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FRV Clupea

Cruise 2/86

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REPORT

29 January - 18 February 1986

Personel

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Objectives

To observe the reactions of fish to trawls in "darkness".

Narrative

During the day of 29 January, "Clupea" was loaded and a new 500 m length of TV vehicle towing cable was connected to the slip rings and wound on to the winch. "Clupea" sailed at midnight for Scapa Flow. The TV vehicle was made ready while at anchor during the morning and, with an easterly gale blowing, permission was obtained from Orkney harbour to tow the vehicle in the north part of Scapa towards Stromness. These tests showed that the new 34 mm diameter cable was too thick for the spooling mechanism to keep up during hauling; a manual spooling guide was devised and operated well. "Clupea" berthed overnight in Stromness. Easterly gales persisted and the first tow was made in Hoy Sound to retry the spooling system. When this was satisfactory, observations were made in the mouth area of the black and white trawl starting at 1830 in Hoy Sound on 31 January. Although fish were scarce and productivity of observations was low, hauls were recorded in the afternoon and the evening of February 1 and 2 and one on the 3rd despite continuing easterly, southeasterly and north easterly gales. In the last haul continuity in the motor supply cables within the towing cable was lost.

During the half landing in Stromness, a replacement cable was delivered to Scrabster. "Clupea" sailed for Scrabster at 0700 on 5 February and fitted the cable onto the winch during the morning. A spare cable was also taken onboard and in a strong north easterly gale "Clupea" returned to Stromness where this cable was stored ashore.

On 6 February the weather had eased and "Clupea" sailed 15 miles west to Stormy Bank where an afternoon and evening tow were successfully observed and flash photographic survey of fish reactions made. With an overnight stop at Stromness and prospects of good weather, "Clupea" sailed early for the east side of Orkney and 3 tows were made on the 7th at Copinsay.

Many more fish were seen on this tow and a flash survey was made comparing reactions of fish during day and night. "Clupea" tied up at Kirkwall for the night. On 8 February with little or no wind, observations were recorded by flash photography of the port sweep and its effect on fish reaction during daylight and darkness. The night light level was found slightly brighter than on previous nights although cloudy (there were reports of a very bright Aurora Borealis having been seen in the clearer south of England). On 9 February, although the weather was workable, the day was not productive due to various vehicle faults. The wind from the SE had strengthened by the 10th and a heavy swell at Copinsay made the vehicle handling impossible and observation was abandoned. The haul landing was at Kirkwall on 11 February.

On 12 February with a fierce southerly gale the vehicle was towed in the shelter of Inganess Bay allowing various adjustments. With too much wind to observe a trawl tow, and with a forecast of the wind going south east, "Clupea" stayed overnight in Kirkwall and sailed during the morning for the west side. Strong south east winds limited work again to the two tows in the lee of Hoy and a photographic flash survey was made in the area between the sweeps of the trawl before and after dark. On 14 February this was repeated but the dark haul was abandoned early due to strengthening south easterly gales and a blizzard. On the 15th, with a continuing south easterly gale and poor weather prospects, together with a new vehicle cable fault, "Clupea" remained in Stromness and with warnings of gales going north east plans were agreed to attempt to reach Buckie by taking the 6 am tide through the Pentland Firth on 16 February arriving Buckie at 1500. A series of light and turbidity profiles was made on stations off Cromarty on 17 February returning to Buckie at 1500.

Results

Flash photographs were made both before and after dark at known ambient light levels in the mouth area of the trawl, over the port sweep and in the area between the sweeps.

The surface light level was measured before and after each observed haul. The light level at the sea bed was measured directly during the daytime by lowering a light meter to the seabed while recording an attenuation profile. At night this profile was checked by measuring the light levels at different depths generated by a ship's floodlight beamed over the side above the lowered light meter. This attenuation was then applied to the night surface measurement to estimate the sea bed light level. During the survey light levels less than 10^{-7} lux were found after 1900.

Bioluminescence was detected at low levels but not in sufficient levels to make turbulent water visible. About 1000 flash photographs were taken and have been developed and fish reactions recorded in day and night light levels analysed.

The photographs provide the best evidence yet that visual stimuli provide the main responses of fish in the mouth area of the trawl. Orientation reaction appears to cease in those photographs taken at light levels lower than 10^{-7} lux.

C S Wardle
2 February 1987

Seen in draft: George Calder