Title: Egg development rates of Gadoid fish in Norwegian waters

Study Programme: Fishery Biology, Aquaculture

Type of study: Field and laboratory experimentation

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Richard D.M. Nash IMR web page: http://www.imr.no/om_havforskningsinstituttet/ansatte/n/richard_nash/en

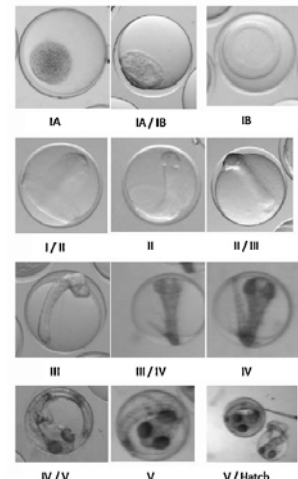**Saithe (*Pollachius virens*)**   **Norway pout (*Trisopterus esmarkii*)**   **Temperature gradient incubation block**

IMR, *RV GO Sars*   **Egg development stages**

Project description:

The time it takes for a fish egg to develop from fertilisation to hatching is dependent on the ambient water temperature, the species and probably the stock or sub-stock. The development of fish eggs can be classified in to stages, the most generally accepted stage schedule for many north European fish species covers five to six stages (IA, IB, II, III, IV and V). Each of these stages takes a specific time to develop and therefore has a stage duration. The consequence is that eggs captured in the field and identified to stage can then be aged. These data can then be used to estimate the egg production from a fish stock and so provide a fishery independent method of estimating spawning stock biomass. In addition egg development rates are very important for drift modelling studies as the eggs are only present in the water column for a finite period of time, whilst they develop.

The egg development rates of many of the gadoids (e.g. cod, haddock and bib) have been estimated, however, we are uncertain if the development rates from stocks which do not occur along the Norwegian coast are applicable to the local stocks. In addition there are few data if any at all on species such as Norway pout, saithe, poor cod or pollack, let alone many of the other non-commercial species such as the rocklings. The aim of the project is to build up a comprehensive set of temperature dependent development rate relationships for the local species and test whether these rates are significantly different from relationships estimated for other stocks.

The project will consist of using artificially spawned and fertilised eggs run through a temperature gradient to assess the development times. The experiments will be conducted both at sea and in the laboratory and thus provide 'at-sea' (on one of the IMR research vessels) and land based laboratory experimentation.

Skills to be acquired during Masters work: Field experience, laboratory experimental design with live animals, animal husbandry, statistics.

Background knowledge: Basic fish biology

Further information: will require a sea medical certificate, ability to work at sea would be an advantage. Experimentation required to occur between January and April.

References:

Fox, C.J., Geffen, A.J., Blyth, R. & Nash, R.D.M. 2003. Temperature dependent development rates of plaice (*Pleuronectes platessa* L.) eggs from the Irish Sea. *Journal of Plankton Research* **25**: 1319-1329.

Geffen, A.J., Fox, C.J. & Nash, R.D.M. 2006. Temperature dependent development rates of cod (*Gadus morhua* L.) eggs. *Journal of Fish Biology* **69:** 1060-1080.

Geffen, A.J. & Nash, R.D.M. 2012. Egg development rates for use in egg production methods (EPMs) and beyond. *Fisheries Research* **117-118**: 48-62.