

In confidence: Not to be quoted without ref. to the Laboratory.

R1/6

CRUISE REPORT

F.R.V. "CLUPEA"

May 27th - June 29th, 1968

Location: Minch

- Objectives:
- a) Loch Eil survey.
 - b) Haddock and whiting survival experiments.
 - c) Physiological observations of plaice and haddock.

Narrative:

The sailing of "Clupea" from Buckie was delayed for a time due to a fault in one of the engine room electrical control panels. The ship sailed on May 29th and, having completed the Loch Eil survey on May 31st, arrived in Stornoway on June 1st where she was joined by the scientific staff on June 3rd.

Exploratory trawl hauls were made in Broad Bay and in the Minch to the South of Stornoway. Haddock of a size suitable for the work to be undertaken and in a suitable depth were very scarce in both places but it was decided that the area off the mouth of Loch Grimshader was the more promising as fish were a little more plentiful there and the steaming time to Loch Grimshader from Stornoway was only half an hour as against the two and a half hours it took to reach Broad Bay. Accordingly the two 18' cages were set up in Loch Grimshader in 60' of water on June 4th.

The scarcity of fish meant that many dives had to be made each day in order to build up the populations of fish in the cages to an acceptable level but eventually four groups of haddock were collected that had been treated in the following ways:

- a) Tagged at surface - transferred to sea bed cage.
- b) Taken to surface, handled but not tagged - transferred to cage.
- c) Tagged on sea bed - transferred to cage.
- d) Handled on sea bed but not tagged - transferred to cage.

All these fish were trawl caught in depths of 25 - 30 fathoms.

Daily counts of the fish in the cages were made to obtain estimates of survival over a period of time.

On the evening of June 12th there was a small fire in the galley of "Clupea". It was promptly extinguished but the ship was out of action for the whole of the next day and, as the crew went off for their 'long weekend' on June 14th it was not until June 18th that trawling could be started again. The scientific staff remained in Stornoway for this period and continued the work successfully by running to Loch Grimshader from Stornoway each day in the rubber boat.

The last trawl hauls were made on June 20th - work being confined to observations after that date. During the last two working days the caged haddock were released (the untagged ones having been first tagged in situ) and the cages were lifted. The ship left Stornoway on the afternoon of June 25th, the scientific staff returning to Aberdeen the following day.

Methods:

The survival experiments were the last of a series designed to estimate

the degree of initial tagging mortality of haddock captured by trawl and seine and tagged in the normal way and to compare the survival of these fish with that of groups of fish treated in the various ways listed above.

Fish taken to the surface were stored on deck in plastic tanks and were taken down to the cages in polythene bags by divers. The groups of fish that were at no time taken to the surface were obtained by divers detaching the trawl codend at a depth of 70' after which it was towed slowly by the rubber boat a distance of 100 yards or so to the cages. The codend used here was modified in that it was built round three galvanised steel rings, 18" in diameter, so that it formed a cage both when being towed and when hanging freely in midwater. Perhaps because of the design of this codend all the haddock caught were in excellent condition as far as could be judged by their superficial appearance.

Results: a) Survival experiments.

The table shows the survival of the various groups of fish expressed as numbers of fish alive on successive days following their introduction into the cages. These results confirm previous indications that tagging itself is not the main factor that causes an initial high mortality but that factors occurring during capture, raising to the surface and handling on deck are chiefly responsible for this mortality. The results are interesting in that the survival of the surface tagged fish on this occasion was considerably higher than on the previous trips. Two possible causes of this may be put forward. The first is that, as already mentioned, the fish were of high quality and the second is that during the duration of the trip there was no ground swell at the cages. This allowed the fish to rest on the bottom undisturbed immediately after their introduction into the cages.

Table 1
Numbers alive on successive days after introduction.

	Nos introduced.	Day													
		1	2	3	4	5	6	7	8	9	10	11	12		
Surface tagged	18	16	16	?	?	14	12	11	X	released					
Surface tagged	16	15	12	6	5	5	4	4	4	4	4	4	X	released	
Surface untagged	3	3	3	3	3	3	2	2	2	2	2	2	2	X	tagged & released.
Surface untagged	17	11	9	6	6	6	6	X	tagged and released.						
Bottom tagged	19	18	18	18	18	18	18	X	released.						
Bottom untagged	8	7	6	6	5	5	5	5	5	5	5	5	4	X	tagged & released.
Bottom untagged	11	?	?	10	9	9	X	tagged and released.							

At the end of the trip 58 tagged haddock and 7 tagged plaice were released. The tags used throughout the trip were the orange flag tags on braided nylon thread.

b) Physiological work.

Serial blood samples of individual plaice were collected so that the changes in lactate, glucose and haematocrit following capture and tank and cage adaptation could be followed. I¹³⁵ labelled human serum albumen was injected to measure the state of contraction of the capillaries in the muscle at different times following trawling.

The results of the serial sampling so far measured have confirmed findings previously obtained by killing relatively large numbers of fish at various periods following capture. The capillaries in the muscle were

apparently closed more than in long term tank-adapted fish. This suggests a shutdown of circulation and explains the lack of lactate in the blood of plaice during the first 24 hours after capture.

General:

Loch Grimshader proved to be a suitable site for work of this nature, deep water being found very close to high cliffs that provided shelter from most winds. Due to the prevalence of westerly winds no working days were lost because of weather conditions.

The rocks adjacent to the cages abounded in fish life and the opportunity was taken to get more practice in the use of the underwater cameras, both colour and black and white film being used. The species seen were cod, whiting, ling, saithe, pollack, Trisopterus minutus, ballan, cuckoo and goldsinny wrasse, plaice, dab, Squalus acanthias and Callionymus lyra. At times towards the end of the trip large shoals of gadoids about 1" in length which could not be identified with any certainty were observed round the cages.

Coloured photographs showing the methods employed during the survival experiments were taken for demonstration purposes.

John Hislop
8th July, 1968