Seafish Technology SR444

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Exploratory Fishing for *Chaceon (Geryon) affinis* on Rosemary Bank

Summary:

This report summarises the results of an exploratory voyage for the crab *Chaceon affnis* on Rosemary Bank.

Various types of traps and pots were used at various depths. Measurements were taken of catch per effort and size frequency distributions of the catch from the various pots and traps.

The catch per effort is discussed with a view to the viability of the fishery assuming a constant population density.

Acknowlegements

The authors would like to thank the owners Trevor Bartlett and Reg Matthews, skipper David Putt and the crew of the vessel AMADEUS for their cooperation.

Thanks are also due to Highlands and Islands Enterprise for some of the financial backing for the voyage and their permission to release these details.

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Catch per 24 Hours in Kilograms using the Carapace h/Weight Relationship Obtained by SOAFD from an EarlieWidtr Sample

1. Introduction

Stocks of crabs of the genus *Geryon* sustain fisheries off the coast of Africa and the North Western Atlantic (Wigley et al, 1975).

Exploratory voyages in the mid 1970s by SOAFD (Shelton and Dooley, 1982) showed that the species *Geryon*[1] *affinis* was present on the slopes of the Rockall Bank and could be captured in inkwell pots.

With the expansion of deepwater tangle netting in these waters, *Geryon* crabs have been landed as claws and legs in some quantities and a market paying approximately £2-3kg has been developed.

This report describes the results of an exploratory voyage on the crabber AMADEUS (TH 7).

2. Aims

The project aimed to collect catch per effort, selectivity and biological information on the exploratory voyage on Rosemary Bank with a view to assessing the viability of the fishery. Specific objectives were:

To compare the selectivity and the catch per effort of the various types of cage and pot used in the voyage.

To obtain biological information on the composition of the catches.

Since this work was started there has been an alteration in the generic name for this species from *Geryon* to *Chaceon*. However, the term *Geryon* is used to describe the species in this report.

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3. Methods

3.1. Fishing Methods

These observations were carried out on a voyage to Rosemary Bank off the west of Scotland during May-June 1994. Two modes of fishing were adopted:

- Cage type traps were set on individual down lines
- A mixture of inkwell pots and a number of other designs were rigged as ordinary Cancer pagurus gear, but at approximately double the normal spacing (see Table 1 and Figs. 612, Appendix I).

Table 1 - Pot Types

Pot Code	Description of Pot	Figure
SMI	Smooth mouthed inkwell pot	6
CAG	Large cage type trap	7
HEX	Hexagonally shaped pot	8
ISP	Smooth mouthed inkwell pot with snare	9
DES	Double entranced inkwell pot	no figure
SES	Side entrance snare pot	10
RFS	Round entrance snare pot	11
SQI	Square entrance inkwell with snare	12
SPR	Spring lock inkwell	no figure

3.2. Measurements

The location of each string of pots or cages was noted at the time of setting by latitude and longitude using GPS and the times and dates of setting and hauling were also noted. As each pot or cage was hauled the catch of *Geryon*, the bait used and the quantity of other species was noted. Carapace width/frequency distributions for both sexes of *Geryon*, at each location and from each pot type were obtained.

4. Results

4.1. Catch per pot

The variation in the average numbers of *Geryon* captured per 24 hours' soak for the whole sample is shown in Table 2.

Table 2 - Number observed, mean (average) catch *Geryon* per 24 hours and minimum and maximum for all pots counted

Pot Type	No. Pots Hauled	Mean (Average)	Minimum	Maximum
SMI	783	1.0	0.0	7.0
CAG	22	11.7	0.0	55.3
HEX	73	1.6	0.0	11.9
ISP	22	0.5	0.0	3.6
DES	4	2.4	0.0	7.1
SES	34	1.5	0.0	9.5
RES	32	0.2	0.0	1.2
SQI	74	1.3	0.0	5.9
SPR	I 8	2.6	0.0	7.7

To compare the pots only those strings on which the pots were mixed were compared in Table 3.

Table 3 - Number observed, mean (average) catch *Geryon* per 24 hours and minimum and maximum for strings of mixed pots

Pot Type	No. Pots Hauled	Mean (Average)	Minimum	Maxim m
SMI	252	1.4	0.0	6.6
CAG	0	*	*	*
HEX	73	1.6	0.0	11.9
ISP	22	0.5	0.0	3.6
DES	4	2.4	0.0	7.1
SES	34	1.5	0.0	9.5
RES	32	0.2	0.0	1.2
SQI	74	1.3	0.0	5.9
SPR	T 8	2.6	0.3	7.7

*In these strings no significant difference between pot types was shown.

Table 4 - Number observed, mean (average) catch *Geryon* per 24 hours and minimum and maximum for all gear used deeper than 370 fathoms

Pot Type	No. Pots Hauled	Mean (Average)	Minimum	Maximum
SMI	380	1.6	0.0	7.0
CAG	14	16.3	0.0	55.3
HEX	62	1.8	0.0	11.9
ISP	17	0.5	0.0	3.6
DES	4	2.4	0.0	7.1
SES	27	1.8	0.0	9.5
RES	27	0.2	0.0	1.2
SQI	60	1.5	0.0	5.9
SPR	5	3.8	1.1	7.7

4.2. Catch per pot with depth

The mean depth of each string was obtained by measuring the depth at each end of the string when shot and taking the mean of these two measurements. The number of *Geryon* captured per pot increased significantly with depth as shown in Fig. 1. It was therefore decided to compare pot types at depths of 370 fathoms or more. This is shown in Table 4. In this case, as would be expected from Fig. 1, the catch per effort for most pot types is higher at the greater depth. The ratio between catch per effort in the cages and catch per effort in the pots is approximately 10:1 which is similar to the overall ratio of catch per effort between the cages and other pots shown in Table 2.

Table 5 compares the estimated weight of the catches per 24 hours for the whole sample and for those captured at depths greater than 370 fathoms.

Table 5 Average catch per 24 hours in numbers and the estimated catch per 24 hours in kilograms using the carapace widthtweight relationship obtained by SOAFD from an earlier sample

	Inkwell Pots	Cages
Average number/24 hours (whole sample)	1.0	11.7
Average weight of individual	1.21	1.45
Average weight (kg)/pot or trap/24 hours	1.21	16.9
Average number/24 hours (deeper than 370 fathoms)	1.6	16.2
Average weight (kg)/pot or trap/24 hours (deeper than 370 fathoms)	1.9	23.5

5. Biological Differences

The carapace width/frequency distribution of the male and female *Geryon* is shown in Fig. 2. The males were much larger than the females and the mean size of all the *Geryon* was much larger than observations of other species in the genus (Wigley et al, 1975). Further analysis of the data may reveal information on variation in the distribution of the sexes with depth and location.

6. Selectivity of Cages

The carapace width/frequency distributions of the *Geryon* captured in the inkwell pots and cages are compared in Fig. 3. Because significantly more *Geryon* were captured per effort in the cages these results are calculated so that each bar represents the proportion of the catch/24 hours at 15cm. The range of sizes is the same; perhaps the differences are best ascribed to the different locations in which the pots and cages were fished. In particular, there are proportionally more larger animals in the cages. This may simply be due to more male *Geryon* in the areas where the cages were fished.

7. Selectivity of the Pots

These results are shown in Figs. 4 & 5. In each case only those strings on, which there was a mixture of pots were used to obtain these results. In each case the range of sizes of *Geryon* were similar. Differences between the shapes of the graphs are probably best ascribed to chance.

8. Discussion

8.1. Catch rates

Various gear failures and other problems meant that AMADEUS had to return to port leaving gear soaking for longer than 24 hours. This means that the results may not be representative of a normal 10 day voyage. The significant differences observed between the catch per effort in the cages and the pots could be ascribed to:

- The increased amount of bait placed in the cages attracting more *Geryon*.
- There was physically more room in the cages for the *Geryon* and the increased number of entrances allowed more animals in than the pots.

In view of the second possibility, some caution should be exercised if a reduction in the size of the cages is considered. Comparisons should initially be made between limited numbers of large and small cages before major investment in small cages is planned.

8.2. Commercial viability

Overall, a yield of one tonne per day of *Geryon* required 800 pots or 60 cages to be set per day (derived from Table 3). However, Fig. 1 shows that there is a positive correlation between depth and numbers of *Geryon* captured. At deeper than 370 fathoms the requirement in terms of cage numbers is 43 cages per day or 510 pots. Given approximately half an hour for hauling and setting each cage this would seem a viable proposition.

The gear failures resulted in the need to return to port so there is some uncertainty as to whether this voyage is representative. As knowledge of the fishery increases the number of pots or cages required for producing one tonne of *Geryon* per day may well reduce provided the availability of the *Geryon* remains the same.

However, this only represents one voyage during late May to early June. Seasonal variations may affect the availability of the *Geryon*.

These results suggest that at the current availability of *Geryon* at this location a yield of 1 tonne per day is feasible. However, it does not take into account:

- The extent of the resource.
- The growth rate and recruitment of the species.
- Seasonal changes in availability.
- Other environmental and biological factors which might affect the viability of the fishery.
- The effect of any changes in the current level of effort in the exploitation by tangle netters and other fisheries.

Further analysis of the data may reveal more information on the biological features of the fishery. Investigations of the growth rate, extent of the resource and seasonal variations would require more extensive surveys using specialised techniques, such as underwater cameras.

9. Conclusions

This study showed that:

- The range of sizes of Geryon was the same in all of the gears used. Although the shape of the carapace width/frequency curves does vary between the different types of pot there is no evidence to suggest differences in selectivity.
- There was a positive correlation between catch per effort (in numbers per pot per 24 hours) and depth in fathoms.
- The catch per effort of the cages was significantly higher than the pots; the ratio between pots and cages being approximately 1:10 at depths greater than 370 fathoms.

10. Further Work

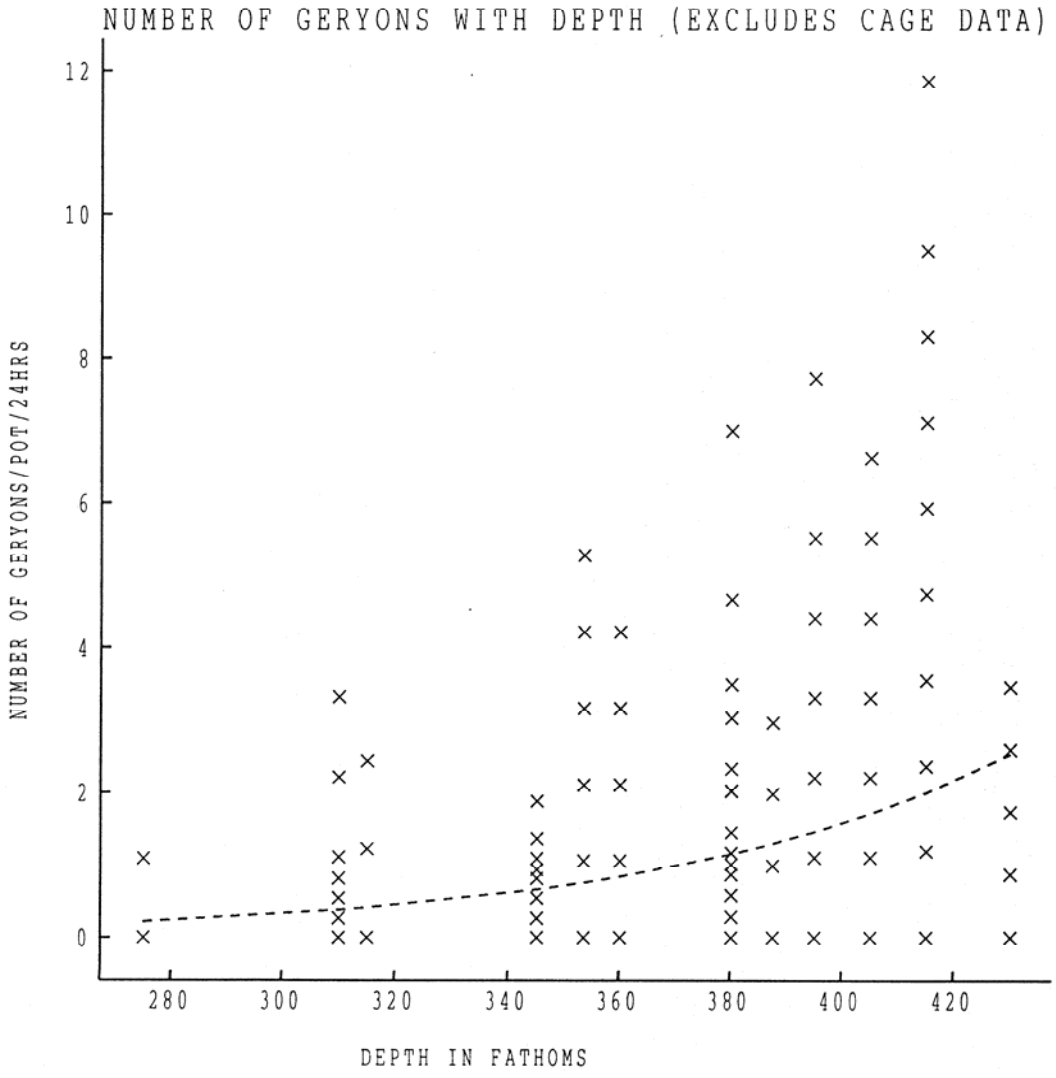
There is a requirement for some further analysis of the data already collected to examine sex ratios and catch per effort with respect to depth and location. In order to further assess the viability of the fishery for this species there is a requirement to investigate:

- The extent of the resource, possibly using some form of remote sensing as well as pots and cages.
- The biology of the species, in particular the growth and mortality rates.
- Seasonal changes in availability.
- Existing and potential markets.
- Catching and hauling aspects, in particular matching the most appropriate gear types to the available hauling technology.

11. References

Shelton R. G. J. and H. D. Dooley, 1982.
New records of the Geryonid crab *Geryon affinis* and other deep water Brachyura from the North East Atlantic. Crustaceana 42(1), p.108-110.

Wigley R. L., R. B. Theroux and H. E. Murray, 1975
Deep sea red crab *Geryon quinquedens*. Survey of North Eastern United States. M.F.R. Paper 1154. From Marine Fisheries Review, Vol. 37, No. 8, August 1975.



The broken line shows the best fit by linear regression

Fig. 1

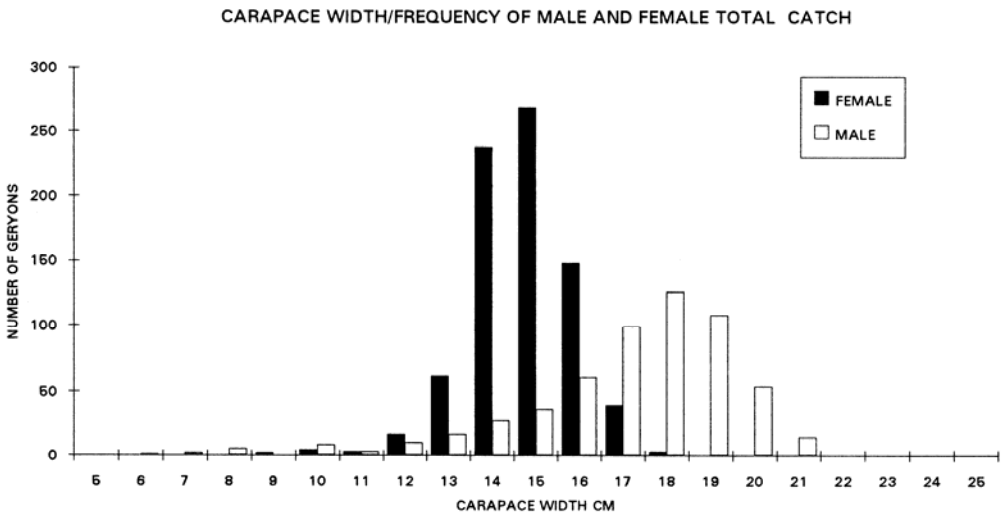


Fig. 2

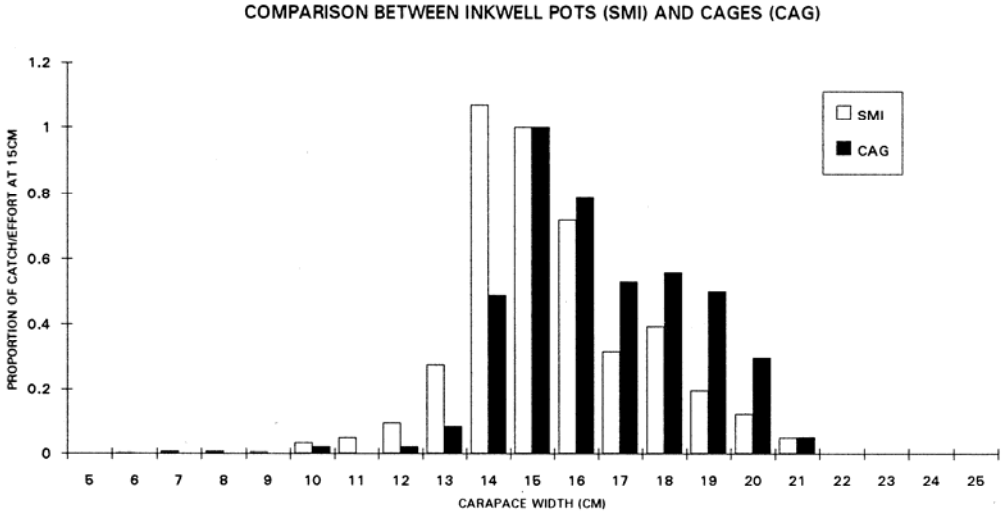


Fig. 3

Pot Type	No. of Pots	No. of Geryons
SMI	783	791
CAG	22	308

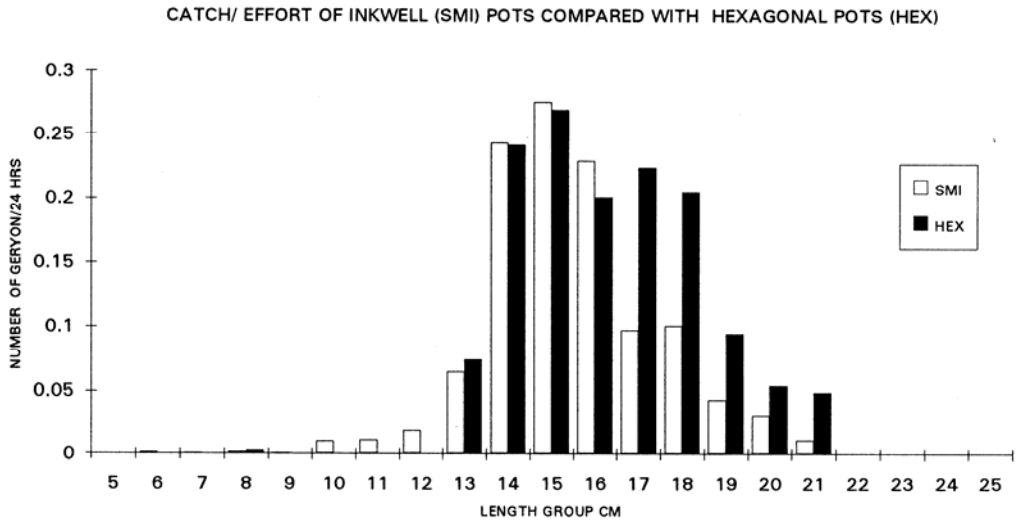


Fig. 4

Pot Type	No. of Pots	No. of Geryons
SMI	252	385
HEX	73	147

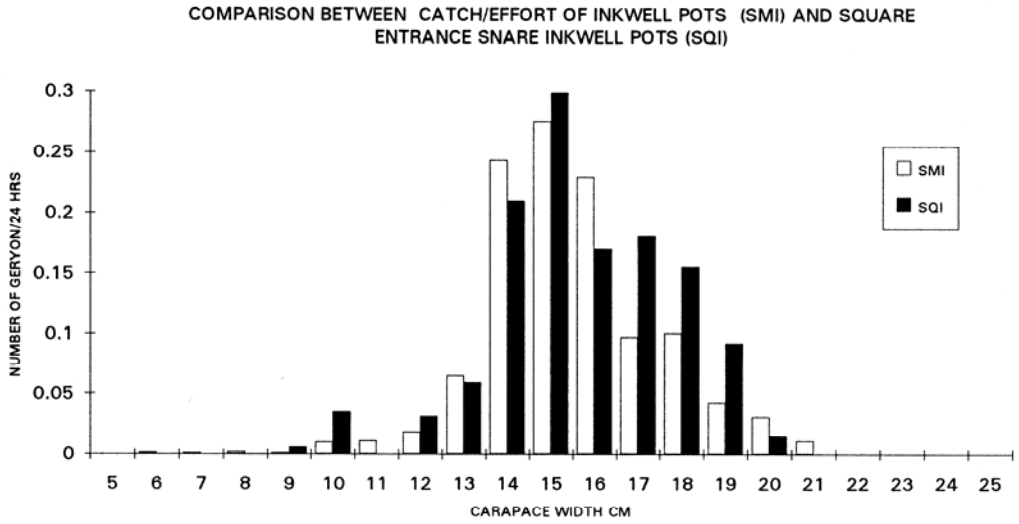


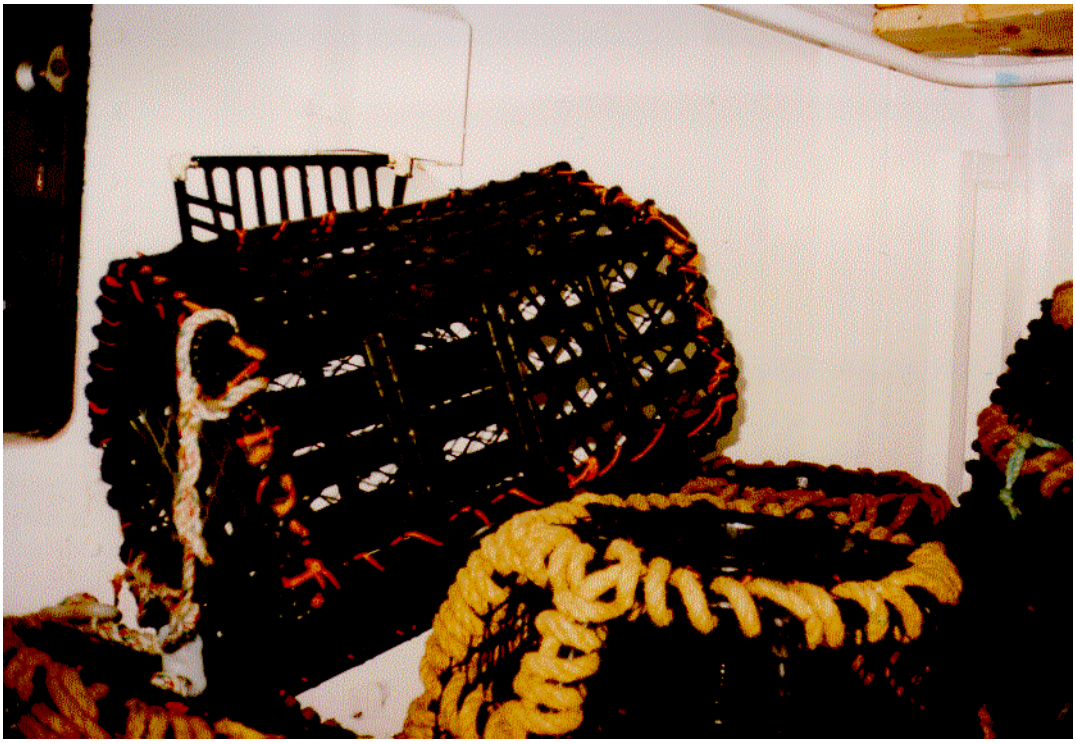
Fig. 5

Pot Type	No. of Pots	No. of Geryons
SMI	252	385
SQI	74	110

Appendix I

Photographs of Pot Types

(2)



(1)

Fig. 6 – (SMI) Smooth Mouthed Inkwell Pot (1) and (HEX) Hexagonally Shaped Pot (2)

Fig.7 – (CAG) Large Cage Type Trap

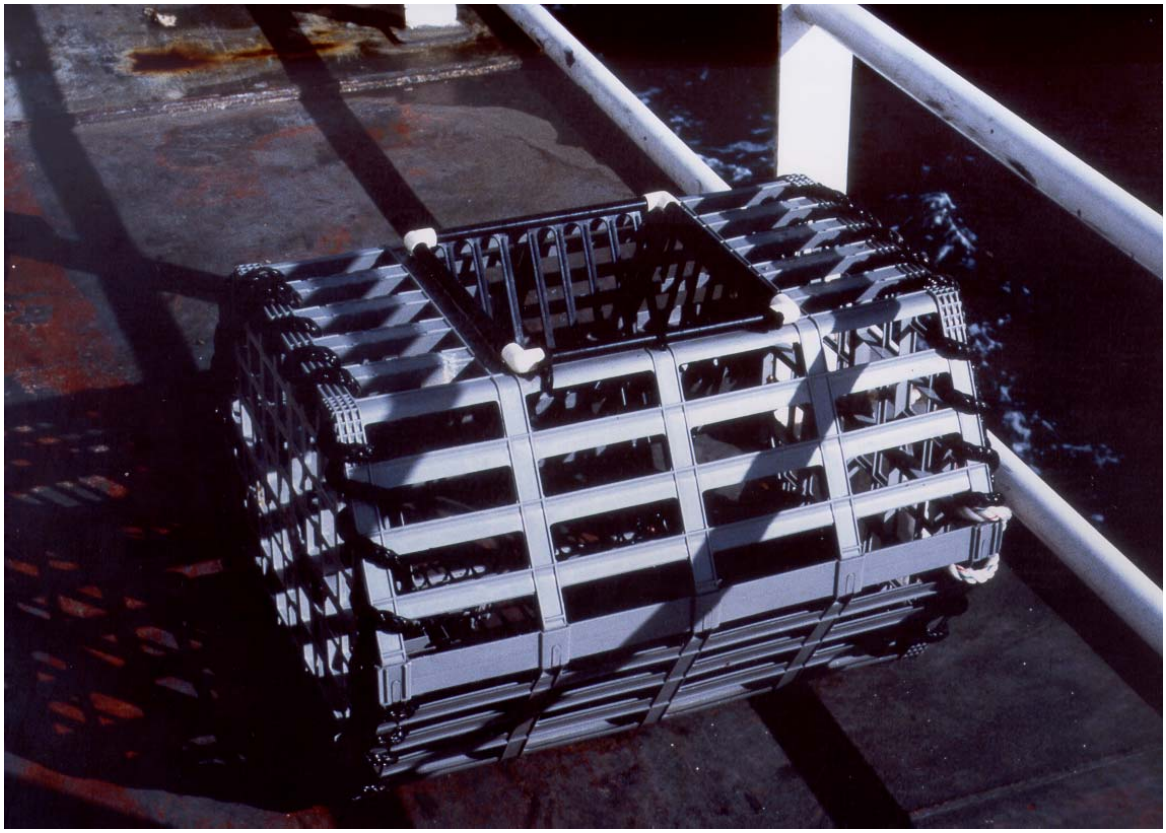


Fig.8 – [HEX] Hexagonally Shaped Pot

Fig. 9 – [ISP] Inkwell Pot with Snare

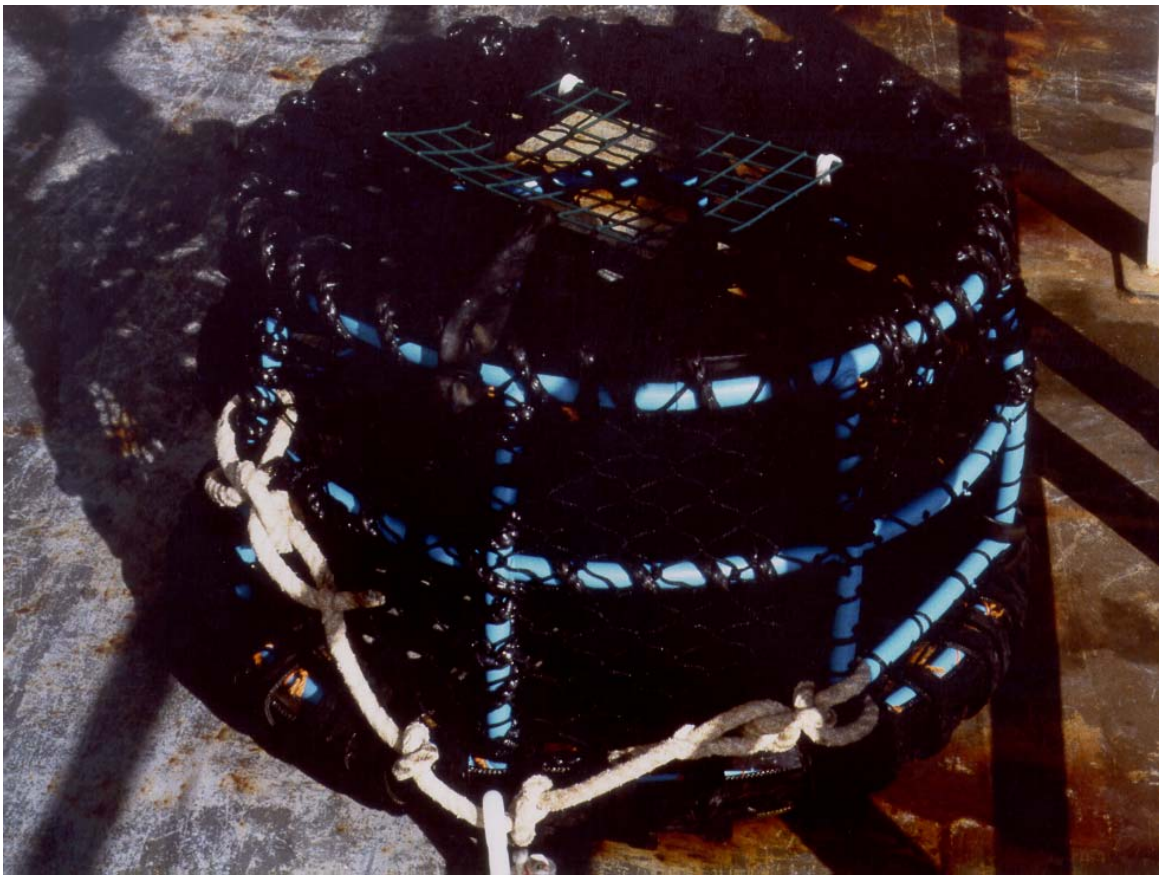


Fig. 10 – [SES] Side Entrance Snare Pot

Fig.11 [RES] Round Entrance Snare Pot

Fig. 12 – [SQI] Square Entrrance Inkwell with Snare