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## SURVIVAL OF DISCARDED NEPHROPS

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### ABSTRACT

Survival of discarded Nephrops norvegicus was estimated during research vessel cruises in the North and Irish Seas. Following capture from 30 min-1 h trawl hauls and 1 h on deck, survival averaged 71-85%. After 24 h in seawater tanks the undamaged and least damaged survived well. Overall 42% of the Nephrops in the North Sea experiment and 75% in the Irish Sea experiment survived capture, sorting and 24 h storage. The higher survival in the Irish Sea may have been due to smoother sea conditions and to the use of a side trawler, which is considered to result in less damage to catches than does the use of a stern trawler as in the North Sea experiment. As there was little difference in survival rates between Nephrops sorted from the codend and those from the cover, survival rates of Nephrops escaping selectively from the codend on the sea bed would certainly be no less than those estimated for discards on deck.

### INTRODUCTION

Discarding of undersized or unmarketable Nephrops norvegicus occurs in the Nephrops fisheries of the ICES area. Yield assessments of Nephrops stocks should include estimates of the proportion of the catch discarded and the survival of discards. The 1980 meeting of the ICES Nephrops Working Group was able to take account of discard rates and survival in its assessments (ICES, 1980). However, the Group felt that further research on discard survival was necessary.

French trials on the survival of discards in cages on the sea bed showed that body damage and exposure on deck critically affect survival (Gueguen and Charuau, 1975). Similar experiments in Scotland compared the survival of trawl and creel caught Nephrops (ICES, 1979). During

recent MAFF research vessel cruises in the North Sea and Irish Sea the opportunity was taken to estimate discard survival.

## METHODS

### North Sea

RV CORELLA fished with a Boris 'prawn' trawl with a 50 mm codend off the Northumberland coast of England in November 1979. From each of five separate short (30 min or 1 h) hauls samples of 100 small Nephrops (carapace length < 30 mm) were selected randomly after being left for 1 h exposed on deck among the catch and by-catch, at an air temperature of 8-9°C. All the Nephrops were subjected to a sorting procedure similar to that used in the English commercial Nephrops fishery.

Each Nephrops was then classified as dead or alive, the living Nephrops being further classified into damaged (appendages missing, carapace crushed, etc) or undamaged (no visible damage). The living Nephrops were then held in perforated plastic trays in a deck-tank supplied with running sea water at a temperature of 10°C. Survival was assessed after 24 h.

### Irish Sea

The experiments in the Irish Sea in April 1980 were carried out in a similar way from RV CLIONE. A Boris 'prawn' trawl with a 75 mm mesh codend covered with a 16 mm mesh cover was used and samples of small (< 30 mm carapace length) Nephrops were selected from hauls lasting 1 h. They were taken from either the codend or cover after exposure on deck for 1 h at air temperatures ranging from 8 to 15°C. They were then sorted and classified: (a) no damage apparent (b) one chela missing (c) two chelae missing (d) body damage (e) dead. A maximum of 25 Nephrops from each of the categories (a) to (d) were kept for 24 h in perforated plastic trays in seawater tanks at a temperature of 8°C.

## RESULTS

### North Sea

Nearly a third of the Nephrops were found to be dead when sorted after 1 h on deck (Table 1). A further third were damaged but alive and the rest undamaged. Following 24 h in sea water, 70% of the undamaged Nephrops were still alive, but only 45% of the damaged survived. Overall 42% of the Nephrops survived capture, sorting and storage for 24 h.

### Irish Sea

On average 15% of the Nephrops were found to be dead when sorted after 1 h on deck, 22% were damaged and 62% apparently undamaged (Table 2). Following 24 h in sea water, 93% of the undamaged Nephrops were still alive, 88% of those with one chela missing, 62% of those with two chelae missing, and 53% of those sustaining body damage. At the end of the experiments 75% were still alive following capture, sorting and storage for 24 h. There did not appear to be any difference in damage or survival between those Nephrops sorted from the codend and those which had passed through the codend mesh and were sampled from the cover.

### DISCUSSION

The results show that, following capture and sorting, at least two-thirds of the Nephrops were still alive. Following 24 h in sea water further deaths occurred. However, the condition of the surviving animals appeared excellent and a high survival rate upon return to the sea could be expected.

As expected the survival rate of Nephrops depended upon the degree of damage caused during capture and sorting. From the Irish Sea experiment it could be seen that the survival of Nephrops was quite high (93%) if they were undamaged, and got progressively worse as one then two claws were lost, and was lowest (53%) when body damage occurred.

There was a considerable difference between the overall survival rates from the two series of experiments. The survival rate from the Irish Sea series was considerably high at 75% than that from the North Sea series (42%), despite a longer average haul duration and higher average air temperatures - factors which would be expected to reduce survival. Sea conditions were rougher during the North Sea experiments and this might have resulted in some additional damage during hauling and in the deck tanks. The average total catch weights from the two series were similar (260 kg in the North Sea and 312 kg (including cover catch) in the Irish Sea). The explanation for this difference in survival rates may lie in the different trawling methods used aboard the two different vessels. RV CORELLA is a stern trawler and RV CLIONE a side trawler. It is generally accepted that fish needed for tagging survive best from a side trawler, having been less damaged during capture and hauling aboard. This also appears to apply to the capture of Nephrops.

Although these experiments are not fully representative of commercial practice the survival rates found for various categories of damage could be applied to the commercial fishery if estimates of damage rates are obtained from fishing vessels. It is interesting to note that in the Irish Sea series there appeared to be no difference in survival rates between Nephrops sorted from the codend and those from the cover. This suggests that those Nephrops escaping selectively from the codend on the sea bed would certainly have survival rates no less than those estimated for discards on deck.

#### REFERENCES

- GUEGUEN, J. and CHARUAU, A., 1975. Essai de détermination du taux de survie des langoustines hors taille rejetées lors des opérations de pêche commerciale. ICES CM 1975/K:12, 3-3 pp. (mimeo).
- ICES, 1979. Report of the working group on assessment of Nephrops stocks. ICES CM 1979/K:2, 71 pp. (mimeo).
- ICES, 1980. Report of the Nephrops work group. ICES CM 1980/K:2 (mimeo).

Table 1 Damage and survival of Nephrops after 1 h on deck (air temperature 8-9°C) and after 24 h in seawater tanks (water temperature 10°C) during North Sea cruise of RV CORELLA

Experiment	Duration of haul (min)	Sample size	<u>Nephrops</u> examined after 1 h			% survival after 24 h of those alive after 1 h		% survival following capture, sorting and 24 h in tanks
			% Dead	% Alive				
				Damaged	Undamaged			
1	30	100	23	24	53	38	75	49
2	30	100	9	53	38	34	74	46
3	30	100	44	30	26	33	54	24
4	60	100	33	24	43	63	79	49
5	60	100	35	36	29	56	69	40
Average			29	33	38	45	70	42

Table 2 Damage and survival of Nephrops following 1 h on deck and 24 h in seawater tanks (water temperature 8°C) from 1 h hauls during Irish Sea cruise of RV CLIONE

Experiment	Air temp (°C)	Sample size	<u>Nephrops</u> examined after 1 h					% survival after 24 h of those alive after 1 h				% survival following capture, sorting and 24 h in tanks
			% Dead	% Alive				Body damage	2 chelae missing	1 chela missing	Undamaged	
				Body damage	2 chelae missing	1 chela missing	Undamaged					
1 (codend)	15	81	25	2	0	11	62	100	-	78	92	68
2 "	8	171	8	6	6	14	65	45	50	92	96	82
1 (cover)	15	177	17	3	1	14	64	17	50	92	92	73
2 "	8	213	8	11	5	14	62	54	80	83	92	78
3 "	10	151	16	4	4	19	58	50	67	93	92	75
Average			15	5	3	14	62	53	62	88	93	75