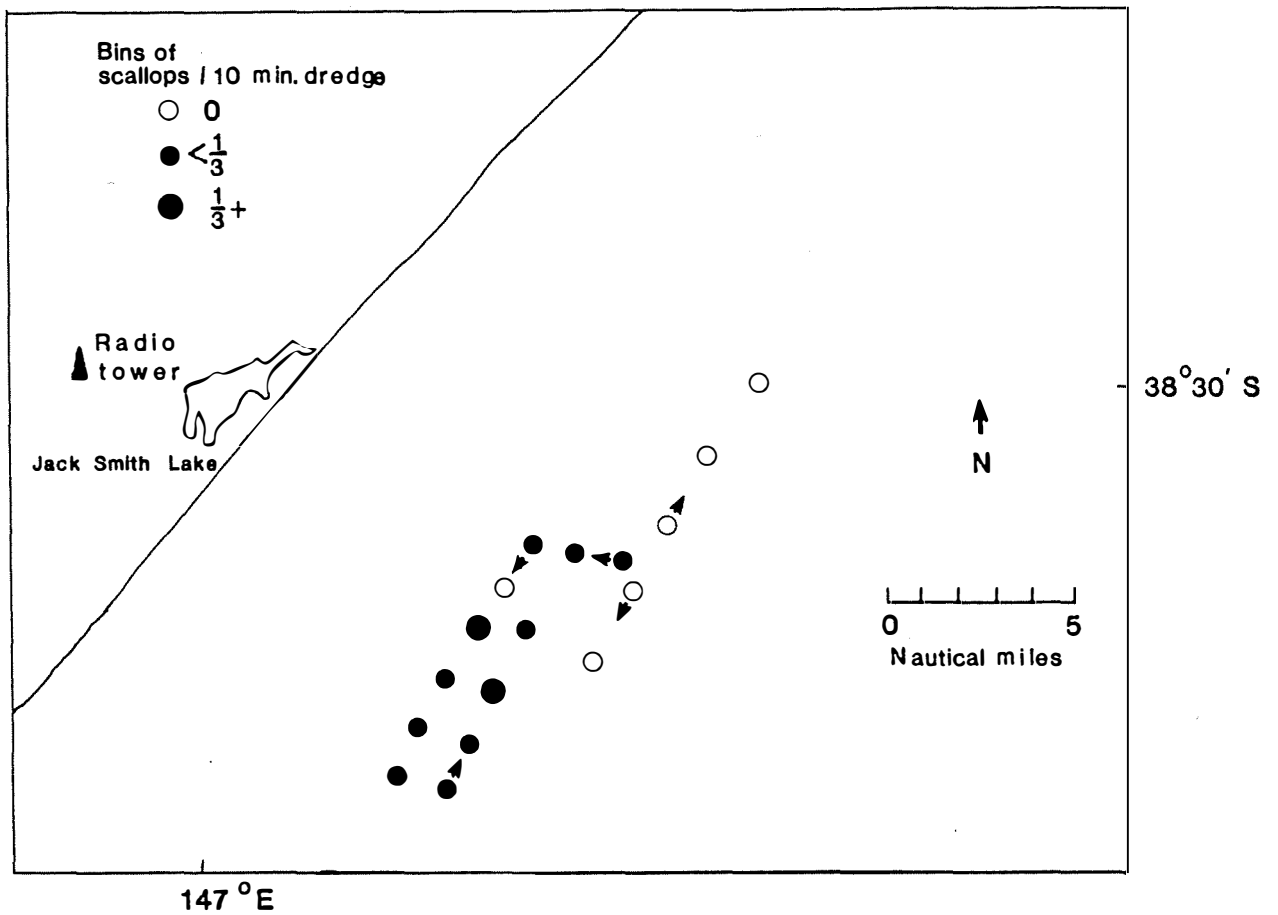


Figure 5. Results of the survey of the scallop bed off the Omega tower west of Lakes Entrance (June 1987).
 Dot size indicates the abundance of scallops per 5-10 minute tow measured as number of 56 litre rubbish bins full. Arrowheads indicate direction of tow.