

Snake pipefish (*Entelurus aequoreus*) intrusion as a new species into the Barents Sea ecosystem.

Magnus Reeve, Erik Olsen and Leif Nøttestad.

The snake pipefish *Entelurus aequoreus* is a member of the *Syngnathidae* family. The open water species is distributed in the eastern Atlantic, from the Azores to Iceland and Norway, including the Baltic Sea. Concentrations of snake pipefish were observed for the first time in the Barents Sea in August–October 2005, after which both their distribution area and average density have increased substantially in 2006. The area inhabited by these fish increased three-fold from 2005 to 2006, using data from pelagic trawling. The density in these areas rose from an average of 2.4 to 9.3 caught fish per nautical mile of trawling. However, using trawl data to measure abundance may not be the most adequate method due to little knowledge of the behavioural patterns of this fish species. Snake pipefish have historically usually been associated with warmer temperate waters, so it is interesting to note that the increase in numbers may coincide with exceptionally high sea surface temperatures for that time of year. We plan to investigate this relationship in further detail with collection of relevant data in 2007.

Keywords: Snake pipefish; distribution pattern; Barents Sea; climate change.

Contact author: Magnus Reeve: Institute of Marine Research, P.O.Box 1870, 5817 Bergen, Norway [Tel: +4794244904, e-mail: mre055@student.uib.no]

Snake pipefish *Entelurus aequoreus* (Linnaeus 1758) are members of the *Syngnathidae* family. They are a pelagic or oceanic species that are distributed in the eastern Atlantic from the Azores to Iceland and Norway, including the Baltic Sea (Beare D et al. 2006). A study by Beare D et al. (2006) has shown that snake pipefish in waters around Britain and in the northeast Atlantic were rare in the years prior to 2002 but have increased greatly since. Further studies have also shown the snake pipefish abundance and distribution to increase annually in regions such as the northeast Atlantic (Kirby R et al. 2006; Lindley JA et al. 2006) and Icelandic waters (Astthorson OS and Palsson J 2006). These increases have been noted to coincide with increases in sea surface temperatures for these areas (Kirby R et al. 2006).

The autumn ecosystem survey in the Barents Sea is a joint survey carried out between Norway and Russia. It is aimed at the monitoring and research of the Barents Sea ecosystem and is the largest survey in the region. Since 2003, pipefish have been observed on this survey and for each year their distribution and abundance into the Barents Sea has been mapped. In subsequent years both their area distribution and average density increased substantially, shown by a three-fold increase in area inhabited by these fish and density in these areas rising from an average of 2.4 caught fish per nautical mile trawling to 9.3. This project will be a combination of the past years data with that collected on this autumn's 2007 survey to see if the distribution and abundance has continued to rise.

Kirby et al. (2006) suggest that increases in *Entelurus aequoreus* numbers in the north-eastern Atlantic are a result of changes in the surface sea temperatures linked to global warming. Here they propose that the change in temperatures may affect pipefish physiological processes such as reproduction and growth rates which in turn result in a higher recruitment. This agrees with the data collected on the Barents Sea survey as the increasing numbers found so far in the region coincide with exceptionally high sea surface temperatures for that time of year. It has also been suggested by Cindy JG et al. (2006) that the changes in pipefish community in the north-eastern Atlantic may be a result of increasing temperatures affecting the presence and abundance of Calanoids that may be preyed upon by the pipefish. Another theory by Kloppmann MHF and Ulleweit J (2007) is that the increase in numbers off the west of the British isles has come due to the shape of pipefish enabling them to evade capture by trawling, thus leading to increasing numbers in the oceanic population. Changes have not only been seen in the pipefish community but also in the presence of many other fish species (Astthorson OS and Palsson J 2006; Beare D et al. 2004). The relationship between pipefish

population and sea surface temperatures in the Barents Sea will be further analysed with the collection of this years 2007 data.

Consideration will be given into whether the use of trawl data is the most adequate method for analysis due to little being known about the behavioural patterns of this fish species. Also, pipefish have a long thin morphology and this may influence their catchability in trawls, thus causing an underestimation of their numbers (Beare D et al. 2006).

References.

Astthorsson OS, Palsson J (2006) New fish records and records of rare southern species in Icelandic waters in the warm period 1996-2005. ICES C.M. Papers, C:20

Beare D, Burns F, Greig A, Jones EG, Peach K, Kienzle M, McKenzie E, Reid DG (2004) Long-term increases in prevalence of North Sea fishes having southern biogeographic affinities. Mar Ecol Prog Ser 284: 269-278.

Beare D, Harris MP, Toresen R, Nøttestad L, Kloppmann M, Dorner H, Peach K, Rushton DRA, Foster-Smith J, Wanless S (2006) A major increase in snake pipefish (*Entelurus aequoreus*) in northern European seas since 2003: potential implications for seabird breeding success. Marine Biology 151(3): 973-983.

Cindy JG, Couperus AS (2006) Mass occurrence of snake pipefish: result of change in climate? ICES C.M. Papers, C:17

Kirby RR, Johns DG, Lindley JA (2006) Fathers in hot water: rising sea temperatures and a northeastern Atlantic pipefish baby boom. Biology letters 2(4): 597-600.

Kloppmann MHF, Ulleweit J (2007) Off-shelf distribution of pelagic snake pipefish, *Entelurus aequoreus* (Linnaeus, 1758), west of the British Isles. Marine Biology 151:271-275.

Lindley JA, Kirby RR, Johns DG, Reid PC (2006) Exceptional abundance of the snake pipefish (*Entelurus aequoreus*) in the north-eastern Atlantic ocean. ICES C.M. Papers, C:06.