

## First Record of Greenland Halibut (*Reinhardtius hippoglossoides*) in the Beaufort Sea (Arctic Ocean)

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**ABSTRACT.** Eleven Greenland halibut (*Reinhardtius hippoglossoides*) were captured in two longline sets in the offshore waters (71°45'N, 127°08'W) of Sachs Harbour, Banks Island, Northwest Territories. This is the first record of Greenland halibut in the Beaufort Sea and Arctic Ocean. The Greenland halibut were captured in the Atlantic water layer of the Beaufort Sea at a depth of approximately 430 m, with a temperature of 0.3°C and salinity of 34.8‰.

**Key words:** first record, Greenland halibut, *Reinhardtius hippoglossoides*, Atlantic water mass, Beaufort Sea, Arctic Ocean

**RÉSUMÉ.** On a capturé onze flétans du Groenland (*Reinhardtius hippoglossoides*) dans deux jeux de palangres placés dans les eaux au large (par 71°45' de latit. N. et 127°08' de longit. O.) de Sachs Harbour, dans l'île Banks située dans les Territoires du Nord-Ouest. C'est la première fois que l'on enregistre la présence du flétan du Groenland dans la mer de Beaufort et l'océan Arctique. Les flétans du Groenland ont été pris dans la couche d'eau de l'Atlantique de la mer de Beaufort à une profondeur d'environ 430 m, avec une température de 0,3°C et une salinité de 34,8 p. mille.

**Mots clés:** premier relevé, flétan du Groenland, *Reinhardtius hippoglossoides*, masse d'eau de l'Atlantique, mer de Beaufort, océan Atlantique

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Eleven Greenland halibut (*Reinhardtius hippoglossoides*) were captured from the offshore waters of Banks Island, Northwest Territories, during a winter exploratory groundfish survey. The objectives of the exploratory survey were to investigate the presence or absence of commercial groundfish species in the offshore waters of Banks Island during the ice-on period, and to provide recommendations to the Inuvialuit Fisheries Joint Management Committee as to the potential for a winter fishery such as currently exists in Cumberland Sound (Crawford, 1992; Pike, 1994).

Greenland halibut, a deep water flatfish in the family Pleuronectidae, is commercially harvested in both the Atlantic and Pacific Oceans, under the name Greenland turbot. It is easily distinguished from other pleuronectids by the dark colour of its blind (left) side (Hart, 1973) and by its straight lateral line (Scott and Scott, 1988). In addition, its left eye is located on the dorsal margin of its head instead of having migrated fully to the right side as in other pleuronectids (Atkinson et al., 1982).

Greenland halibut has previously been described as having an amphiboreal distribution (Andriyashev, 1954; Hubbs and Wilimovsky, 1964; Atkinson et al., 1982; Alton et al., 1988; Crawford, 1992), being present in both the Atlantic and Pacific Oceans but unknown in the intervening Arctic Ocean. Hubbs and Wilimovsky (1964) suggested that this species may have occurred in the Arctic Ocean during the last

interglacial or postglacial hypsithermal period, when Arctic waters were warmer.

Greenland halibut from the Pacific and Atlantic Oceans were considered to be two separate species (Andriyashev, 1954), but Hubbs and Wilimovsky (1964) concluded on the basis of morphometric and meristic characteristics that they were one species. Later Fairbairn (1981), using biochemical genetic techniques, found genetic divergence at the subspecific level between Greenland halibut from the Northwest Atlantic and those from the Bering Sea.

In the Pacific Ocean, Greenland halibut is found universally from Japan north to the Chukchi Peninsula (Federov, 1971), with species abundance centered in the eastern Bering Sea and in the Aleutian Islands (Alton et al., 1988). In the western Pacific it occurs in the Okhotsk Sea (Andriyashev, 1954; Novikov, 1960; Shuntnov, 1965) but is rare in the Japan Sea (Novikov, 1960). Greenland halibut have been captured as far north as Norton Sound, Alaska (Alton et al., 1988), and occasionally as far south as off the coast of British Columbia (Westheim and Pletcher, 1966), California (Best, 1963; Schott, 1966), and Baja California, Mexico (Hubbs and Wilimovsky, 1964).

In the Atlantic Ocean, Bowering and Chumakov (1989) report Greenland halibut as being continuously distributed from Davis Strait south to the northern slopes of the Newfoundland Grand Banks. They are found as far north as Smith

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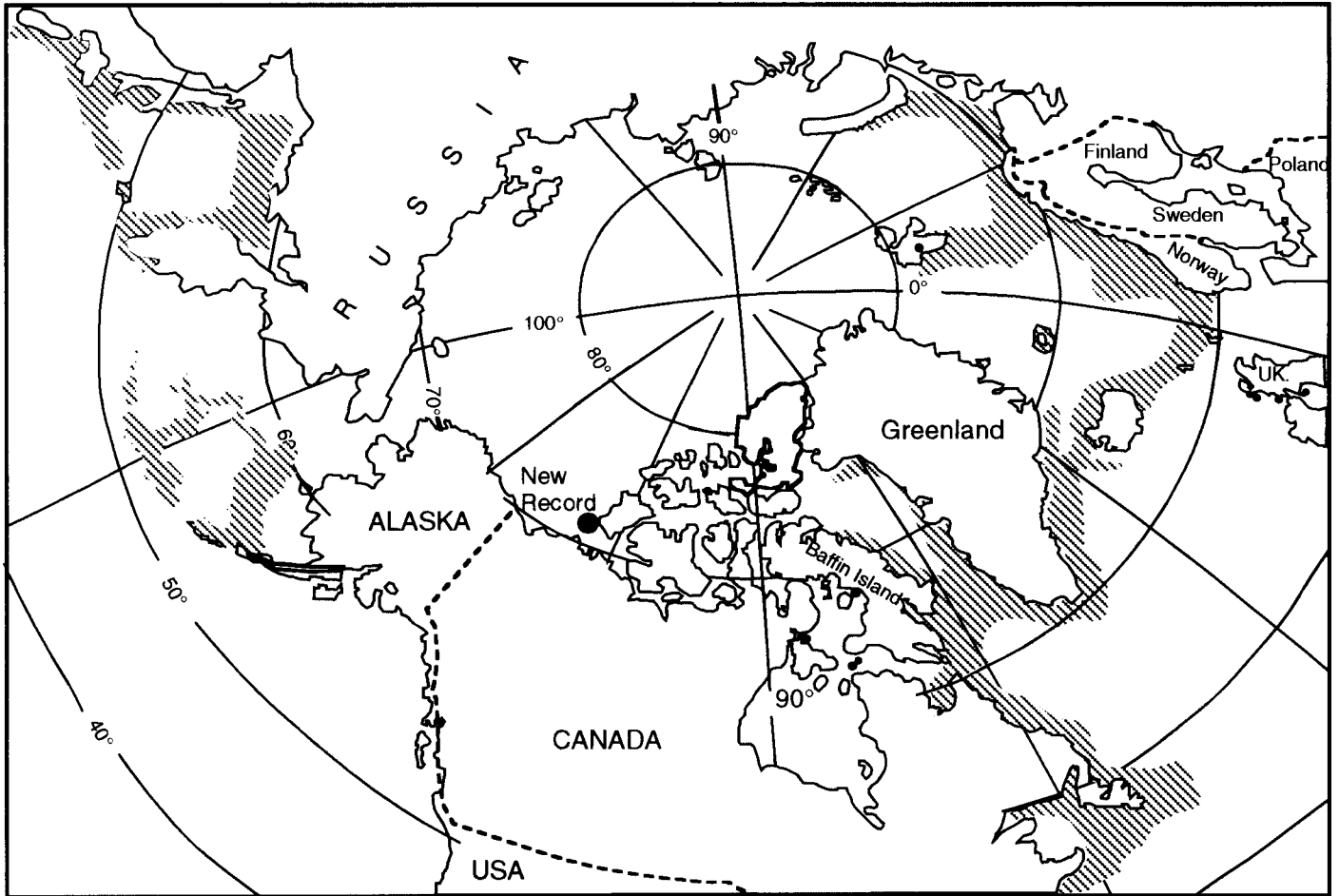


FIG. 1. Geographical distribution including new record of Greenland halibut, *Reinhardtius hippoglossoides*. (Modified from Alton et al., 1988.)

Sound (Templeman, 1973), are abundant during the winter months in Cumberland Sound, Baffin Island, Northwest Territories (Crawford, 1992), and are occasionally abundant in the fjords of east and west Greenland (Smidt, 1969). Additionally they are present in Hudson Strait and Ungava Bay (Dunbar and Hildebrand, 1952). Greenland halibut have been captured as far south as the Gulf of Maine during a period of low water temperatures (Boyar, 1964). They are widely distributed in the Gulf of St. Lawrence (Bowering, 1982) to the edge of the Scotian Shelf (Templeman, 1973), but are rare in the Bay of Fundy (Barrett, 1968). To the east they are captured off Iceland (Sigurdson, 1981) and in the eastern Norwegian and Barents Seas (Andriyashev, 1954).

In March 1993, two longline sets were made to a depth of approximately 430 m in the Beaufort Sea. The two sets were made through drifting pack ice, offshore of Sachs Harbour, Banks Island (Fig. 1). Each set consisted of 99 baited circle hooks fished along the bottom. Bottom substrate was mud, as evidenced by dirty baits and mud along the line itself. The first set was made on March 11, at 71°45'54"N, 127°09'26.5"W and retrieved on March 12 (after 17 hrs and 45 min) at 71°45'48"N and 127°08'19"W. Eight Greenland halibut were captured. The line was rebaited, set, and retrieved 24 hours later (March 13) at 71°45'21.5"N and 127°05'59"W. Three Greenland halibut were captured from

this second set. Five of the Greenland halibut have been deposited with the Canadian Museum of Nature in Ottawa, Canada. Three fish from longline set one are catalogued under NMC 93-0117 and two fish from set two are catalogued under NMC 93-0118.

The station was reoccupied on March 15, having now drifted to 71°40'55.8"N and 126°56'29.7"W, to obtain a conductivity, temperature and depth (CTD) profile. Temperature and depth were taken within two metres of the bottom. Salinity was 34.80‰, while temperature was 0.3°C. These data suggest that this bottom layer of water is Atlantic in origin. The Atlantic water that enters the Arctic Ocean from the Greenland Sea (Coachman and Barnes, 1963; Aagaard and Coachman, 1977; Treshnikov, 1977) is characterized by salinities greater than 34‰ and temperatures greater than 0°C (Coachman, 1969; Melling and Lewis, 1982; Melling, 1983) and is found in depths greater than 250 m (Melling and Lewis, 1982; Melling, 1983) to depths exceeding 1000 m (Coachman, 1969).

The average total length of the Greenland halibut captured was 576 mm, with a range of 450 mm to 815 mm (Table 1). Mean weight was 2166 g, with a range of 831 g to 5762 g. All of the Greenland halibut were female except for one immature male. One female was mature, suggesting that spawning occurs in the Beaufort Sea. The remaining females

TABLE 1. Lengths, weights, sex, age, and meristic counts for Greenland halibut captured in the Beaufort Sea, March 1993.

Fish Number	Total Length (mm)	Stand Length (mm)	Weight (g)	Dorsal Fin	Anal Fin	Right Pect	Left Pect	Right Pelv	Left Pelv	Sex	Age
37230	609	545	2407	95	72	13	14	6	6	F	9
37231	536	488	1571	96	72	14	14	6	6	M	8
37232	560	502	1745	101	74	13	13	6	6	F	9
37233	450	410	831	94	72	14	14	6	6	F	9
37234	502	446	1305	101	72	13	13	6	6	F	8
37235	562	505	1970	95	71	14	14	6	6	F	8
37236	500	445	1132	99	69	14	14	6	6	F	9
37237	662	598	2974	97	73	15	14	6	6	F	9
37238	565	512	1902	103	75	14	15	6	6	F	9
37239	572	531	2230	98	77	13	13	6	6	F	NA <sup>1</sup>
37240	815	734	5762	97	71	14	14	6	6	F	12

<sup>1</sup> NA = Not aged

were all immature. Ages read from the left saccular otolith were eight and nine years except for the mature female, which was age twelve.

Meristic counts for dorsal, anal, right and left pectoral and pelvic fins (Table 1) fall within the range found in Greenland halibut in both the Atlantic Ocean (Templeman, 1973) and Pacific Ocean (Hubbs and Wilimovsky, 1964).

These captures represent a significant westward range extension of approximately 2400 km from the Greenland halibut's nearest known capture locality in the eastern Canadian Arctic Archipelago (Cumberland Sound: Crawford, 1992; Pike, 1994) and an eastward extension from the Pacific Ocean (Norton Sound: Alton et al., 1988) of 1800 km. Further study is required on Greenland halibut to determine its distribution and abundance within the Arctic Ocean and to determine the relationship between its Atlantic and Pacific subspecies.

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