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Spawning of Greenland Halibut in East Greenland Waters

by

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Abstract

Spawning Greenland halibut was observed during two joint Norwegian-Greenland surveys in East Greenland waters. During a gillnet survey conducted in 1995 at Kap Bille Bank (62°05 N) and Fylkir Bank (62°40 N) several females were reported to be spawning at 1 200-1 400 m depths. During a longline survey at Kap Bille Bank (62°14 N) in August 2000 one running female and two running males were observed. Greenland halibut have not been reported to spawn in this area before. The spawning female observed in 2000 had oocytes diameter in the range , and the oocytes were floating freely in the ovary, and were floating out on the measuring board when the ovary was opened.

Keywords: Greenland halibut – spawning – East Greenland – maturity.

Introduction

Greenland halibut (*Reinhardtius hippoglossoides*) in East Greenland, Iceland and Faeroe Island are treated as a separate management unit in the ICES management system. It has recently been referred to as the West Nordic Stock of Greenland halibut. This management unit is assumed to originate from a common stock with spawning grounds southwest of Iceland. Little has been known about the reproduction biology of this management unit. With respect to maturation and spawning the information is sparse. Surveys in East Greenland waters indicate that females are maturing or mature during late summer. Spawning is observed west of Iceland in March (Magnusson 1977). It has, however, been questioned whether there may occur spawning also in other areas of the distribution area of this management unit. This paper describes observations of spawning of Greenland halibut in East Greenland waters, an area where spawning not has been reported so far.

Material and Methods

A gillnet survey targeting for Greenland halibut was conducted in August 1995 using nets of 200, 220 and 240mm mesh size. The survey was conducted in ICES Division XIVb, at the southern part of the Kap Bille Bank (62°05'N) and at Fylkir Banke (62°40N). Fishing depth was 800-1400m. 589 females and 24 males were matured. 5 stages were used: immature, mature, spawning (running), spent and uncertain.

In august 2000 a longline survey targeting for Greenland halibut and Roughead grenadier (*Macrourus berglax*) was conducted in ICES Division XIVb, at the northern part of the Kap Bille Bank (62°14 N, in the period18th August to 28th August, and at Heimlands Ridge (64°00 N) between 29th August and 3rd September. In the southern location fishing was mainly conducted at depths 1200-1400m. Further north fishing depth was 400-1 000 m.

At Kap Bille Banke 1203 females were determined for sex and maturity. At Heimland Ridge 68 females were determined for sex and maturity. In 2000 a new maturity scale was used on the Greenland halibut females, compared to the scale used in 1995. The scale is slightly revised from Nielsen & Boje (1995). The new classification comprised 7 maturity stages; immature, early maturing, maturing, late maturing, spawning, spent and uncertain (whether spawning has occurred or if the fish is as immature). In 2000 ovaries were fixated on 3.6 buffered formaldehyde. Oocytes diameter was measured in the laboratory shortly after the survey, using physiological saline water. Males were classified based on the same maturity scaled used in 1995.

Results and Discussion

1995 Survey

63 females were classified as running during 1995. In addition observations were made of running females when fish were gutted for production on board. Spawning was observed at to locations; at Kap Bille Bank (62º03-62º07N, 40º06-40º13W) and at Fylkir Bank (62º39N, 40º34W).

2000 Survey

Of the 1 203 Greenland halibut (1 129 females) analysed at Kap Bille Banke, 1 female and 2 males were running at the time of sampling. The female was 81cm and 7.30 kg. Due to the running stage gonad weight was not possible to register. Oocytes were hydrated and floated freely in the ovary. When the ovary walls were cut, oocytes floated out on the measuring board. Oocyte diameter was found to be in the range 3.40-5.04mm (measured in a binocular) after preservation in 3.6 % buffered formaldehyde.

At Heimland Ridge no spawning females or males were observed in the catches. However, a female caught at 63°55 N and 36°20 W had hydrated oocytes in the anterior part of one of the lobes. The rest of the ovary was in a recovery stage and classified as maturing. The large hydrated oocytes are most probably residual oocytes that were not spawned in the last spawning. They are commonly observed in the gonad channels after spawning.

The observations made during the survey in 1995 and 2000 indicated spawning to occur at the grounds of Kap Bille Banke and Fylkir Banke. However, only few individuals were observed. Nevertheless, spawning did occur during the time of the surveys. When the females were gutted the oocytes were floating freely in the ovary, and the entire ovary was filled with ripe oocytes. In both years ripe males were observed in the catches at the same time. The possibilities of separate spawning in East Greenland waters throws new light on the reproductive biology of the species, as it may indicate that there may be several spawning entities in the management unit. Spawning is earlier described to occur southwest of Iceland (Magnusson 1977). The definition of this management unit is partly based on the assumption that Greenland halibut in all areas originate from a common stock with spawning grounds in this area.

Information on reproductive biology and potential is of major importance for the management considerations of the stock, and improvements in this respect will progress the management considerations. Information on the maturity status of the stock is basic input values estimating the SSB whereas estimates of egg production are important links between the SSB and forthcoming recruitment, which again is basic in predictions of the stock. Knowledge about spawning entities gives the fundament for knowledge about general reproductive capacity, and further on nursery grounds for the juveniles.

The presented observations indicate the need of separate spawning investigations in the area. As spawning females tend to have a lower feeding rate than maturing specimen gillnets are recommended as sampling gear. Gillnets show high selectivity for large Greenland halibut (Boje *et al*. 1997; Huse *et al*. 1999), corresponding to mature females.

Experiences made during the gillnet survey conducted in 1995 confirm that gillnets meshed 200 – 240 mm are usable in the present area and will sample potential spawners.

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