



## UPDATE ON THE STATUS OF CUSK (*BROSME BROSME*) IN NAFO DIVISIONS 4VWX5Z FOR 2022

### Context

Cusk, *Brosme brosme*, is caught as bycatch in certain directed fisheries. Most landings are in the groundfish longline fisheries. Commercial catch rates for Cusk declined after the 1980s. Changes to management measures (e.g., reductions to trip limits, overall caps, and bycatch percentages) may have contributed to this reduction in catch rates (and landings); however, it is thought the decline in Catch Per Unit Effort (CPUE) is also due to a decline in Cusk abundance (Harris and Hanke 2010). The extent of the decline in abundance is not known.

The Industry-Fisheries and Oceans Canada (DFO) Halibut Fixed Station Longline Survey (Halibut Survey) catch per station has been accepted as the ongoing index for monitoring Cusk biomass. The Upper Stock Reference (USR) and Limit Reference Point (LRP) for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks, respectively (Harris et al. 2012). The 3-year geometric mean of the biomass index was accepted as the metric for monitoring Cusk status relative to the USR and LRP.

Cusk was assessed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2003 and later reassessed as endangered (COSEWIC 2012). In response to the 2003 assessment, the Governor in Council decided in 2013 not to add Cusk to the List of Wildlife Species at Risk set out in Schedule 1 of the *Species at Risk Act* (SARA; Minister of Justice, Canada 2013).

DFO's Resource Management Sector asked Science to determine what the 3-year geometric mean of the Cusk index is from the Halibut Survey relative to the USR and the LRP. The information will be used by DFO Resource Management as guidance in discussions with various industry stakeholders on recommendations for management measures.

This Science Response Report results from the Regional Peer Review of December 6-7, 2022 on the Update of Stock Status for Cusk in 4VWX5.

### Background

Cusk is a deep-water, solitary, sedentary, slow-growing, long-lived gadoid (Harris and Hanke 2010). In Canadian waters, cusk is most common in the Gulf of Maine, western Scotian Shelf, and along the edge of the Scotian Shelf to Banquereau Bank. The largest Cusk caught in the Halibut Industry longline survey measured 150 cm. Fish less than 40 cm are infrequently found in port sampling and the Halibut Survey. Juveniles have been caught in annual DFO Research Vessel (RV) bottom trawl surveys, but catches in these surveys are low for all sizes of Cusk.

### Description of the Fishery

In the commercial groundfish fisheries, Cusk are caught primarily in summer and fall, with very limited landings in winter (Table 1).

Table 1. Cusk landings in metric tonnes per calendar year from 2007 to 2022.

Year	4X5YZ	4VW	Total
2007	963	55	1018
2008	560	47	607
2009	533	40	573
2010	436	31	467
2011	435	29	464
2012	453	38	491
2013	338	45	383
2014	181	26	207
2015	151	37	188
2016	146	25	171
2017	119	27	146
2018	109	19	128
2019	72	19	91
2020	118	23	141
2021	117	23	140
2022	107	20	127

### Analysis and Response

The 57 fixed stations from the Halibut Survey that have been sampled in all years since 1999 are used to calculate the survey indices for Cusk (Harris et al. 2012). In 2014, data from Station 159 were excluded due to serious damage to the gear which resulted in a non-typical catch. The long-term mean for station 159 is 13.2 kg/1000 hooks.

The subset of stations includes some of the preferred habitat for Cusk, such as the deeper areas along the shelf edge, although only a few of these 57 stations are in the Gulf of Maine, the area of highest commercial landings. The catches at each station (standardized to Catch [kg]/1000 hooks) were used to calculate a biomass index. When the number of hooks fished was not recorded, it was assumed that the survey standard of 1000 hooks was fished in the single set. In some cases, stations were fished by 2 or 3 sets of fewer hooks that sum to roughly 1000 hooks. In these cases, all of these sets were included in calculating the standardized catch for the station.

The recent trend in the Halibut Survey (3-year running geometric mean) was used to determine the status of the Cusk biomass in relation to the reference points. This index has been at, or above, the proposed LRP since 2008 (Figure 1). A high level of uncertainty in the annual biomass indices is indicated by the wide confidence interval.

The Halibut Survey is conducted annually, generally from May to July. Variations in the Halibut Survey fishing protocol include a shift to the use of larger hook size, larger geographic area that each 'station' encompasses, lack of consistency in stations sampled, and variation in soak time and bait type. These variations are not accounted for in the Cusk biomass index and would contribute to the high variability and could bias estimates.

**Indicator of Stock Status**

The 3-year geometric mean (2020–2022) of the survey index for Cusk is 13.3 kg/1000 hooks (Figure 1).

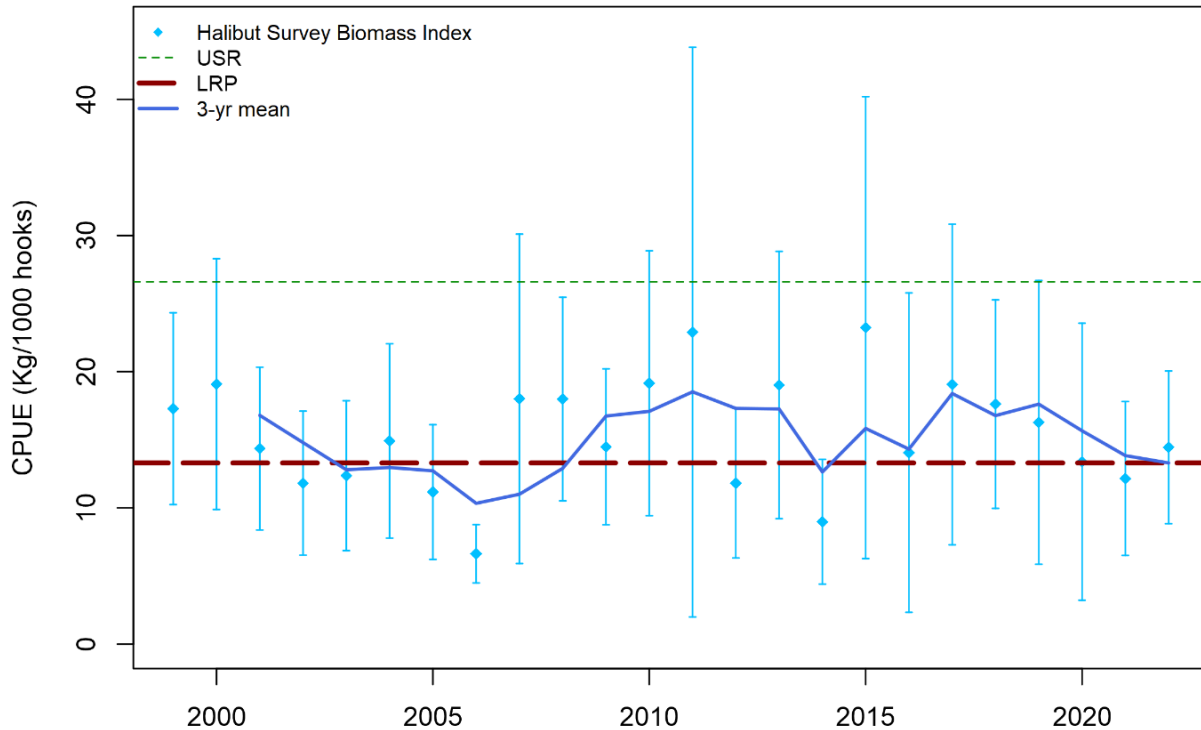


Figure 1. The blue diamonds represent the biomass index for Cusk in the Halibut Survey, including the 95% confidence interval, and the heavy blue line represents the 3-year geometric mean of the index, the green dashed reference line represents the Upper Stock Reference (USR) point, and the red dotted line represents the Limit Reference Point (LRP).

**Conclusions**

The 3-year geometric mean (2020–2022) of the Halibut Survey biomass index for Cusk has declined to the LRP at 13.3 kg/1000 hooks.

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### Sources of Information

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