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Commercial Vesel M/V *Solstice* (BF 56)

Charter Cruise 9209H (EC project jointly funded by SOAFD and DIFTA)

REPORT

Part I 12-25 July 1992; Part II 2-15 August 1992

Personnel

Part I		Part II	
G I Sangster	HSO (in charge)	G I Sangster (in charge)	shore based
J Main	SSO	K Lehmann (DIFTA)	on board
R J Kynoch	SO	ROV technician (DIFTA)	on board
N S Collie	PTO	J Main	shore based
		R J Kynoch	shore based
		N S Collie	shore based
		A O Coroon (craftsman)	shore based
		C W Shand (HSO) 11-14 August	shore based

Objectives

Part I To carry out a survey to find a suitable working site for the EC project on fish survival after escaping from cod-ends. The survey was to involve; trawling for the required species (SOAFD's interest - haddock, whiting and cod - DIFTA's interest - saithe and cod) and hand-lining in the same area for "control" fish of the same species (these are fish which had not passed through and escaped from a trawl). Furthermore, the survey was also to include a SCUBA diving underwater search, close to each trawling area, to find a suitable site for erecting fish holding cages.

Part II To assess the survival of commercial species of fish (haddock, whiting, saithe and cod) escaping from bottom trawl cod-ends as used by the 500/600 hp Scottish fleet. The survival of triplicated groups of fish were to be measured by retaining them in 25 m^3 cages on the sea bed after they had escaped through the cod-end meshes during trawling. Furthermore, the selectivity characteristics of each test cod-end (90 mm, 100 mm and 110 mm diamond mesh and 120 meshes round the circumference including those in the selvedges) were to be measured using 35 mm mesh ringed covers during the same period and on the same population.

Narrative

Part I The trawling and diving equipment were transported to Macduff harbour on 8 July. The scientific staff travelled by minibus to join the ship at Macduff on 12 July. The trawling and diving gear were immediately prepared and loaded on board the vessel. M/V *Solstice* sailed from Macduff at 2130 the same day. Bad weather ruled out trawling around the Orkney Islands and the ship made a passage for the North Minch grounds around Kinlochbervie. Trawling, hand-lining and underwater surveys continued uninterrupted from 13 to 24 July in the North Minch, Summer Isles, Inner Sound, Small Isles and Outer Hebrides. The vessel berthed at Gairloch harbour on 25 July when the crew and scientific staff returned home by minibus.

Results

The areas surveyed during Part I are listed below showing the availability of the trawl and hand-line caught fish and the underwater survey information.

Area	Trawl species	Hand-line species	Cage site suitability
Kinlochbervie	Haddock, whiting, saithe and cod	Nil	Too exposed and deep
Handa Island	Haddock and whiting	Mackerel and saithe	Sheltered behind island, otherwise area exposed, deep with strong tides
Stoer Point	Haddock, whiting, saithe and cod	Mackerel	No sheltered sites, static gears in diving depths
Rhu Coigach	Whiting	Mackerel and saithe	No sheltered sites found; hard ground inshore
Summer Isles	Whiting and saithe	Mackerel and saithe	Static gears in diving depths
Gruinard Area	Whiting and mackerel	Mackerel and saithe	No suitable cage sites; static gear in abundance

Area	Trawl species	Hand-line species	Cage site suitability
Greenstone to Loch Ewe area	Whiting, saithe and pout	Mackerel and saithe	Hard ground in diving depths; very exposed
Rhubh Rhe	Haddock, whiting, saithe and dogs	Mackerel and saithe	Hard ground in diving depths; also exposed
Longa Island to Torridon	Haddock, whiting, saithe and codling	Haddock, whiting and saithe	Good sheltered site at south east of Longa Island
Inner Sound Area	Whiting	Mackerel	Too deep and exposed
Staffin Is/Rhu Hunish	Haddock, whiting and saithe	Haddock, whiting and saithe	Sheltered site behind Staffin Is otherwise exposed with strong tide
Trodday/Uig	Haddock, whiting	Haddock	Too deep inshore with hard ground and tide
Loch Dunvegan	Whiting, dogs and pout	Nil	Strong tides and static gears inshore
Lochmaddy and North Uist	Haddock, whiting, dogs and pout	Mackerel and horse mackerel	Too deep inshore for cages; also static gear
Rodel/Scalpay	Whiting, dogs, pout and horse mackerel	Mackerel and saithe	Sites too exposed and deep; static gear

Some of the areas investigated were good for trawling, but totally unsuitable for hand-lining and diving activity involving small support inflatable craft and the Laboratory's M/V *Stella*. For example, the Kinlochbervie area provided good trawl caught fish but the inshore waters were so exposed to weather that the area was ruled out as far as handline fishing and cage erection were concerned. Similarly, the area around Staffin Island in northern Skye was ideal for the required trawl-caught and hand-line caught species. However, with the absence of a local jetty or pier to partially erect and load the sea cages and diving equipment onboard the vessels, the logistics of operating daily from Portree pier (30 km distance) or Uig pier (25 km distance around the exposed northern headland of Skye) ruled out this area. The region finally chosen was from Rhubha Rhe to Red Point working daily from the new pier at Gairloch harbour where the cages would be partially erected ashore, lifted by harbour crane on to M/V *Stella* and transported in 45 minutes to a sheltered sea bed site at Longa Island for final erection by divers in 20 m depth. The estimated distance for transporting fish at depth by *Stella* from the trawling areas to the cage site was not expected to exceed 10 km.

Narrative

Part II DIFTA staff loaded and prepared their equipment aboard M/V *Solstice* at Gairloch, including the towed underwater vehicle "FOCUS 300" and were ready for operation on 4 August. The SOAFD diving team meanwhile, had set up a shore base at Gairloch harbour, prepared *Stella* for the cage transferring operation and set up 12 25 m^3 cages on the sea bed at Longa Island in approximately 20 m depth of water. Hand-lining for the "control" fish continued when diving operations had ceased each day. These fish were kept in large plastic bins overnight at approximately 15 m depth. Only those fish seeming in visually perfect condition were introduced into the three sea bed cages designated for controls. A minimum of 30 control fish of each species (haddock and whiting) were transferred to these cages. Mackerel was caught in abundance during hand-lining but the saithe and small codling previously available during Part I had "taken off". DIFTA staff on board *Solstice* carried out direct observation of the covered test cod-ends using FOCUS 300 and collected selectivity data on the 90, 100, 110 mm diamond mesh cod-ends to obtain L50 figures for both haddock and whiting. To collect the cod-end escaped fish from each mesh size, divers disconnected the small mesh cover from the cod-end. The whole cover and its fish contents were then transferred at 20 m depth to a towed container (2 m dia x 4.5 m in length). The complete cover was gently inserted into the cylindrical container, secured and tensioned fore and aft so that the hooped cover also remained cylindrical. The rear door of the container was closed allowing the fish to swim in a flow-free environment. *Stella* towed the container at a constant depth of 20 m to the underwater cage site at an average speed of 1 m/s. Divers then transferred the fish from the cover to the cages (using zipped access openings in the cage netting) on arrival at the Longa Island site. Once the survival experiment commenced, divers made daily visits to the cages to monitor mortality, remove dead fish and to offer all the caged fish food in the form of chopped sandeels and sprats.

The experiment will continue to be monitored on a twice weekly basis after the conclusion of the fishing vessel charter, with SOAFD diving staff travelling to the cage site from Aberdeen. The fishing vessel charter finished at Gairloch on 15 August when all participants returned to Aberdeen.

The results of the SOAFD part of the EC project on fish survival will be prepared for the coordinator before submission to Brussels in November. Preliminary results will be presented in a separate "Field work" report on the termination of this experiment in late September/October.

G I Sangster
9 November 1992