

ECONOMIC FEASIBILITY OF SCALLOP CULTURE

IN TASMANIA

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D.A. Cropp
Marine Biologist
Research & Resource Section
T.F.D.A. ,

HOBART

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SUMMARY

This report concludes investigations into the economic and biological viability of scallop culture in Tasmania. Research into spat settlement and ongrowing methods has continued from the 1970's and the current TFDA and FIRTA funded programmes (1980-84) have successfully cultured scallops to legal, marketable size. The purpose of this report is to examine the economic feasibility of a scallop farming venture based upon traditional methods of culture.

INTRODUCTION

The possibility of scallop culture becoming an economically viable industry in Tasmania was first mentioned by Dix, 1981. Various workers have specifically investigated scallop culture or farming (Berry and Burnell, 1981; Cameron, 1983) although virtually all research has followed methodology derived from work by the Japanese (Taguchi and Walford, 1976; Ventilla, 1982). Many techniques have been modified to suit Tasmanian conditions and have proved to be successful, (Dix, 1975; Dix, 1981). The rearing of scallop larvae has been completed totally within a hatchery system and the potential to release the subsequent spat onto the seabed has been mentioned (Dix and Sjardin, 1975).

A feasibility assessment of scallop culture based upon collection of wild spat and on-growing in conventional cage culture is detailed here, concurrently, consideration is given to biological influences and their effect on cost and work load.

REQUIREMENTS

a) Lease

Initially a 3.4 ha deepwater lease is required (average water depth 31 m). In Tasmania annual lease expenses amount to \$100 rental and \$25 per utilised hectare, or part thereof, making a total of \$200. In this area of 243 x 140 m. 15 individual 101 m longlines can be positioned.

b) Longlines

A single 101 m longline, holding 100 droppers (1 m apart) supporting 40 onion bag collectors each, is used for scallop spat collection (Fig. 1). This is required each year from August to December (0-90 days, Fig. 2 & 3). Given an average recovery rate of 480 scallops/collector, a total of 1.9 million scallops will be available for on-growing each year. After the first 16 months all 15 longlines

will be utilised. Work schedules outlining the various ongrowing stages are illustrated in Fig. 2 & 3. Details are provided in the next section.

c) Ongrowing

~~Spawning~~ Grading and transfer of scallops spat takes place approximately 90 days after settlement, at a mean length of 10 mm (Fig. 2). Some 6,400 pearl nets are required to house the scallops at a density of 300 per net (Taguchi and Walford, 1976). These can all be supported on a single longline.

The second grading occurs 60-70 days later when scallops have reached an average size of 25 mm. With 10% mortality over this period 1.7 million scallops remain and these are transferred to 16 mm mesh lantern cages (Taguchi and Walford, 1976). Typical cages have six levels with a total of 480 scallops per cage. Five longlines are used to support 3,600 cages, with 2 m intervals horizontally and 0.5 m intervals vertically.

Ongrowing to 38 mm takes a further 70-80 days and mortalities of around 5% reduce the crop to 1.6 million scallops. The final upgrading of scallops into 32 mm mesh lantern cages at a density of 40 per level takes place at this stage; after which a 3% mortality is expected before the ongrowing phase is complete. Ten longlines are then required to support the lantern cages.

Final processing at the completion of ongrowing occurs 580-620 days after spat settlement. With a meat yield of 16.0 g each, processing of 1.6 million scallops would produce 25,500 kg worth \$122,300 to the producer (@ \$4.80/kg) and \$229,300 to the processor (@ \$9.00/kg).

Approximately eleven months after the first settlement spat collectors may be again attached to a longline. A similar catch to the first year is expected and the same process of upgrading is followed. As scallops from the first crop are processed more

longlines will become available for the second crop. When the second year juveniles are transferred from pearl nets to 16 mm mesh lantern cages all 15 longlines will be fully occupied with cages (Fig. 3). The first year's crop is completely harvested before collectors are placed for the third year of settlement and at this point the farm is on a year-in-year-out operation.

Equipment such as chain, mesh bags, shackles and floats will need to be replaced annually to bi-annually, 32 mm mesh lantern cages every five years and pearl nets and 16 mm mesh cages every ten years. All gear requires drying and cleaning before it is re-used.

The costs involved in running the scallop culture program for five years will now be examined.

EXPENSES

(i) Labour Costs

The workload necessitates an owner-operator paid \$16,640 and an assistant on \$7/hour for a "work as needed" system throughout each year. On a year-in-year-out basis this virtually becomes full-time employment.

Initial laying of longlines involves three weeks construction time, and one week positioning them, using a chartered vessel with a crane and winching gear. All other sea work involves the use of a company owned 5 metre runabout. For simplicity the year's work has been divided into sections clearly specified in Fig. 3.

(ii) Capital and Running Costs

Leased Crown Land (≈1.5 ha) on the foreshore is required to operate from. A large concrete floored shed is needed in which to make and store gear and provide office facilities. A vehicle

with a one tonne load capacity is required to carry equipment and tow the trailer and boat which is a five metre, aluminium, open plan runabout with a 35 HP motor. S.C.U.B.A. diving equipment is used to examine and maintain longlines, place, observe and retrieve spat collectors, pearl nets and lantern cages.

An electric pump will be used to supply saltwater to tanks for holding scallops whilst working on them and for cleaning equipment.

Operating costs of the deepwater lease, land, shed and office are low. Vehicle and boat running expenses (registration, insurance, fuel and maintenance) fluctuate between years and increase prior to final processing of the scallops.

CAPITAL COSTS

Longline Gear

(ropes, buoys, bags, mesh, clips, chain, shackles, weights)	-	\$24,393.90
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Ongoing Equipment

(pearl nets, lantern cages)	-	<u>\$261,027.60</u>
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\$285,421.50

Plant and Equipment	-	<u>\$27,800.00</u>
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TOTAL:		<u>\$313,221.50</u>
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Operating Expenses

	Yearly Cost	
	<u>Min.</u>	<u>Max.</u>
	\$	\$
Labour:		
Owner/Operator (drawings)	16,640	16,640
Assistant (\$7.50/hr)	11,940	14,040
Lease, shed and site costs	1,310	1,460
Vehicle costs	1,500	1,775
Boat running costs and charter fees	550	2,000

Total annual operating expenses range from \$33,465 Year 1 to \$35,090 in Year 5.

Note: Costs involved in general maintenance and repairs have been included under capital and labour expenses.

CASH FLOW PROJECTION SUMMARY

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
	\$	\$	\$	\$	\$
Income	-	122,292.63	122,292.63	122,292.63	122,292.63
Capital Costs:					
Longline gear	285,421.50	300.00	1,137.00	300.00	1,137.00
Plant & equipment	27,800.00				
Capital depreciation	43,569.91	43,569.91	43,569.91	43,561.91	43,561.91
Operating expenses:					
Salaries & wages	33,465.00	34,790.00	34,790.00	34,190.00	35,090.00
TOTAL EXPENSES:	390,256.41	78,659.91	79,496.91	78,059.91	79,696.91
GROSS PROFIT:	- 390,256.41	43,632.72	42,795.72	44,232.72	42,595.72
CUMULATIVE CASH					
FLOW:	-390,256.41	-346,623.69	-303,827.97	-259,595.25	-216,999.53

DISCUSSION

The schedule of work, as detailed, is a successful method, although it is not efficient or cost-effective. Costs could be reduced by eliminating pearl nets from the culture programme and transferring scallop spat directly from collectors to lantern cages. However, this is dependent upon the level of competition for space within collectors, which varies from year to year, and influences the development and growth of scallop spat.

The construction of scallop cages locally and the introduction of automatic sorters and counting machines can all reduce capital and labour costs. Cages constitute 83% of total capital costs in Year 1 and have a lifespan of 5-10 years depending on usage.

Recent investigations have shown that growth rates, at least equivalent to those obtained in cage culture, can be realised from other cheaper forms of culture (e.g. scallops glued to tapes and hung off longlines). Development of improved hatchery techniques (Rose & Dix, 1984) may result in lower cost scallop spat being readily available for ongrowing culture in the future. The timing of production of hatchery spat is flexible and, therefore, advantageous in gaining full benefit from peak growing periods.

CONCLUSION

This investigation into the feasibility of commercial production of scallops using established aquaculture methods has shown that:

- a) up to 25 tonnes of scallop meat could be produced per year in a 3.4 hectare deepwater lease;
- b) this procedure is currently not economically viable.

Although technically and biologically successful the procedure of using cage culture with imported Japanese cages is very expensive. Therefore, either an alternative method of culture with reduced costs is necessary or an alternative cage is required before scallop culture is economically feasible.

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- Taguchi, K. & Walford, J. 1976. Techniques and economics of Japanese scallop culture in Mutsu Bay, Aomori Prefecture. Mimeog. Paper 15 pp. (full reference not to hand).
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Fig. 1.

SUB-SURFACE LONGLINE DESIGN

(Not drawn to scale)

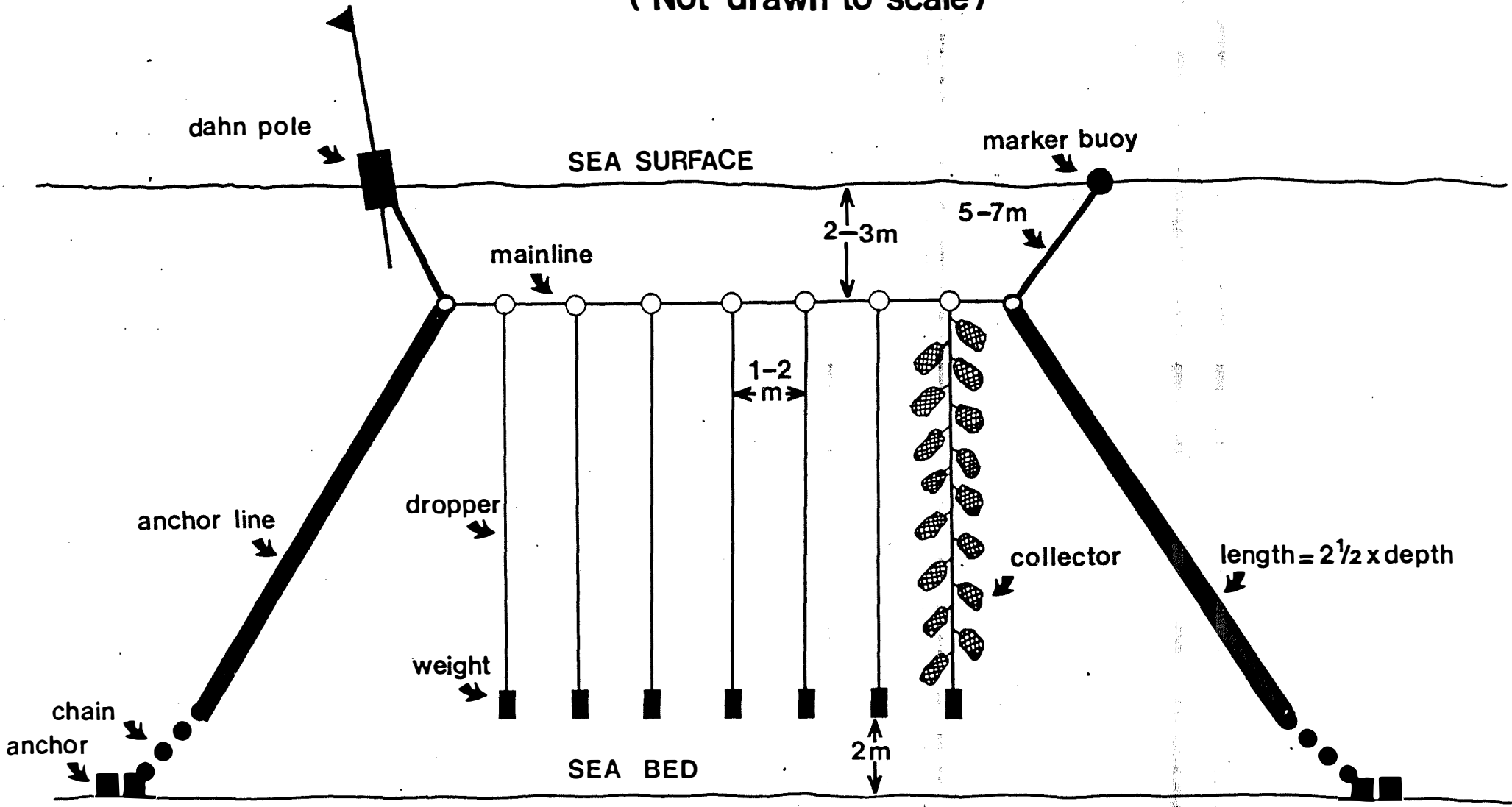


Fig. 2

Work Flow Chart

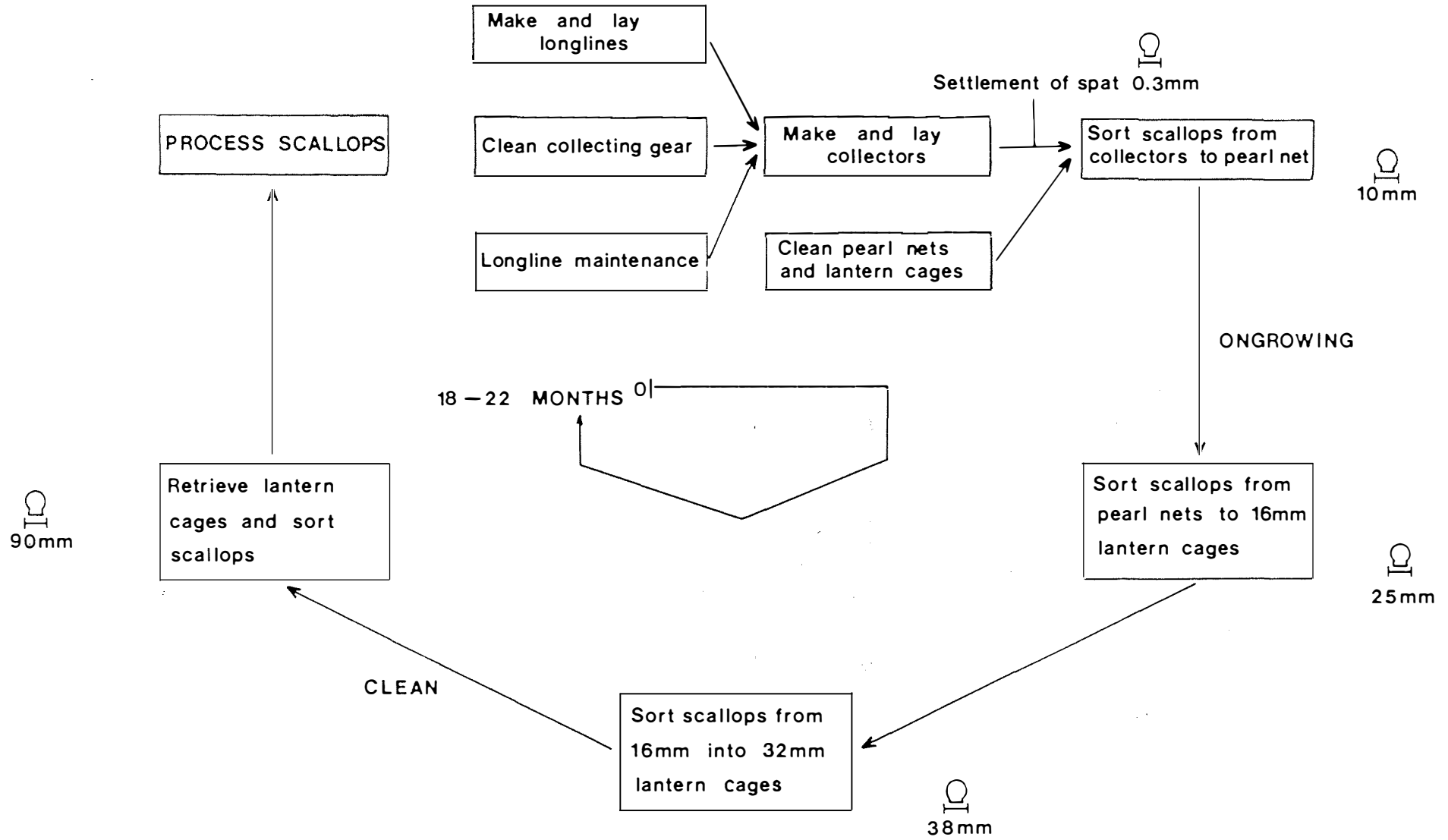
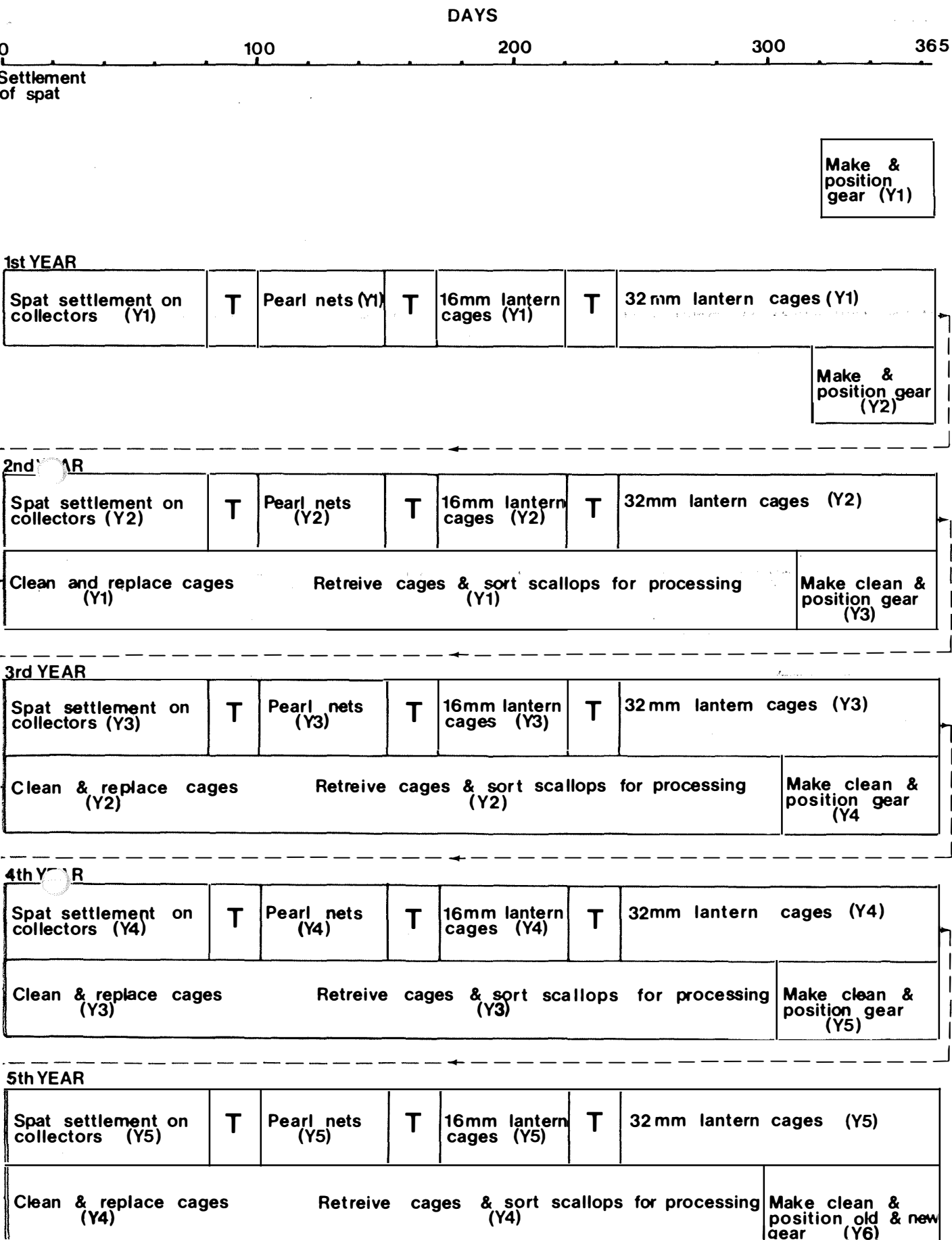


Fig. 3.

YEARLY WORK SCHEDULE



T = TRANSFER

NOTE Work is based around age and size of scallops, hence day 0 is taken as the 1st day of spat settlement although gear construction is required prior to this.
Most gear is renewed or entirely replaced after 5 years.