

Foto: Terje van der Meer



When cod spawn

Every December and January, sexually mature Northeast Arctic cod migrate from the Barents Sea to their spawning grounds between Finnmark and western Norway. The most important of these grounds are in Lofoten and Vesterålen.

BY BEATE HODDEVIK SUNNSET

In Lofoten, the cod spawn in the transition layer between the cold water brought by the Norwegian Coastal Current and the deeper, warmer water of the Atlantic Current. The temperature in this transition zone is 4–6 °C, and spawning takes place at depths of anywhere between 50 and 200 m. When the wind blows from the northeast in Lofoten and the Vestfjord, the transition layer is pressed down along the western side of the fjord and the cod spawn at greater depths and well offshore. When the wind is from the southwest, on the other hand, the transition layer is raised up and the fish spawn at a shallower depth and close to shore.

The ocean off the Lofoten archipelago is characterised by huge eddies, in which a large proportion of the cod eggs, and later on, the larvae, may remain for several weeks before they are carried north by the current. This period is probably

particularly advantageous during the first stages of food intake, since their prey, the earliest stages of various copepods, are concentrated in these eddies together with the cod larvae. Eddies also form on the banks off Vesterålen, but not all areas retain the larvae and other forms of plankton for such long periods of time.

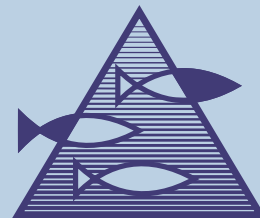
MULTIPLE SPAWNING SESSIONS

During the spawning process itself the females spend most of the time at the edge of the spawning grounds, while the males wait in the centre. Each female releases between 15 and 20 portions of eggs at intervals of about three days. When a female is ready to spawn, she swims in to meet the males. The spawning act itself is a highly tuned affair, with fixed rules for courting, followed by belly-to-belly swimming for a few seconds while the eggs and milt are released simultaneously. The number of cod eggs in the sea is highest at the beginning of April, although the first individuals begin to spawn as early as mid-March, while the last are finished in May. Each female may release anything from half a million to 15 million eggs, depending on her age and size. Each egg is around 1.5 mm in diameter.

RAPID DEVELOPMENT

If fertilisation is successful, the egg develops from one to many cells in the course of a few hours. The clump of cells gradually changes shape. In the course of a few days it will have developed into an embryo with eyes, and we can gradually see that there is a tiny fish larva inside the egg. How long this process takes is dependent on the temperature of the sea. When it is around





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RESEARCH GROUP

Recruitment biology and behaviour
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When cod spawn



5 °C the larva will be ready to hatch in about 20 days. Hatching is triggered by the release of an enzyme that weakens the membrane surrounding the egg.

In many cases, by the time the egg reaches hatching time, it will have been transported far from the spawning grounds by the current. In the course of a few days, the new-born larva will have to find out how to catch its food, while avoiding being eaten itself by bigger fish, krill or jellyfish. After only a week, its yolk-sac (its “lunch-box”) has been used up, and the larva will need to hunt for its own food. If nature is kind to the larvae, hatching will be synchron-

ised with maximum plankton production, so that they have plenty of food easily available.

METAMORPHOSIS

The larvae gradually begin to look more like tiny fish and they soon undergo a metamorphosis in the course of which they turn into fry. This takes place when the larvae are about 15 mm long or 45 days old, once again depending on sea temperature. Metamorphosis involves the development of normal fins, while the spinal cord, stomach and mouth all develop into what we can recognise in adult fish.

The ‘travelling’ from the spawning grounds to the Barents Sea takes several months, and the fry do not arrive there until sometime in the autumn. By that time they are nearly 10 cm long and are starting to stay close to the bottom of the sea. They remain in the Barents Sea for six to eight years before they migrate back to the sea off Lofoten as fully adult fish, where they spawn in their turn.

The egg has been successfully fertilised, and development has reached the eight-celled stage.



The egg is almost ready to hatch, and we can clearly see the larva inside it.



An approximately five-day-old cod larva. Photo: Anders Thorsen

