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Commercial Vessel *M/V Heather Sprig* (BCK 181)

Charter Cruise 0398H (EC FAIR Contract on Fish Damage and Survival)

REPORT

22-25 July (Pre-charter preparation period)

26 July - 22 August 1998 (Main charter work period with *Heather Sprig*)

24 August - 6 September (Post-charter experiment monitoring and termination periods)

Personnel

G I Sangster	HSO (in charge)	shore based with diving team (22 July - 6 September)
F G O'Neill	HSO	shore based with diving team (22-26 July, 4-22 August)
R J Kynoch	SO	shore based with diving team (22 July - 4 September)
M Breen	SO	shore based with diving team (22 July - 6 September)
N Graham	SO	shore based with diving team (22 July - 6 September)
D J Bova	SO	shore based with diving team (22 July - 6 August)
S J McKay	ASO	shore based (22-26 July, 24 August - 6 September)
P J Barkel	PTO	on board (26 July - 22 August)
D Wileman	(DIFTA)	shore based (25 July - 1 August and 16-22 August)
M Andersen	(DIFTA)	on board (part time)
U J Hansen	(DIFTA)	on board (part time)
R R Harris	(DIFTA/Leic Univ)	shore based (31 July - 15 August)
M Carmo Santos	(DIFTA/Univ Sao Paulo)	shore based (31 July - 15 August)
A V Soldal	(IMR, Bergen)	shore based (part time) (26 July - 15 August)
O Cruickshank	(IMR, Bergen)	shore based (part time)
L Nottestad	(IMR, Bergen)	shore based (15 August - 6 September)
M Ulmestrand	(SEIMR, Sweden)	shore based (31 July - 15 August)
H Halbäck	(SEIMR, Sweden)	shore based (22 July - 6 August)
M Farrington	(New England Aquarium)	visitor, shore based (1-22 August)
Dr C D Park	(Nat Fish Res Inst, Korea)	visitor, on board (part time) (13-20 August)
Dr R S T Ferro	PSO	shore based (13-14 August)
Dr A Revell	(Grimsby College)	visitor, based with diving team (10-14 August)

Out-turn days to project : 26 days - C544

Objectives

1. To assess the damage to, and survival rates of haddock and whiting after escaping from a typical 500 HP hopper trawl with respect to length, age, trawling duration (*viz* one, two and three hours) and "cover exposure" duration (ie the time the fish are subjected to swimming activity inside the small mesh cover after cod-end escape).
2. To measure the selectivity characteristics of the "test" cod-end using hoop-supported covers.

Narrative

FRS and Swedish staff travelled to Gairloch on 22 July to catch "control" category haddock and whiting for the survival experiment, using handlines with barbless hooks. Fish in perfect condition, after being held in keep bins at 10 m depth for 24 hours, were transferred into three control cages set out on a seabed site near Longa Island. This underwater site contained 21, 35 m³ cages which had been erected by the FRS diving team during the period 29 June to 9 July (see separate Field Work Report).

Other participants travelled from Dyce Airport to Gairloch on 25 July. The Danish and Norwegian teams prepared the trawl gear and rigged the acoustic release system for detaching the cod-end cover during trawling.

MV Heather Sprig arrived at Gairloch (from Buckie) on 26 July when the trawl gear and instrumentation were set up. Direct observations and filming were conducted between Gairloch harbour and Longa Island between 27 and 30 July. Selectivity hauls were also conducted during this period while damage to the fish transport container was repaired at Gairloch.

The *Heather Sprig* and a locally hired vessel (*MV Salar*) then worked on a daily basis between Gairloch harbour, Longa Island site and the Inner Sound/North Minch fishing grounds providing haddock and whiting for a) the survival/damage experiments; and b) selectivity data for the "test" cod-end. The *Heather Sprig* carried out the trawling work and the *Salar* towed the fish container as well as acting as the diving safety tender.

Using acoustically operated systems to close the cover and to release it from the cod-end, cover sampling time could be controlled and its effect on survival assessed, together with haul duration. Depth metres were used to monitor fishing depth during the tow and rate of ascent of the cover after release. Separate hauls allowed the collection of trawled "control" fish in the small mesh cover with an open cod-end.

On 21 August, the fish container was raised from the sea bed on to the stern of *Heather Sprig* and put ashore at Gairloch Harbour. *MV Heather Sprig* was off-loaded on 21 August and sailed for Buckie the following day.

During the period 24 August to 4 September, the FRS diving team and support staff terminated all cage experiments. All haddock and whiting survivors were collected into a small mesh cover and taken to the shore laboratory for further investigation. All fish cages were then raised. The raft was towed into the inner harbour at high water and dismantled during the next low tide. The shore base was cleared by 3 September. Personnel returned to Aberdeen on 4 September and all equipment returned during the period 7-11 September.

Results

The mean trawling depth on the Inner Sound fishing grounds was 112 m. At that depth, the dimensions of the trawl gear measured by Scanmar instrumentation using 390 m of warp aft were 56.5 m door spread, 14.6 m wingend spread and 7.3 m headline height.

The collection of fish for the survival experiment was not possible due to bad weather on 10 of the 26 days. However, some cod-end selectivity work was possible on four of these days. The loss of so many days in the survival work resulted in the cancellation of the two hour haul duration (intermediate category). However, some two hour tows were included in the selectivity work. A total of 38 hauls were carried out, 13 of which were rejected due to net damage, fasteners, acoustic release problems and bad weather. Selectivity estimates for haddock and whiting will be obtained from 12 valid hauls when the data are fully analysed. Preliminary estimates of L50 for haddock are 27.4 cm (S.Range 6.8 m) and 28.6 cm (S.Range 4.6 cm) for towing durations of two and three hours respectively.

Ten valid survival hauls allowed 10 cages to be filled with haddock and whiting. The following categories were used: one hour tow with 15 minute cover sampling duration; three hour tow with 15 minute cover sampling duration; three hour tow with 30 minute cover sampling duration; open cod-end "controls" with 15 minute cover sampling duration. Once a cage experiment commenced, the FRS diving team monitored its progress daily and offered food to the fish. The survival of the different groups of haddock and whiting escapees was measured over a period of eight days. The experiment was monitored by FRS divers after the end of the vessel charter. They continued to feed the fish and remove dead individuals. Post mortems were carried out on all dead fish. At the termination of each fish cage experiment, a random sample of 20 haddock survivors were given post mortem examinations. The results of these examinations will be used to determine whether any fatal injuries had been sustained during the captive process or while in captivity. The results will also provide condition parameters for each fish which will be compared with relevant control samples to assess whether the fish were subject to chronic captive stress

Video film of the trawl, including the release of the cover from the cod-end was obtained during three direct observation hauls. Video film was also taken during the cover's transfer into the container and at the survival cage site.

The data from this EU Project will be analysed by the participating Institutes from UK, Denmark, Norway and Sweden according to the tasks laid down in the agreed EU Contract Work plan.

G I Sangster
28 October 1998