Spat collector construction costs

Spat collectors are an essential part of any farming operation for the black-lipped pearl oyster, *Pinctada margaritifera*. Putting out spat collectors should be one of the first steps in setting up a farming operation. They increase the amount of settlement of pearl oyster juveniles spawned in the lagoon, thus providing a source of supply of oysters for farming purposes, and relieving the pressure on the wild stock, as well as the labour of collecting from the wild. The oysters they provide are generally of better quality for farming purposes than stock collected from the wild: the mother-of-pearl they secrete often has a better colour and more lustre, and growth rates may be better Spat collectors are also simple and fairly inexpensive to make and deploy. A typical spat collector unit consists of a main-line, which may be from 30m to 500m or in length, and from which are hung individual spat collectors every metre or so. The collectors may be made from a variety of materials, as shown in the figure below. These include branches of rot-resistant bushes, coconut husks or plastic sheeting inside mesh bags, or shade cloth tied up into strips, cylinders or bundles.

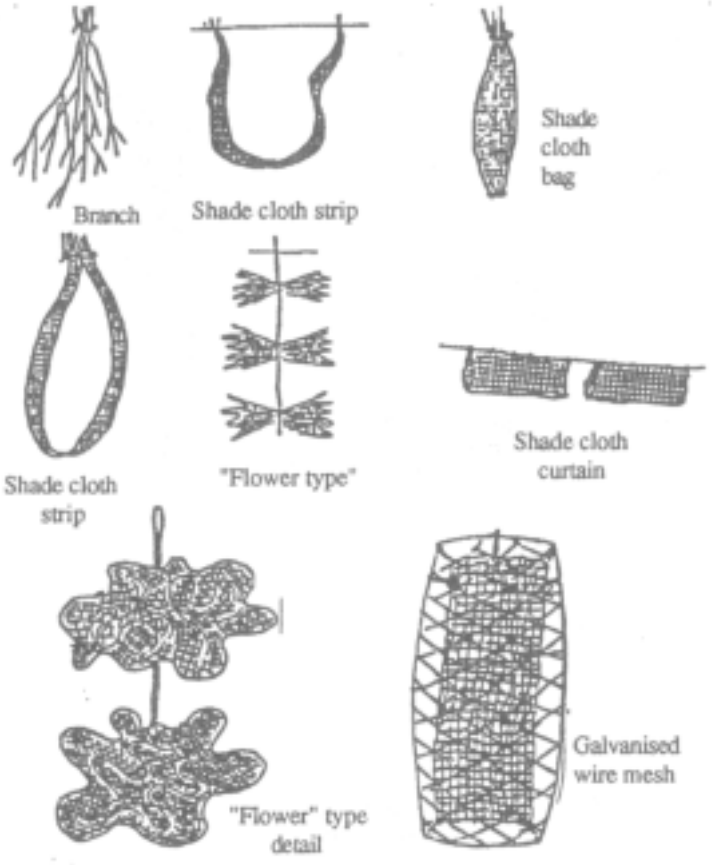

FIGURE 1 Spat collectors types (after Hauti et al, 1987)

The main-line is deployed a couple of metres below the sea surface inside the lagoon. It is kept in place by using short lengths of rope to tie it to coral heads, rocks, or, if necessary, specially placed cement blocks or other moorings. The line is kept from sinking by buoys, often used longline floats, attached to it at intervals. A typical spat collector arrangement is shown below.

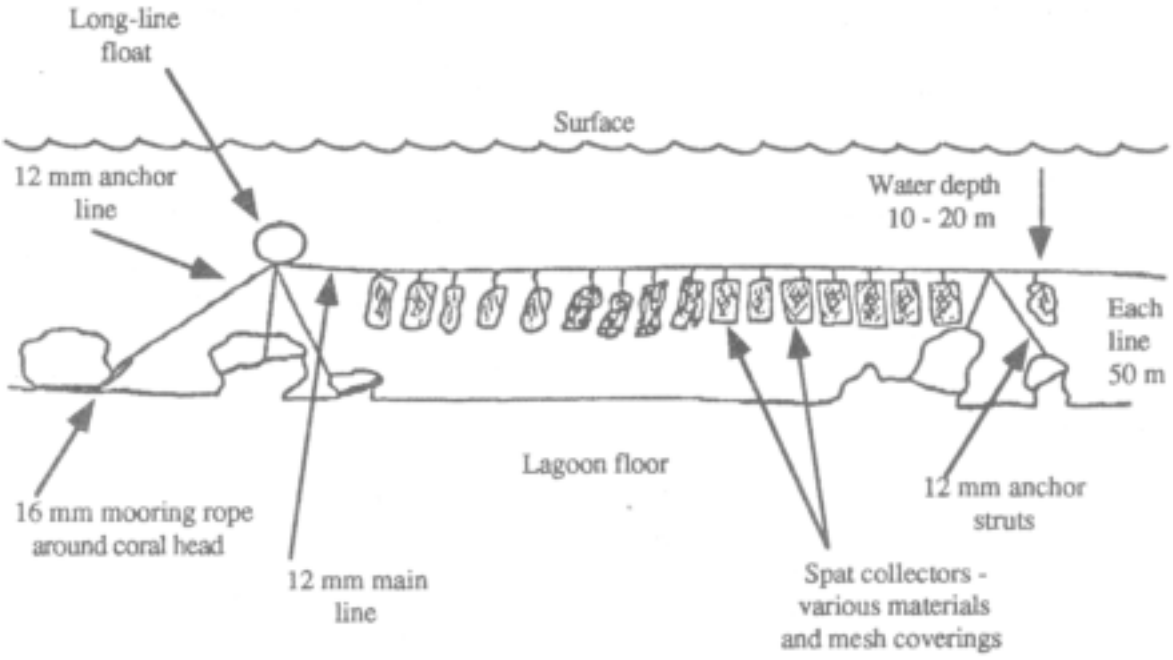

FIGURE 2 Mainline arrangement (after Sims et al, 1990, in press)

A materials list compiled for three 100m spat collectors in the Cook Islands by Passfield (undated mimeo, probably 1988) was as follows:

Item	Unit cost (NZ$)	Total cost (NZ$)
5 x 220m coils of 8mm polypropylene rope	69/ coil	110
6 x 25kg buoyancy floats	18 each	108
30 x 10kg buoyancy floats	16 each	480
300 polyethylene spat bags	0.6 each	180
100m x 4m roll black plastic sheeting (for placing inside spat bags)	140/ roll	140
2 x 220m coils of 4mm polypropylene rope (for attaching spat bags)	28/ coil	56
Total NZ$		**1309**

A similar list, based on experimental deployment of five 50m spat collector lines in Christmas Island, Kiribati in 1898, is provided by Sims et al (1990, in press):

Item	Cost (AS$)
Ropes	
- 3 x 220 m coils of 10 mm diameter polypropylene main line	160
- 1 x 220 m coil of 16 mm diameter polypropylene anchor line	80
- 4 x 220 m coils 5 mm lashing rope	25
Floats	
- 12 x plastic long-line floats	180
- 5 x inflatable white marker buoys	170
Collector materials	
- 2 x rolls (5 m x 17 m) "Film-grad" black polyethylene sheet (200 collectors)	55
- Coconut husks (72 collectors)	0
Bags	
- 3 x rolls (910 mm x 30 m) "Cyclone" nylon mosquito mesh (156 bags)	70
- 2 x rolls (2 m x 30 m) 40 mm black plastic screen	160
Other	
- Transportation/ freight	50
TOTAL AS$	**950**

In 1985/86, the average cost of materials used in constructing a spat collector line 50m long in Takapoto, French Polynesia, was estimated at 90,000 CFP (Hauti et al, 1987).

Cost per 50m of spat line in each of the three sample locations was therefore as follows:

Rarotonga, Cook Islands	NZ$	218
Christmas Island, Kiribati	A$	190
Takapoto, French Polynesia	CFP	90,000

The use of galvanised wire mesh bags to cover the collector has been abandoned in French Polynesia. Originally intended to protect juvenile pearl oysters from predation, it was found that they prevented settlement of pearl oyster larvae by becoming clogged with other growth.

According to the French Polynesian experience, pearl oyster larvae seem to prefer the folded configuration of the "flower" collector shape (see figure 1 above). Some collectors of this type in Manihi had settlement of over 1,000 larvae each. As the larvae grow into juveniles, they must be harvested and transferred to proper grow-out conditions, preferably by the time they are 30mm in diameter. If this is not done, crowding will cause the number of spat will diminish, either by dispersal (small pearl oysters are capable of movement) or mortality due to competition. The number of spat on one collector in Manihi was observed to fall from over 1,000 to 30 as the juveniles grew (Hauti et al, 1987).

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US dollar exchange rates for the currencies quoted in these articles were as follows in February 1990:
US$ 1.00 = CFP 111 = A$ 1.26 = NZ$ 1.58.

Exchange rates have varied widely over the period covered by these articles. Costings should therefore be taken as indicative only, and confirmed independently if necessary.

Christmas Island (Kiribati) Survey

A survey of pearl oyster stocks was recently undertaken in Christmas Island, Kiribati, by Being Yeeting (Research Unit, Fisheries Division, Ministry of Natural Resource Development, Kiribati), Garry Preston (Inshore Fisheries Research Project, South Pacific Commission), Ron Alfred (Marine Resources Authority, Ministry of Resources and Development, Marshall Islands), and Neil Sims (Zoology Department, University of New South Wales, Australia). Funding for the work was provided by the SPC Inshore Fisheries Research Project, UNDP, and the Kiribati Government.

Commercial quantities of shell had been taken from Christmas lagoon in the last century. Earlier this year, some trial purchases of shell had been made by the Marine Exports Division. The Fisheries Division needed to know if a commercial shell fishery was sustainable, and what management was appropriate.

Pearl oysters were concentrated in the deeper areas of the lagoon, close to the open passages in the west. The survey involved use of belt-transects, with stations selectively sited to obtain a broad picture of the pattern of distribution of pearl oysters. Unbiased estimates of maximum densities were obtained by randomly sited stations in the areas of greatest abundance. Spat-collector trials were initiated, with five lines each of 50 collector bags set through the lagoon. Unfortunately, insufficient younger pearl oysters were found to permit any meaningful growth trials being established.

A total of only 34 pearl oysters were found during the survey, in densities that did not exceed 1 animal/100m^2 and averaged only 0.54/100m^2 in areas where pearl oysters were present. Extraploation of average densities to the estimated 11 km^2 of suitable pearl oyster habitat in the lagoon gives a projected standing stock of about 60,000 shells – 23,000 (95% confidence limits). The population is therefore depauperate: this is probably attributable to the heavy harvests of the last century, and the more recent harvesting at lower levels, which, combined with heavy predation and poor conditions for jevenile settlement, has prevented population re-establishment. There is little or no potential for commercial exploitation of the wild stock in its present condition, and the survey team recommended a moratorium on further harvesting.

The potential for establishment of pearl farming activities was also assessed. Provided that steps are taken to re-establish the wild stock – deployment of spat collectors, junvenile ongrowing, and perhaps broodstock agrregation – there is probably potential for farming activities, although not for several years. Nevertheless, conditions are not ideal in Christmas Island lagoon: large passes to the west and hypersaline conditions to the east and south mean that larval loss will probably be high, while the shallow, exposed