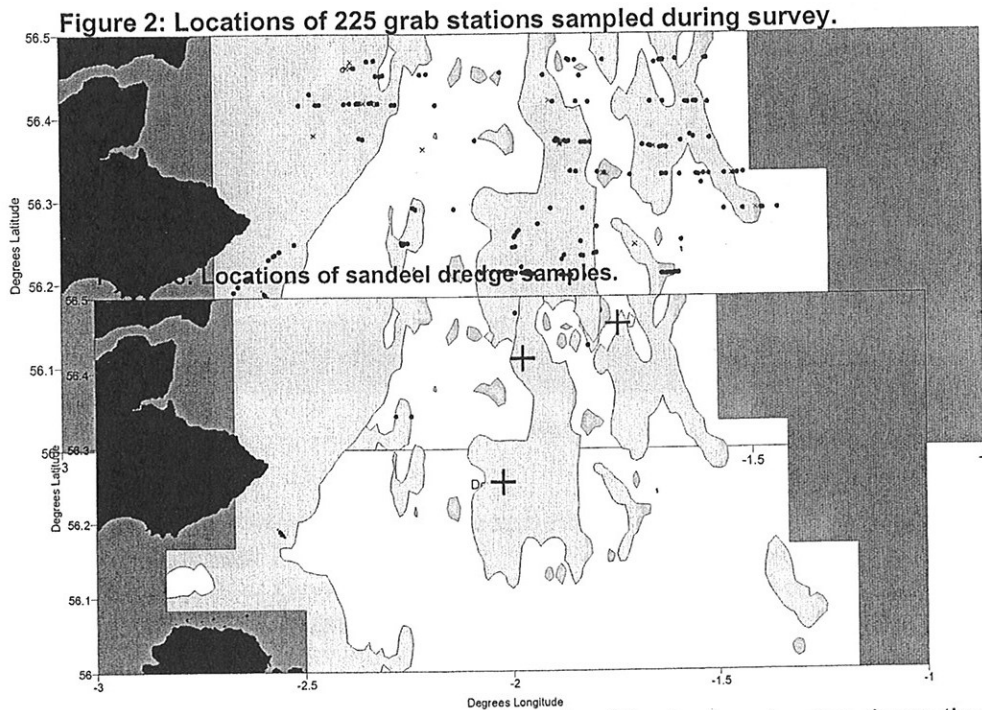


providing a total catch of 406 sandeels. All sandeels caught were measured (to the half centimetre below) and weighed (to the nearest 0.1 g). Otoliths were removed from all fish to enable age determination back in the laboratory.

At three locations the modified sandeel dredge was deployed to collect sufficient sandeels for more accurate estimation of population age and length composition (Fig. 3). At each location

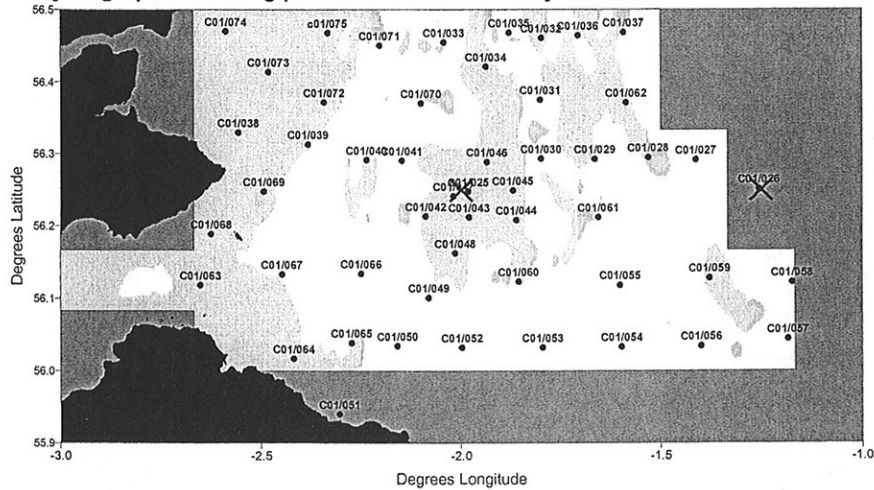


the dredge was towed twice along the seabed for 10 minutes, towing down the line in both directions. A Scanmar depth unit was attached to the dredge so that the precise time of touch-down on to, and lift-off from, the seabed could be determined. The total number of sandeels in each of the six catches was counted and a sub-sample from each was measured to the half-centimetre below. Five sandeels from each half-centimetre size class were weighed to determine length-weight relationships. Otoliths were removed from these fish to establish age-length keys.

The CTD and flurometer were deployed so as to obtain as even coverage across the study area as possible. Generally, the CTD was deployed at convenient grab stations, but in some areas, particularly in the southern part of the study area where few grab stations were located, it was necessary to steam to particular locations specifically to collect CTD data (Fig. 3). Figure 3 also shows where the two hydrographic moorings were laid in the main study area and includes the

CTD dips made when these moorings were being deployed (see above). One CTD dip was made whilst at anchor off Pease Bay to the south of the main study area.

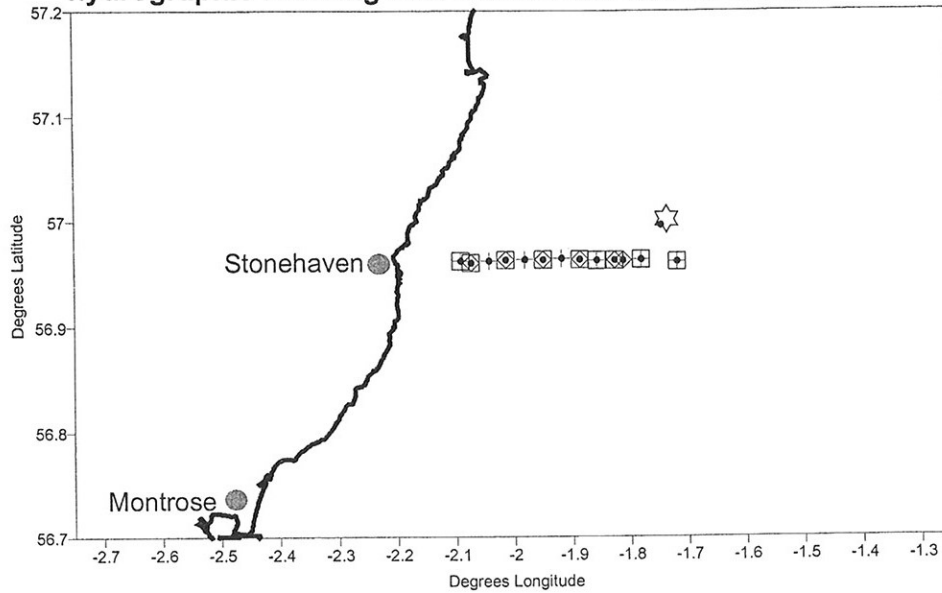
Figure 4: Locations of CTD/fluometry stations (circles) in the main study area. Hydrographic mooring positions are indicated by crosses.



During the course of the nocturnal grab, dredge and CTD survey work, *Clupea* spent the daylight hours at anchor: off St Andrews on 10 March, Pease Bay on 11 March, St Abbs on 12 March, Anstruther on 13 March and Carnoustie on 14 March. This work was completed by 2200 hours on 14 March whereupon *Clupea* sailed for Montrose, arriving at 2400 hours. At 0900 hours on 15 March most of the heavy scientific equipment was unloaded and the third spar buoy was loaded once again. John Dunn and Sarah Hughes rejoined the vessel.

At 1130 hours *Clupea* sailed to lay the third hydrographic mooring off Stonehaven and to complete hydrographic sampling along the Stonehaven transect (Fig. 5). *Clupea* arrived on station at 1400 hours and laying of the hydrographic mooring (star) was completed by 1500 hours. A CTD dip was made close to the mooring to collect calibration data. *Clupea* then steamed west along the Stonehaven hydrographic transect, making CTD dips and collecting 10 m surface water column hose samples for phytoplankton analysis, at each of the 13 stations sampled (dots). At nine stations a dual Bongo net was deployed to collect zooplankton samples (squares). At six stations a water sample was collected using Van Doorn bottles at 10 m depth to collect salinity and chlorophyll CTD calibration samples (diamonds). At seven stations water samples were collected using Van Doorn bottles at the water surface and close to the seabed for silicate, nutrients, salinity, and chlorophyll analysis (crosses).

Figure 5. Stonehaven transect: CTD, phytoplankton, nutrients, silicates and chlorophyll sampling. Position of Stonehaven hydrographic mooring also shown. See text for details.



Work on the Stonehaven transect was completed by 1745 hours, whereupon *Clupea* sailed for Fraserburgh, arriving at 2300 hours. The remainder of the scientific equipment was off-loaded and scientists left the vessel by 1045 hours on 16 March.

S P R Greenstreet
26 April 2001

Seen in draft: A Simpson, OIC