FISHERIES DIVERSIFICATION PROGRAM

Environmental Awareness and Conservation Technology

Project Report: EACT- 4.2001.DFO (FDP 280)

Reducing Lobster By-Catch in Rock Crab Pots

Canada

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Reducing Lobster By-catch in Rock Crab Pots

Prepared for:

- Fisheries Diversification Program
  Environmental Awareness & Conservation
  Technology Component.

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The $10 million Fisheries Diversification Program is part of the $81.5 million Canada-Newfoundland Agreement respecting the Economic Development Component of the Canadian Fisheries Adjustment and Restructuring Initiafive, announced in August, 1999. The main thrust of the Fisheries Diversification Program is industry-wide research and development initiatives that reflect the economic development priorities of the Newfoundland and Labrador fishing industry.

(F D P Project no. 280)

REDUCING LOBSTER BYCATCH IN ROCK CRAB POTS

Laboratory Experiments and Sea Trials

Abstract. To reduce lobster bycatch in the rock crab pot fishery in Newfoundland, six modified rock crab pots were designed and tested in a laboratory tank and at sea in comparison with a traditional pot during summer and fall of 2000. While all six modified pot designs reduced lobster bycatch, the modified pot with a slotted disc installed near the bottom of the entrance cone (Pot F in the text) showed best overall results and is recommended for further refinement and commercial trial. Only one legal size lobster was capture by Pot F in 45 retrievals compared with an average of one lobster captured in every two control pots. In addition, 250 rock crabs were measured for carapace width, carapace length, body height and weight, providing information for determining appropriate sizes for entrances and escape panels of the pots.

1. INTRODUCTION

Rock crabs *(Cancer irroratus)* are found from Labrador to Florida at depths of less than 750 m with concentrations found in shallow coastal waters (less than 20 m). They grow to a maximum of 140 mm carapace width (Elner, 1985, cited in Squires, 1990). Females are typically smaller. Due to their small sizes and high processing costs, rock crabs have not been commercially harvested in the past in Newfoundland. Exploration of rock crab started in 1994 along the northeast coast of Newfoundland using a small version of the conical crab pot. At present, only one fish plant processes rock crabs in the province of Newfoundland and Labrador.

Rock crabs share the same habitat with, and are predated upon by, the American lobster *(Homarus americanus)*, a highly valued commercial species. The existing pot design often result in unacceptable level of lobster bycatch. Preliminary efforts in designing a rock crab pot which minimizes lobster bycatch showed good potential, but the designs require extensive laboratory and at-sea tests before they can be adopted for commercial use. This project was divided into two phases: Phase I - laboratory experiments, and Phase II - sea trials. Phase I of the project was to observe and compare fishing performance of modified pots in comparison with commercial pots in laboratory conditions. Suitable pot designs together with some other designs were used for sea trials

in Phase H. This report describes both laboratory experiments and sea trials conducted during summer and fall of 2000.

2. LABORATORY EXPERIMENTS

2.1 Materials and Methods

Two hundreds and fifty rock crabs *(Cancer irroratus)* and twenty American lobsters *(Homarus americanus)* were obtained from rock crab pots and lobster pots in Bonavista Bay, northeast coast of Newfoundland during the week of the 16th of July, 2000. Both legal and sublegal sizes rock crabs and lobsters were kept under a special permit. The animals were transported in insulated fish tubs and covered with fresh seaweed by truck on the 24th of July to the Ocean Science Centre (OSC) of Memorial University of Newfoundland, where the experiment was carried out. The animals were allowed to acclimatize to tank conditions for a week before the potting experiment began.

The experiment was carried out in a raceway tank measuring 11.60 x 2.46 x 0.96 in (deep) with continuous flow of water at ambient sea water temperature. A standard conical rock crab pot measuring 42 $^{1}/_{2}$" (1080 mm) diameter in the bottom, 21 $^{1}/_{4}$" (540 mm) in the top and 17 $^{3}/_{4}$" (450

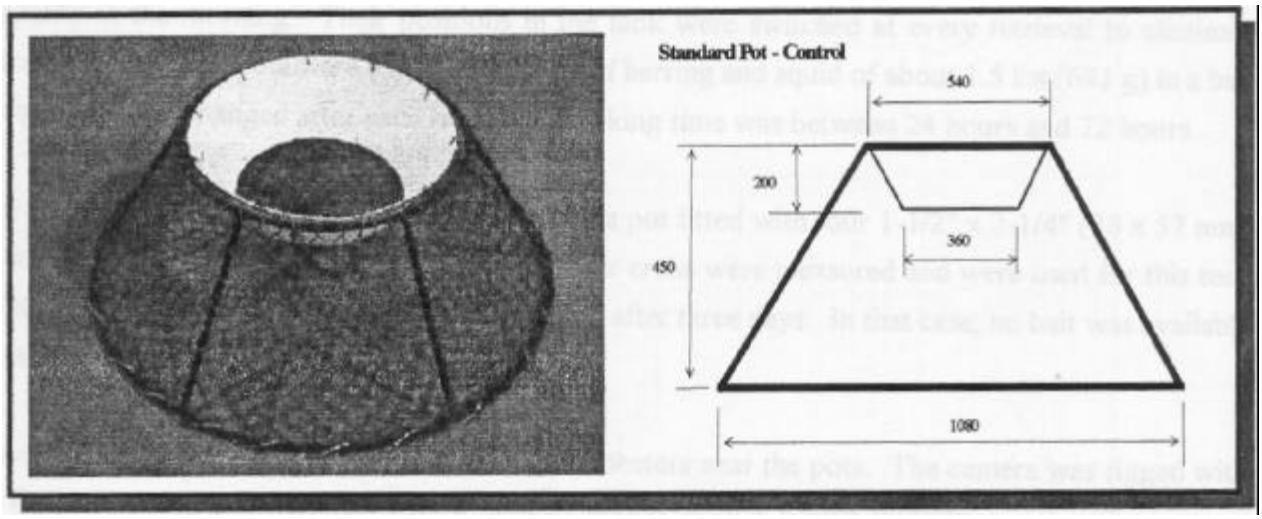


Exhibit 1. The standard rock crab pot was used as control pot during the laboratory experiments.

mm) high (Exhibit 1), was used as control. The pot was covered with 3" (76 mm) mesh braided netting. Four design modifications as shown in Exhibit 2 were tested. They are identified as Pot

Pot B, Pot C and Pot D. Large scale drawings are attached as Appendix I.

Tests were concentrated on Pot A which was modified by adding a ring to the top of the standard pot. The ring was 3" (76 mm) larger in diameter than the top ring of the standard pot and had a spacing (clearance) of 2-1/2" (64 mm) serving as the entrance. This new ring was covered by 3" (76 mm) mesh netting on the top. A total of 13 comparative sets was made using the control pot and Pot A.

Pot B was modified from Pot A by removing the cover netting from the top ring (Exhibit 2). Four retrievals were made for Pot B.

Pot C was modified from the standard pot by adding a ring below the top ring (Exhibit 2). The space (clearance) between the two top rings was 2-1/2" (64 mm), serving as the entrance. There was a roof on the top of the pot. Three retrievals were made with Pot C.

Pot D was modified from the standard pot by adding a plastic strip near the top of the pot and a roof (Exhibit 2). There were six 2-1/2" x 5" (64 x 127 mm) entrances in the plastic strip. The bottom of each entrance was 2-1/2" (64 mm) from the bottom edge of the plastic strip. It was hoped that smaller crabs may not be able to reach the entrance with this band of "crab guard". Five retrievals were made.

The experimental pot and the control pot (standard pot) were set and retrieved at the same time, usually in the morning. Their positions in the tank were switched at every retrieval to eliminate possible bias. The pots were baited with a mix of herring and squid of about 1.5 lbs (681 g) in a bait bag. Bait was changed after each retrieval. Soaking time was between 24 hours and 72 hours.

In addition, an escape test was conducted using a pot fitted with four 1-1/2" x 2-1/4" (38 x 57 mm) escape panels and a sealed entrance. Eighty-four crabs were measured and were used for this test. The remaining crabs were counted and measured after three days. In that case, no bait was available inside the pot.

A video camera was used to monitor crabs and lobsters near the pots. The camera was rigged with a timer to record intermittently over a 24-hour period using a 2-hour cassette.

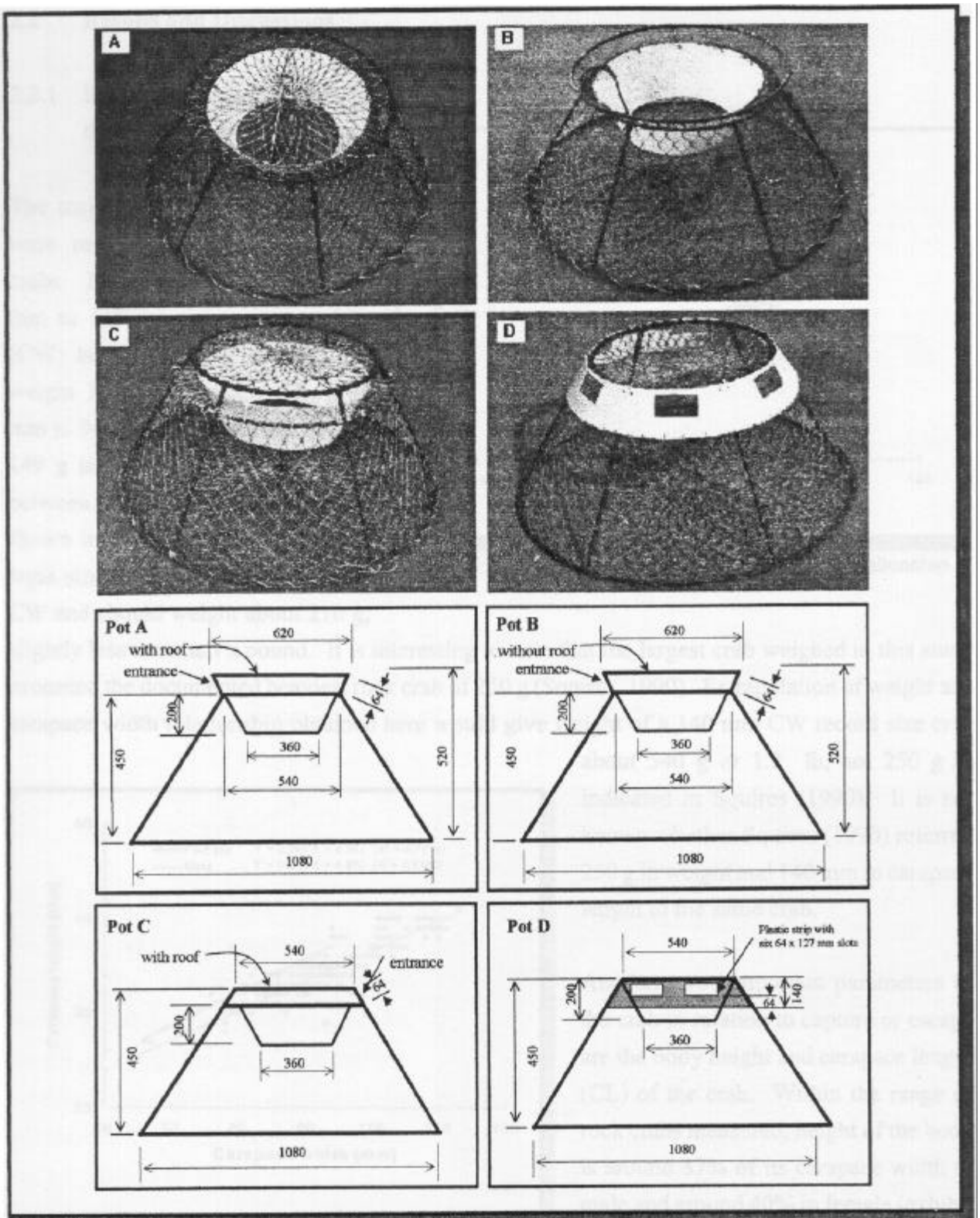


Exhibit 2. Four modifications of rock crab pot designs tested in the laboratory. Drawing not to scale.

2.2 Results and Discussions

2.2.1 Biological characteristics of the rock crab

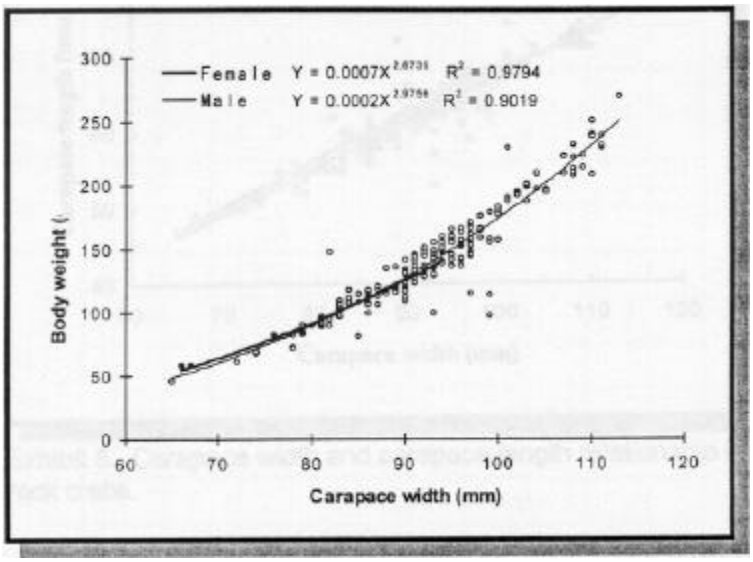


Exhibit 3. Rock crab carapace width and weight relationship.

The majority of the 250 rock crab were males with only 23 female crabs. Male crabs ranged from 65 mm to 115 mm in carapace width (CW) and from 46 g to 270 g in weight. Female crabs ranged from 66 mm to 94 mm CW and from 58 g to 149 g in weight. The relationship between carapace width and weight is shown in Exhibit 3. The minimum legal size rock crab is 4" (102 mm) CW and should weight about 210 g, slightly less than half a pound. It is interesting to note that the largest crab weighed in this study exceeded the documented heaviest rock crab of 250 g (Squires, 1990). Extrapolation of weight and carapace width relationship obtained here would give weight of a 140 mm CW record size crab about 540 g or 1.2 lb, not 250 g as indicated in Squires (1990). It is not known whether Squires (1990) referred 250 g in weight and 140 mm in carapace length to the same crab.

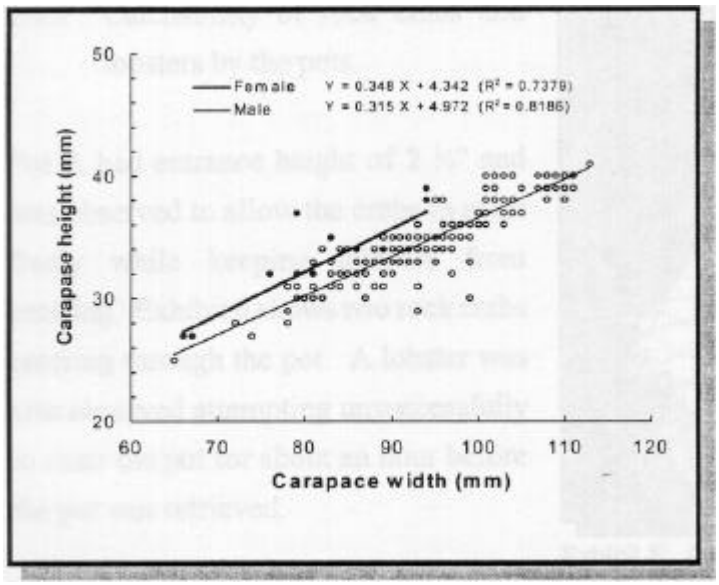


Exhibit 4. Carapace width and body height relationship in rock crabs.

Another two important parameters of the crab in relation to capture or escape are the body height and carapace length (CL) of the crab. Within the range of rock crabs measured, height of the body is around 37% of its carapace width in male and around 40% in female (exhibit 4). Female body is higher than that of males for the same carapace width.

For a crab of minimum legal size (4" or 102 mm CW), its body height would be around 1-1/2" and for a large rock crab of 5" (127 mm) carapace width, the body height would be around 1-3/4". This is very important in designing a pot's entrances and escape vents.

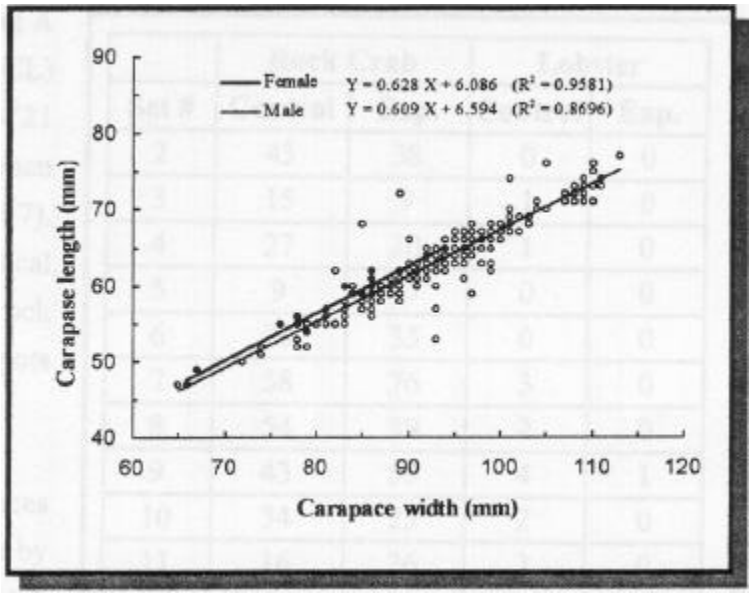


Exhibit 5. Carapace width and carapace length relationship in rock crabs.

On the other hand, there are no noticeable differences in carapace lengths for a given carapace width between mate and female rock crabs (Exhibit 5). From this exhibit, it can be seen that for a rock crab of the minimum legal size (4" or 102 mm CW), the carapace length is around 68 mm (2 2/3"). Current regulation of the escape vent of 2 $^1/_4$" wide would not allow 100 mm carapace width crab to escape. Such escape vents would likely only allow crabs below 3 $^1/_4$" (83 mm) carapace width to escape. It is therefore necessary to make escape vents at least 1 $^1/_2$" (or 38 mm) high and 2 $^3/_4$" (or 70 mm) wide for sublegal crabs to escape.

2.2.2 Catchability of rock crabs and lobsters by the pots

Pot A had entrance height of 2 $^1/_2$" and was observed to allow the crabs to enter freely while keeping lobsters from entering. Exhibit 6 shows two rock crabs entering through the pot. A lobster was also observed attempting unsuccessfully to enter the pot for about an hour before the pot was retrieved.

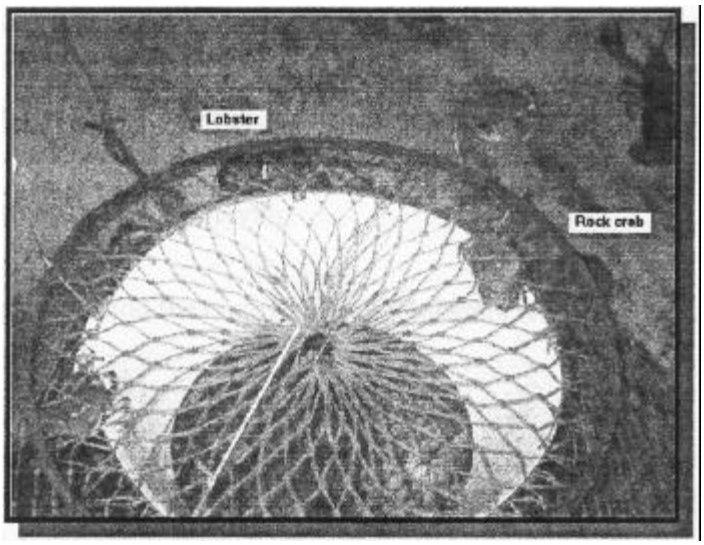


Exhibit 6. One lobster and two rock crabs entering a modified rock crab pot (Pot A) in a laboratory tank.

In 13 retrievals, Pot A caught significantly less lobsters than the control

pot (Paired t-test, $P<0.05$). In fact, Pot A caught only 1 sublegal lobster (74 mm CL) in 13 retrievals compared with a total of 21 lobsters caught by the control pot when both pots were set side by side (Exhibit 7). On the other hand, there was no statistical difference between the number of rock crabs caught by each of the two pots (paired t-test, $P>0.05$).

Overall there are no significant differences between the sizes of rock crabs caught by the control pot and the experimental Pot A when all the crab caught by each pot are compared. Of the 13 comparable trials, Pot A caught slightly larger crabs in five trials while the control pot caught slightly larger crabs in eight trials.

	Rock Crab		Lobster	
Set #	Control	Exp.	Control	Exp.
2	43	38	0	0
3	15	9	1	0
4	27	30	1	0
5	9	17	0	0
6	28	35	0	0
7	58	76	3	0
8	54	39	2	0
9	43	59	4	1
10	34	25	2	0
11	16	26	3	0
12	55	26	0	0
13	17	26	0	0
14	48	84	5	0
Total	447	490	21	1
Diff.	$P>0.05$. Statistically not significant		$P<0.05$. Statistically significant	

Exhibit 7. Catch (rock crab) and bycatch (lobster) comparison between the commercial pot (control) and the experimental pot (Pot A).

There was a roof on the top of Pot A. Video observations and casual observations by researchers did not indicate that there were any crabs or lobsters attempting climbing onto the top of the pot. It is therefore suggested that the roof might be removed without affecting bycatch of lobsters. Instead it may improve catch efficiency of the crab as roofless pot appeared to provide easier access to crabs entering through the side entrance. The modified pot is identified as Pot B (Exhibit 2). No lobsters were caught in that pot in four retrievals.

Three comparative trials were made between Pot C and the control pot. No lobsters were caught in by Pot C.

Pot D was modified from the standard pot by adding a plastic strip near the top of the pot and a roof (Exhibit 2). It was hoped that smaller crabs may not be able to reach the entrance with this band of "crab guard". There were however still large number of small crabs caught in the pot in five retrievals.

2.2.3 The effectiveness of the escape panels

The effectiveness of escape vents was tested by placing crabs in a commercial pot with the top entrance closed by a roof. Eighty-four crabs between 75 mm and 1 14 mm carapace width were placed inside the pot for three days. After three days, only 10 crabs were escaped from the pot (Exhibit 8). No crabs greater than 90 mm CW escaped from the pot.

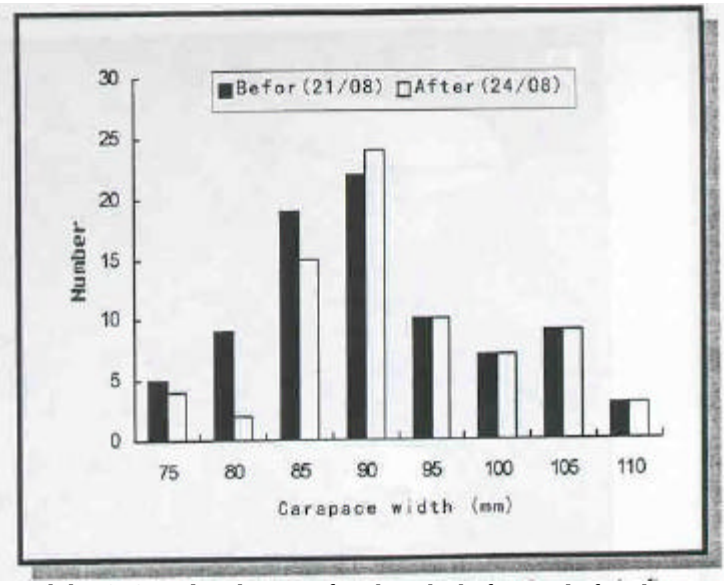


Exhibit 8. Size distribution of rock crabs before and after three days in an escape test pot.

3. SEA TRIALS

3.1 Materials and Methods

Sea trials were carried out near Newtown in Bonavista Bay and near Foxtrap in Conception Bay in September/October, 2000. A standard conical rock crab pot measuring 42 $^{1}/_{2}$" (1080 mm) diameter in the bottom, 21 $^{1}/_{4}$" (540 mm) in the top and 17 $^{3}/_{4}$" (450 mm) high (Exhibit 1), was used as control. Four types of modified pots (Pot, B, E, F, and G) were tested in Foxtrap in Conception Bay (Exhibit 9). Only Pot B and Pot E were tested in Newtown, Bonavista Bay.

Pot B was the same as that used in Phase I laboratory experiments. Pot E was very similar to Pot C tested in the laboratory except that Pot E was slightly higher. Pot F and Pot G were modified together with Mr. William Porter of Foxtrap. Pot B, Pot E and Pot F had similar size compared with the standard pot, while Pot G was modified from the whelk pot which was smaller in size measuring 31" (780 mm) in the bottom, 15" (380 mm) in the top and 10" (260 mm) high. The entrances of Pot B and Pot E were 2 $^{1}/_{2}$" (64 mm) high, and all around the top rim. The entrance for Pot F was two lots measured 2" x 8" (51 mm x 203 mm) placed 7" (178 mm) below the top rim, and that for Pot G was one slot measured 2" x 5" (51 mm x 127 mm) placed 2-1/8" (55 mm) below the top rim.

Each of the modified experimental pots and one control pot were set side by side as a group. They were set and retrieved at the same time, usually in the morning. The pots were baited with cod

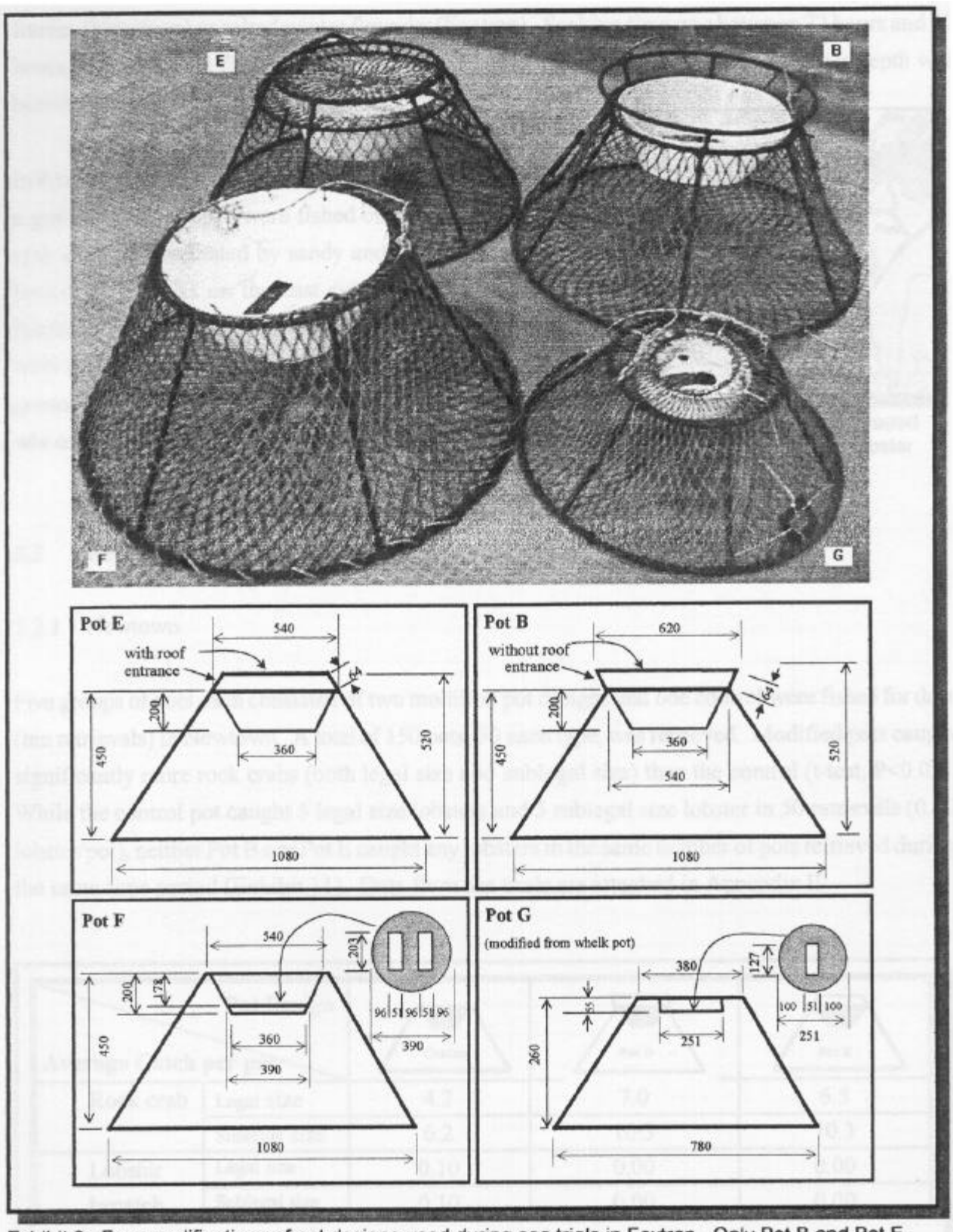


Exhibit 9. Four modifications of pot designs used during sea trials in Foxtrap. Only Pot B and Pot E were tested in Newtown. Drawing not to scale.

frames (Newtown) or salted winter flounder (Foxtrap). Soaking time was between 22 hours and 50 hours, except for the first set in Newtown which had 1 hour soaking duration. Water depth was between 24 and 30 feet in both locations.

In Foxtrap, four different pots were fished as a group. Three groups were fished on rock crab grounds dominated by sandy and kelp bottom which was on the east side of the Foxtrap Harbour (Exhibit 10). Two groups were fished on the traditional lobster fishing grounds dominated by rocky bottom which was on the west side of the Foxtrap Harbour.

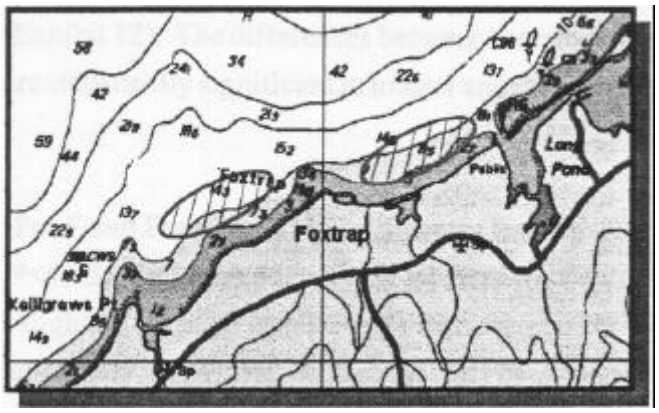


Exhibit 10. Fishing grounds near Foxtrap - shaded areas. Rock crab grounds on the right and lobster grounds on the left.

3.2 Results

3.2.1 Newtown

Five groups of pots each consisted of two modified pot designs and one control were fished for days (ten retrievals) in Newtown. A total of 150 pots, 50 each type, was retrieved. Modified pots caught significantly more rock crabs (both legal size and sublegal size) than the control (t-test, $P<0.05$). While the control pot caught 5 legal size lobsters and 5 sublegal size lobster in 50 retrievals (0. 10 lobster/pot), neither Pot B nor Pot E caught any lobsters in the same number of pots retrieved during the same time period (Exhibit 11). Data from sea trials are attached in Appendix II.

Average Catch per pot \ Pot Design		Control	Pot B	Pot E
Rock crab	Legal size	4.2	7.0	6.5
	Sublegal size	6.2	10.3	10.3
Lobster bycatch	Legal size	0.10	0.00	0.00
	Sublegal size	0.10	0.00	0.00

Exhibit 11. Summary of rock crab and lobster catch (average number per pot) from Newtown trials.

3.2.2 Foxtrap

More lobsters and less rock crabs were caught on the lobster grounds, and more crabs and less lobsters were caught on the rock crab grounds (Exhibit 12). The differences between the catch rates of different pots fished in the two fishing areas are statistically significant in lobster and crab catches ($P<0.05$).

When fished on the rock crab grounds, Pot E, Pot F and Pot G caught significantly less legal size lobsters compared with the control pot (t-test, $P<0.05$). In fact, no legal size lobsters were caught in Pot F and Pot G (Exhibit 12). Pot B caught slightly less legal size lobsters than the control pot on the crab grounds, but the difference is not statistically significant. Statistical tests of catch rates of legal size rock crabs and lobsters between various pots are presented in Exhibit 13. Data from sea trials are attached as Appendix II.

Pot design / Catch per pot		Control	Pot E	Pot B	Pot F	Pot G
Rock crab grounds						
No of pots retrieved		12	39	39	27	39
Rock crab	Legal	24.6	11.9	16.9	25.0	20.2
	Sublegal	12.0	7.6	8.8	10.7	5.9
Lobster bycatch	Legal size	0.33	0.05	0.23	0.00	0.00
	Sublegal	0.00	0.15	0.41	0.15	0.00
Lobster grounds						
No of pots retrieved		8	26	26	18	26
Rock crab	Legal	3.8	5.7	4.5	7.3	5.5
	Sublegal	3.6	5.5	8.7	4.8	5.2
Lobster bycatch	Legal	0.63	0.31	0.46	0.06	0.04
	Sublegal	1.38	0.42	0.50	0.33	0.00
Rock crab grounds and lobster grounds combined						
No of pots retrieved		20	65	65	45	65
Rock crab	Legal	16.3	9.4	12.0	17.9	14.3
	Sublegal	8.7	6.8	8.8	8.4	5.7
Lobster bycatch	Legal	0.45	0.15	0.32	0.02	0.02
	Sublegal	0.55	0.26	0.45	0.22	0.00

Exhibit 12. Summary of catch (average number per pot) of rock crabs and lobster from Foxtrap trials.

On lobster fishing grounds, while catch rates for rock crabs were very low, there are no statistical differences in crab catch rates among different pot designs (Exhibit 13). On the other hand, Pot F and Pot G had significantly less legal size lobster bycatch than the control, Pot A or Pot B. When combining the results from the rock crab grounds and the lobster grounds, Pot F and Pot G are still the best pots in terms of reduced lobster bycatch, while maintaining similar catch rates for legal size rock crabs (Exhibit 12).

	Legal Size Rock Crab Catch					Legal Size Lobster Bycatch				
	Ctrl	E	B	F	G	Ctrl	E	B	F	G
Rock Crab Grounds										
Ctrl		***	***	---	---		***	---	***	***
E	***		***	***	***	***		***	---	---
B	***	***		***	---	---	***		***	***
F	---	***	***		---	***	---	***		---
G	---	***	---	---		***	---	***	---	
Lobster Grounds										
Ctrl		---	---	---	---		---	---	***	***
E	---			---	---	---		---	***	***
B	---	---		---	---	---	---		***	***
F	---	---	---		---	***	***	***		---
G	---	---	---	---		***	***	***	---	

*** Statistically significant, --- Statistically not significant, Ctrl - control pot.

Exhibit 13. Summary of statistical tests between the catch of different pot designs on rock crab grounds and lobster grounds for legal size rock crabs and legal size lobster bycatch from Foxtrap trials.

4. GENERAL DISCUSSIONS AND RECOMMENDATIONS

Though the results from laboratory tests and from Newtown were quite encouraging for Pot B and Pot E in terms of reduced lobster bycatch, the results were not as desired when tested in Foxtrap. Pot B and Pot E are also difficult and costly to modify. As well, they became less stackable due to the additional metal ring.

The two additional pot types, Pot F and Pot G, did show very promising results in Foxtrap. These two pots caught more legal size rock crabs than the control pot, at the same time, they caught less legal and sublegal lobsters. It should be noted that inclusion of Pot G in the sea trials was for experiments only. There was no intention of using whelk pot (Pot G) in the rock crab fishery. Pot F required minimal modification to the traditional pot and remained stackable. Considering existing legal requirement of rock crab pot and availability of the pot, Pot F is recommended for further test and limited commercial use.

Pot F was modified from the standard conical rock crab pot by inserting a plastic slotted disc near the bottom of the cone which was 7" (178 mm) below the top rim (Exhibit 14). The disc was 13 $^{1}/_{2}$" (343 mm) in diameter and 2 mm thick. The material cost for each disc was estimated at $1.50 each.

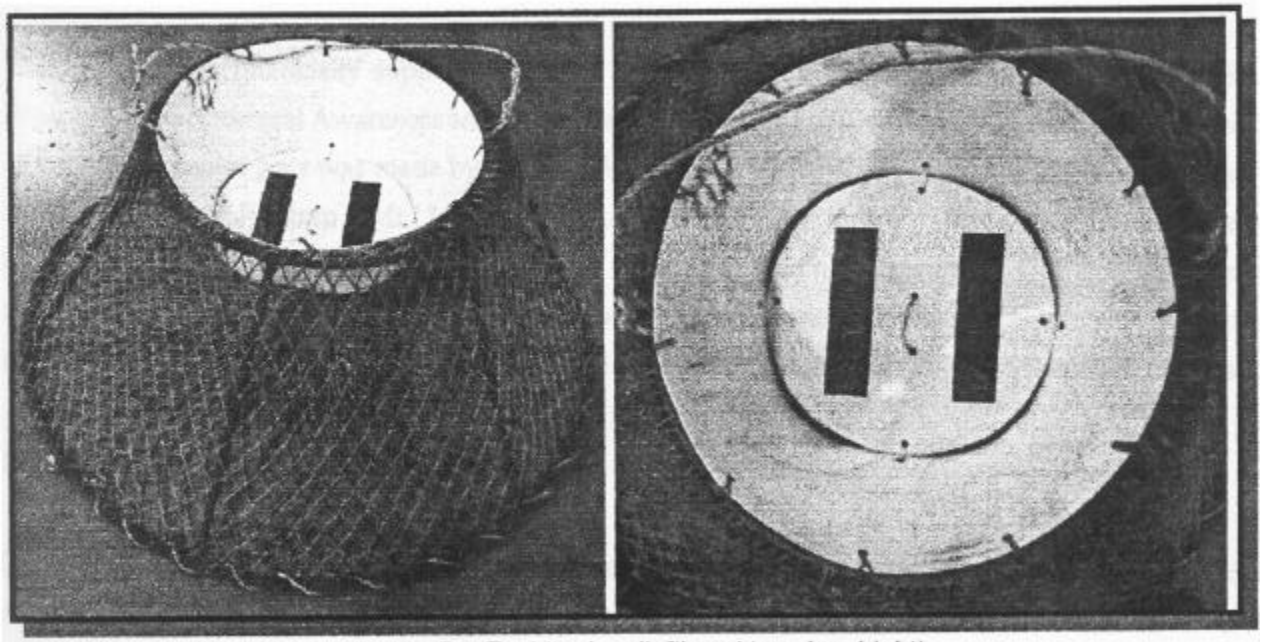


Exhibit 14. Modified rock crab pot - Pot F, side view (left) and top view (right).

There are following advantages of using Pot F as the future rock crab pot:

- √ high rock crab catch
- √ low lobster bycatch
- √ required little modification at minimal costs
- √ remained stackable
- √ easily modifiable for further tests and refinements

It should be noted that the entrance size for Pot E was 2 $^{1}/_{2}$" while that for Pot F was 2". It is conceivable that lobster bycatch may have been lower if the entrance were also 2" for Pot E. Based on sea trial results and other considerations, it is therefore also recommended that Pot E with smaller opening be introduced for further tests at sea in the coming fishing season. Further sea trials will examine the optimal size of the entrance for bycatch reduction and catch improvement for the rock crabs. The sea trials will also evaluate the operational aspects of the modified pots.

Laboratory experiment on the existing escape panel (1 $^{1}/_{2}$" x 2 $^{1}/_{4}$") did not demonstrate its effectiveness in releasing undersized rock crabs. The size and position of the escape panels should be further tested at sea to arrive at a suitable mechanism which allows unwanted small crabs to escape.

5. ACKNOWLEDGEMENTS

This project was financially supported in part by Canada/Newfoundland Fisheries Diversification Program Environmental Awareness and Conservation Technology Component. Initial designs of some of the experimental pots was made by Mr. Eric Way of Department of Fisheries and Oceans and Mr. William Porter of Foxtrap. Mr. John Melindy of DFO assisted in transporting live animals to the laboratory. Technical assistance was provided by staff at Fishing Technology Unit and the Ocean Science Centre. Dr. Seiji Akiyama of Tokyo University of Fisheries of Japan participated in laboratory experiments. Mr. John Boland of Newtown and Mr. William Porter of Foxtrap assisted in sea trials.

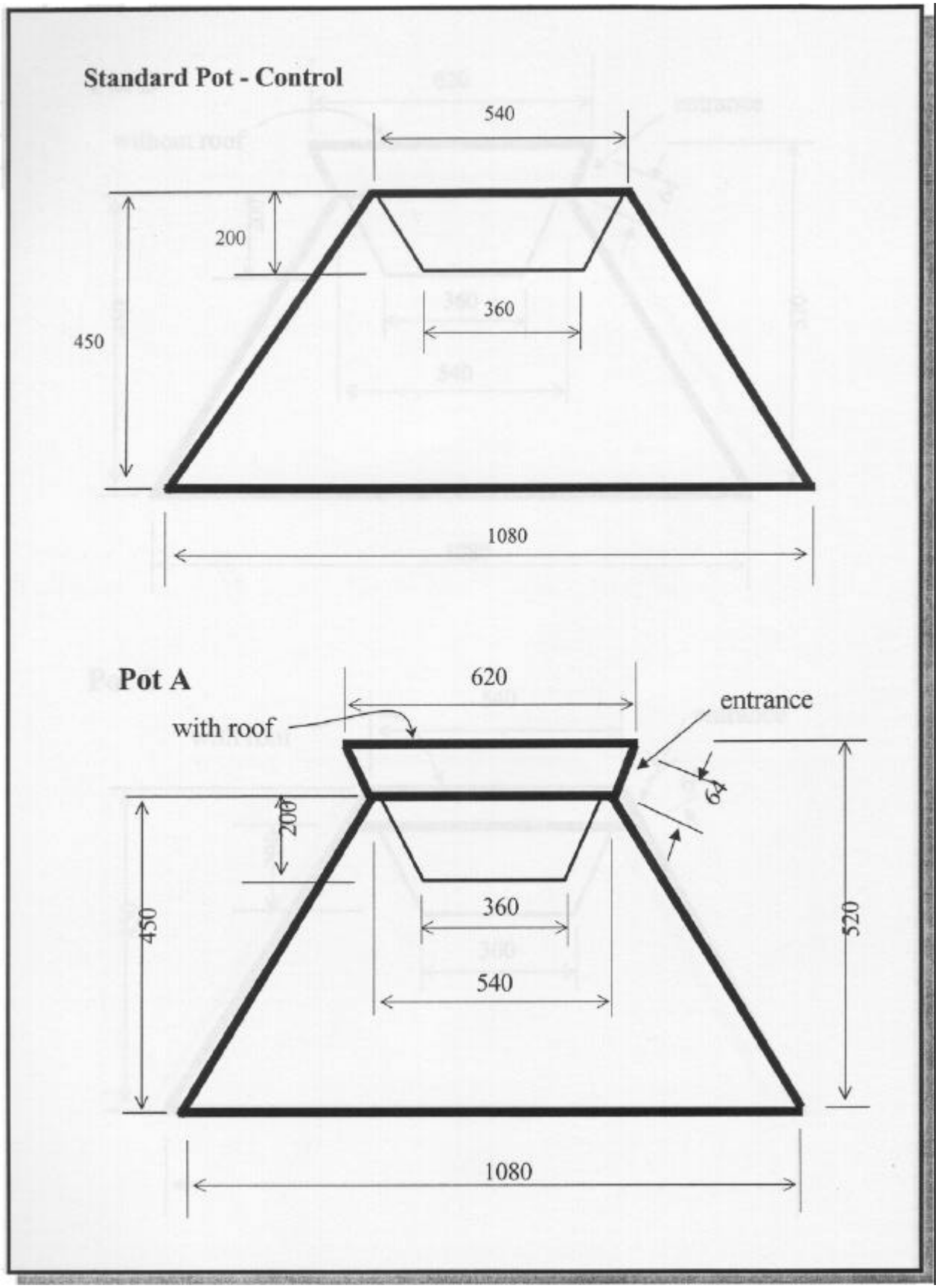
6. REFERENCES

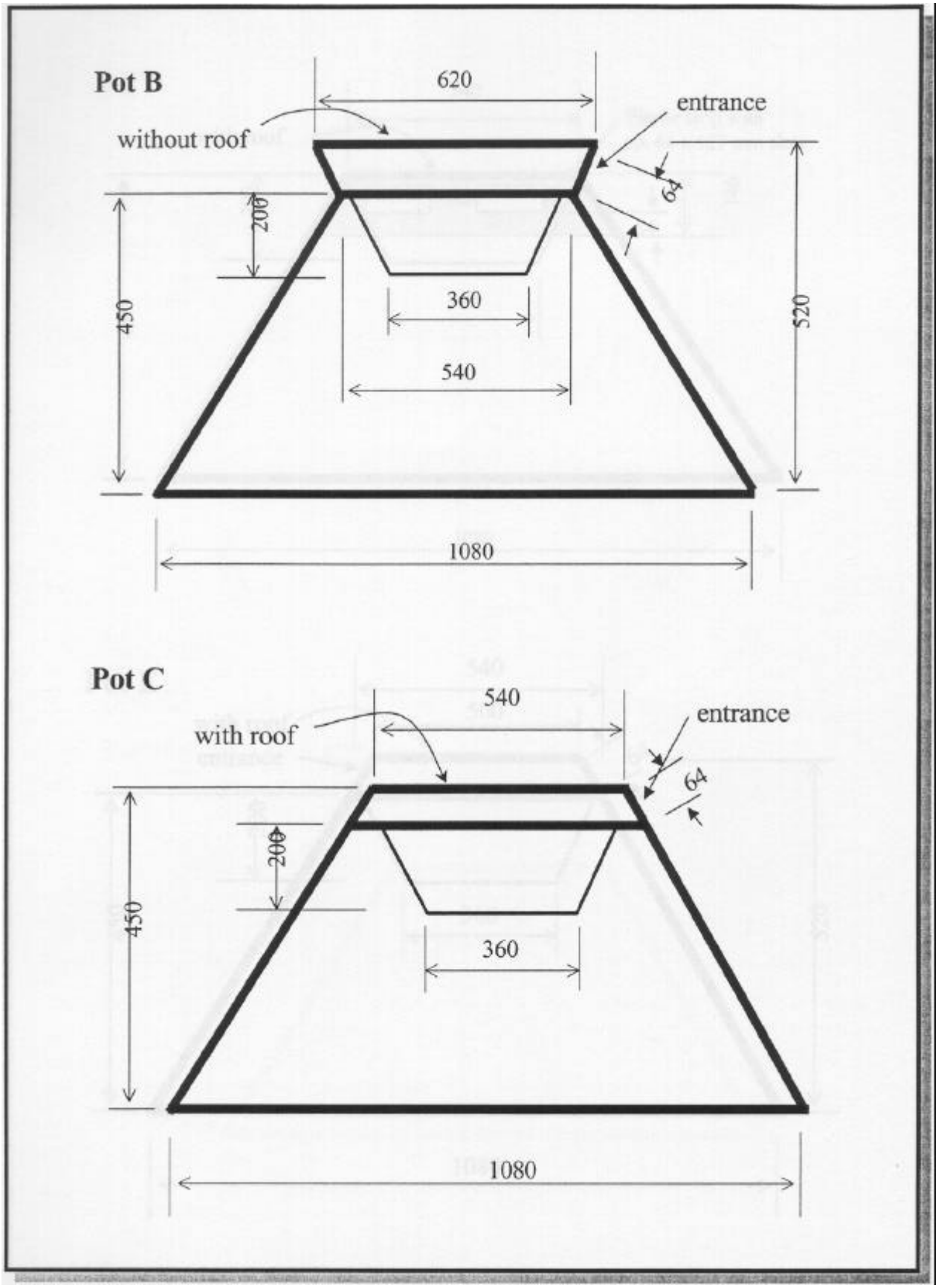
Squires, H. J. (1990). Decapod Crustacea of the Atlantic Canada. *Canadian Bulletins of Fisheries and Aquatic Sciences,* 221: 532 p.

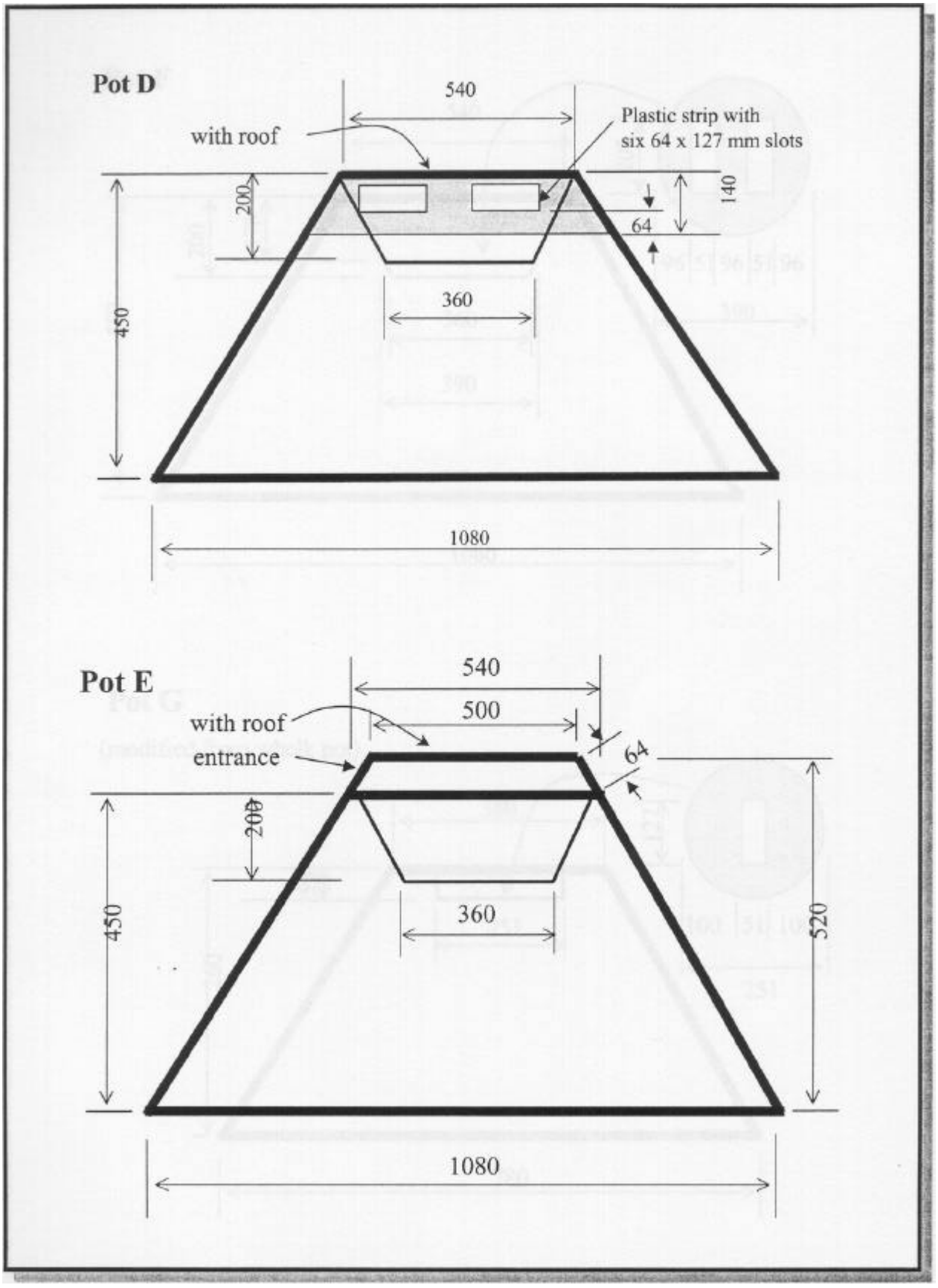
APPENDIX I

SKETCHES OF POTS TESTED

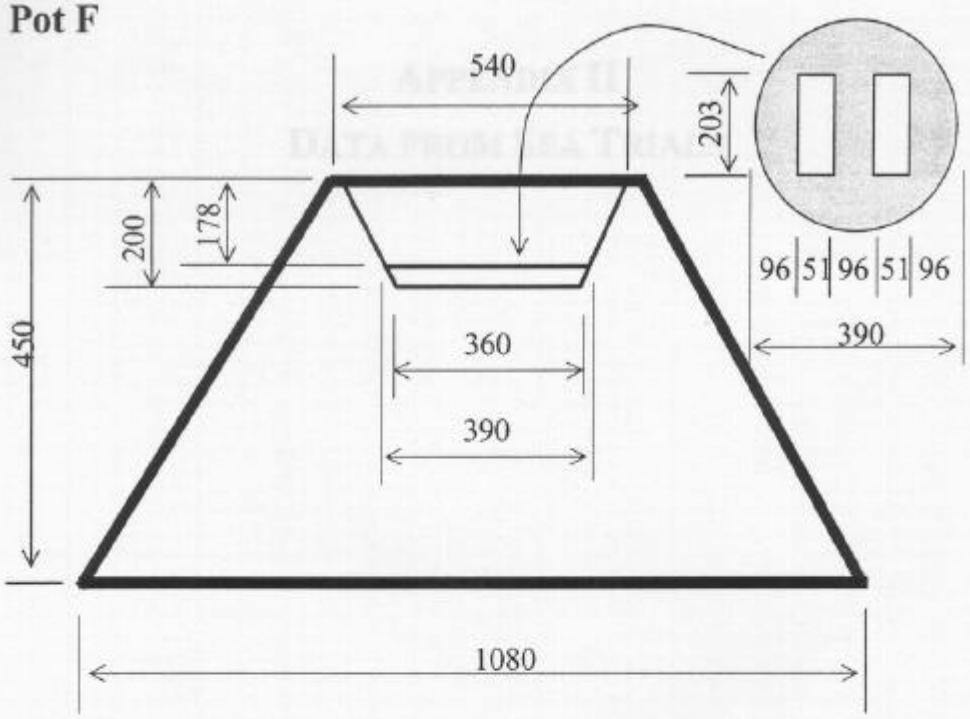
(Drawings are not to scale)


Standard Pot - Control
540
200
360
450
1080
Pot A
620
with roof
entrance
200
360
450
540
520
1080


Pot B
620
entrance
without roof
64
200
450
360
540
520
1080
Pot C
540
entrance
with roof
64
200
450
360
1080

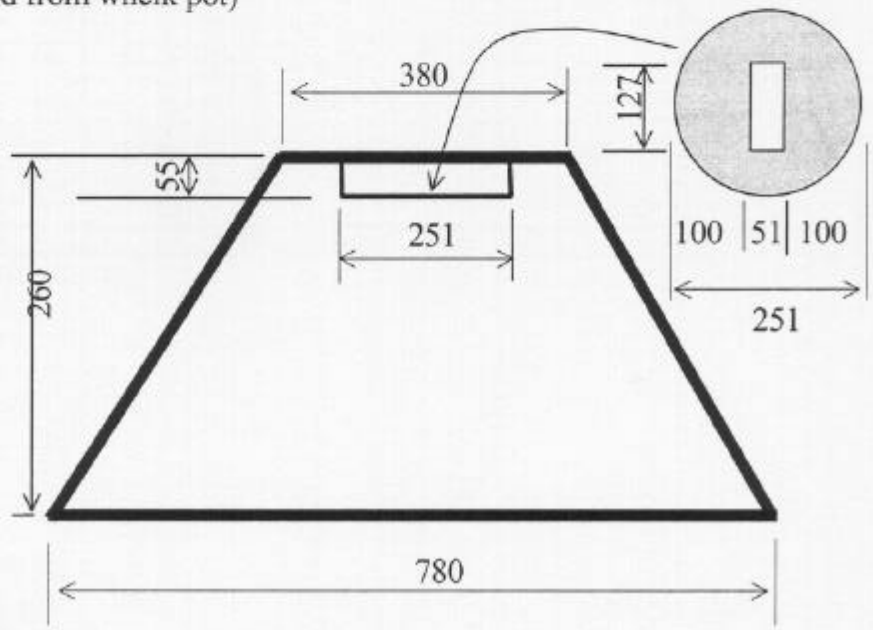

Pot D
540
with roof
Plastic strip with
six 64 x 127 mm slots
200
140
64
450
360
1080
Pot E
540
500
with roof
entrance
64
200
450
360
520
1080

Pot F



Pot G

(modified from whelk pot)



APPENDIX II

DATA FROM SEA TRIALS

Modified Rock Crab Pot Sea Trials - Newtown 29/9 - 8/10/2000 **Skipper: John Boland**

Date		Rock Crab						Lobster					
Deploy	Group#	Control		Pot B		Pot E		Control		Pot B		Pot E	
Retrieval		Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal	Legal	Sublegal
29/09/00 12:30 13:30 (same day)	1	5	8	7	13	8	3	0	0	0	0	0	0
	2	0	0	7	16	9	22	1	0	0	0	0	0
	3	0	0	4	17	5	13	1	0	0	0	0	0
	4	2	24	6	13	9	26	0	0	0	0	0	0
	5	1	13	4	16	3	9	0	0	0	0	0	0
30/09/00 13:30 8:00 (next day)	1	20	28	24	30	26	10	0	0	0	0	0	0
	2	0	1	14	14	16	21	1	0	0	0	0	0
	3	3	6	4	9	6	16	0	0	0	0	0	0
	4	0	0	6	17	3	21	0	1	0	0	0	0
	5	4	11	2	24	3	17	0	0	0	0	0	0
01/10/00 8:00 8:00 (next day)	1	2	8	14	19	2	33	0	0	0	0	0	0
	2	8	12	12	17	8	22	0	0	0	0	0	0
	3	0	0	6	36	4	27	1	0	0	0	0	0
	4	6	16	8	21	4	14	0	0	0	0	0	0
	5	0	1	3	8	3	9	0	1	0	0	0	0
02/10/00 8:00 17:00 (next day)	1	0	4	15	7	17	1	0	0	0	0	0	0
	2	0	0	15	7	19	2	0	1	0	0	0	0
	3	20	11	17	7	19	3	0	0	0	0	0	0
	4	0	1	12	6	20	1	1	0	0	0	0	0
	5	2	6	9	3	17	0	0	0	0	0	0	0
03/10/00 17:00 8:00 (next day)	1	4	9	2	7	3	13	0	0	0	0	0	0
	2	15	6	4	3	6	1	0	0	0	0	0	0
	3	6	17	10	12	5	21	0	0	0	0	0	0
	4	0	1	12	6	13	5	0	1	0	0	0	0
	5	2	3	8	9	10	17	0	0	0	0	0	0
04/10/00 8:00 8:00 (next day)	1	2	8	7	9	6	1	0	0	0	0	0	0
	2	0	0	4	2	9	11	0	1	0	0	0	0
	3	7	6	5	7	4	3	0	0	0	0	0	0
	4	11	17	4	9	5	21	0	0	0	0	0	0
	5	2	1	0	7	3	6	0	0	0	0	0	0
05/10/00 8:00 8:00 (next day)	1	1	12	1	6	0	2	0	0	0	0	0	0
	2	3	9	3	5	2	7	0	0	0	0	0	0
	3	12	7	3	9	0	1	0	0	0	0	0	0
	4	3	2	2	1	6	0	0	0	0	0	0	0
	5	4	3	6	7	8	11	0	0	0	0	0	0
06/10/00 8:00 8:00 (next day)	1	5	4	2	12	1	17	0	0	0	0	0	0
	2	2	3	6	9	4	7	0	0	0	0	0	0
	3	1	6	2	4	0	3	0	0	0	0	0	0
	4	7	1	4	2	6	7	0	0	0	0	0	0
	5	10	3	5	9	7	4	0	0	0	0	0	0
07/10/00 8:00 8:00 (next day)	1	2	9	3	11	5	14	0	0	0	0	0	0
	2	6	1	2	4	2	6	0	0	0	0	0	0
	3	2	3	8	7	4	6	0	0	0	0	0	0
	4	6	3	1	3	0	9	0	0	0	0	0	0
	5	3	7	9	14	10	15	0	0	0	0	0	0
08/10/00 8:00 8:00 (next day)	1	8	3	2	11	1	13	0	0	0	0	0	0
	2	3	6	3	7	4	3	0	0	0	0	0	0
	3	3	6	9	7	8	15	0	0	0	0	0	0
	4	2	3	3	6	8	4	0	0	0	0	0	0
	5	6	3	5	8	7	4	0	0	0	0	0	0
	Total	211	312	324	513	348	517	5	5	0	0	0	0
	Average	4.2	6.2	6.5	10.3	7.0	10.3	0.1	0.1	0.0	0.0	0.0	0.0

Modified Rock Crab Pot Sea Trials - Foxtrap 11/10- 29/10/2000

Skipper: William Porter

Date Time	Soaking Duration (hours)	Group No.	Rock Crab										Lobster									
			Control		Pot B		Pot E		Pot F		Pot G		Control		Pot B		Pot E		Pot F		Pot G	
			Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub	Legal	Sub
11/10/00 13:00	23	1	2	4	7	11	1	3	12	7			1	0	0	0	0	3	0	0		
		2	18	8	9	13	13	13	17	13			0	0	0	0	0	0	0	0		
		3	18	11	21	15	19	16	11	12			1	0	0	0	0	0	0	0		
		4	0	4	2	3	3	7	0	6			1	0	0	0	0	0	0	0		
		5	2	5	3	25	1	14	2	3			1	2	0	0	0	0	0	0		
13/10/00 11:00	46	1	17	22	11	3	17	13	22	3			1	0	0	0	0	0	0	0		
		2	27	8	7	11	14	8	22	6			0	0	0	0	0	0	0	0		
		3	14	13	13	9	21	20	23	4			1	0	0	0	0	0	0	0		
		4	1	1	2	3	1	1	0	8			1	0	0	1	1	1	0	0		
		5	1	5	0	13	0	77	0	2			0	3	0	1	0	0	0	0		
15/10/00 8:00	45	1	11	4	7	1	18	4	23	5			0	0	0	0	0	0	0	0		
		2	49	22	11	3	10	2	29	5			0	0	0	0	0	0	0	0		
		3	28	15	8	6	31	20	14	7			0	0	1	0	0	0	0	0		
		4	4	2	1	0	2	1	1	2			1	1	2	1	2	1	0	0		
		5	3	2	5	5	2	4	7	4			0	3	0	0	1	0	0	0		
17/10/00 10:00	50	1	22	11	3	1	20	0	26	6			0	0	0	0	0	0	0	0		
		2	47	10	11	4	15	10	36	2			0	0	0	0	0	0	0	0		
		3	42	16	21	9	48	19	32	5			0	0	0	0	0	0	0	0		
		4	15	7	2	2	0	1	1	13			1	1	0	0	1	1	0	0		
		5	4	2	9	9	2	9	1	2			0	1	1	0	0	1	0	0		
19/10/00 8:30	45	1			16	11	9	6	22	8	15	7			0	0	0	2	0	0	0	1
		2			11	14	16	12	19	3	23	9			0	0	0	1	0	0	0	1
		3			17	13	10	14	14	8	33	15			0	0	3	0	0	0	0	0
		4			13	7	7	3	9	2	5	6			0	0	2	1	0	0	0	0
		5			14	9	6	12	15	7	6	4			0	0	1	1	0	0	0	0
21/10/00 9:00	51	1			5	2	12	2	33	1	46	7			0	0	1	1	0	0	0	0
		2			10	9	17	3	22	3	31	7			0	0	0	1	0	0	0	0
		3			15	2	54	3	31	2	37	7			0	0	0	0	0	0	0	0
		4			1	0	3	2	3	2	29	5			1	0	0	0	0	0	0	2
		5			14	3	9	3	6	1	12	8			1	3	0	0	0	0	0	0
22/10/00 8:00	23	1			27	16	19	8	12	5	41	18			0	2	1	0	0	0	0	0
		2			9	6	17	11	21	7	32	17			0	2	0	0	0	0	0	0
		3			16	14	14	11	37	13	36	17			0	0	1	2	0	0	0	0
		4			10	9	4	3	11	6	7	5			1	0	0	2	0	0	0	1
		5			6	4	4	7	10	5	17	8			0	2	1	1	0	0	0	0
24/10/00 7:00	47	1			9	1	15	7	24	9	44	14			0	0	0	0	0	0	0	0
		2			11	4	13	5	18	7	19	9			0	0	0	0	0	0	0	1
		3			16	8	37	14	15	6	19	19			0	0	0	0	0	0	0	0
		4			6	4	5	4	6	1	10	7			0	0	1	0	0	0	0	0
		5			1	3	8	8	3	1	4	4			0	0	0	0	1	0	0	0
25/10/00 7:00	24	1			12	9	8	5	38	17	32	14			1	0	0	2	0	0	0	0
		2			9	5	7	4	27	3	16	11			0	0	0	0	0	0	0	1
		3			12	10	48	18	14	2	21	13			0	1	0	0	0	0	0	0
		4			2	3	0	2	9	5	7	3			1	0	0	0	0	0	0	1
		5			3	0	2	4	13	2	5	1			1	0	2	0	0	0	0	0
26/10/00 7:00	24	1			10	6	11	6	19	9	9	5			0	0	0	0	0	0	0	0
		2			16	2	12	3	16	6	13	5			0	0	0	0	0	0	0	0
		3			13	5	14	12	12	8	12	11			0	0	0	0	0	0	0	0
		4			1	1	5	5	5	1	4	6			0	0	0	0	0	0	0	0
		5			5	3	13	21	3	40	1	3			0	1	0	1	0	0	0	1
27/10/00 9:00	26	1			1	1	6	6	10	3	8	5			0	0	0	0	0	0	0	0
		2			4	5	16	4	8	3	3	10			0	0	0	0	0	0	0	0
		3			9	7	8	13	9	5	6	9			0	0	0	0	0	0	0	0
		4			0	5	1	2	0	3	0	2			0	0	0	1	0	0	1	0
		5			2	7	1	14	1	10	0	3			0	0	0	0	0	0	0	0
28/10/00 9:00	24	1			17	10	7	5	18	9	14	8			0	0	1	0	0	0	0	0
		2			10	16	15	8	23	2	21	11			0	0	0	1	0	0	0	0
		3			16	11	9	13	17	4	28	14			0	0	0	1	0	0	0	0
		4			12	5	8	2	9	1	6	4			0	1	0	2	0	0	0	0
		5			13	7	12	11	9	2	7	6			0	0	0	0	0	0	0	1
29/10/00 7:00	22	1			14	9	8	5	23	6	19	8			0	1	1	0	0	0	0	0
		2			18	11	14	7	9	2	29	13			0	0	1	1	0	0	0	0
		3			12	10	18	8	11	4	15	8			0	0	0	1	0	0	0	0
		4			9	8	11	6	9	2	4	6			0	1	0	0	0	0	0	0
		5			10	5	6	4	7	5	7	6			0	0	0	0	0	0	0	0
		Total	325	173	612	439	779	570	931	368	606	376	9	11	10	17	21	29	1	0	1	10
		# pots	20	20	65	65	65	65	65	65	45	45	20	20	65	65	65	65	65	65	45	45
		Avg	16.3	8.7	9.4	6.8	12.0	8.8	14.3	5.7	17.9	8.4	0.45	0.55	0.15	0.26	0.32	0.45	0.02	0.00	0.02	0.22

Note: Group 1, 2, & 3 were set on rock crab grounds dominated by sand and kelp bottom on the east of Foxtrap wharf
Group 4 & 5 were set on lobster grounds dominated by rocky bottom on the west of Foxtrap wharf
Legal - legal size; Sub - sublegal size