STATUS OF CUSK (*BROSME BROSME*) IN NAFO DIVISIONS 4VWX5Z UNDER THE PRECAUTIONARY APPROACH FRAMEWORK

Context

Cusk, *Brosme brosme*, is caught as bycatch in certain directed fisheries, for example, the Halibut longline and Lobster fisheries. Most landings are in the groundfish longline fisheries. Commercial catch rates for Cusk have declined since 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-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 and 13.3 kg, 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 biomass has remained above the LRP since 2008 (DFO 2014).

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). The status of Cusk pursuant to SARA is currently under re-consideration in response to the 2012 COSEWIC recommendation.

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.

The current 3-year geometric mean (2013-2015) of the Cusk biomass index remains above the LRP at 15.1 kg.

This Science Response results from the Science Response Process of December 2, 2016, on the Stock Status Update of 4VWX5 Cusk.

Background

The Halibut Survey, a longline survey that samples an area from the Grand Banks of Newfoundland, along the Scotian Shelf to Georges Bank, is considered to provide a useful index of trends in Cusk abundance in Northwest Atlantic Fisheries Organization (NAFO) Divisions 4VWX5 since 1999. Longline gear is an effective sampling tool for Cusk as demonstrated by the commercial fishery; over 90% of landings were made by the longline fleets (Harris and Hanke 2010).

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 but would contribute to the high variability and could bias estimates.

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). While the fishing year runs from April 1st through to March 30th of the following year, landings from April – November comprise between 93% and 98% of the fishing year landings from 2007 – 2015. Cusk landings have been declining, falling to 189 metric tonnes (mt) in 2015, and reaching only 165 mt by the end of November in 2016. The steep decline in longline effort directed at Cod, Haddock and Pollock have likely contributed to this decline. Current Cusk bycatch from the longline fleet comes primarily from the Halibut directed fishery. Cusk landings are currently managed by means of bycatch caps and trip limits.

Table 1. Cusk landings in metric tonnes per calendar year from 2007 to 2015.

Year	4X5YZ	4VW	Total
2007	963	55	1018
2008	561	48	609
2009	535	38	573
2010	439	29	468
2011	444	34	477
2012	442	39	481
2013	341	39	380
2014	171	29	200
2015	151	38	189

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 was 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.

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. The biomass index from the Halibut Survey has been at or above the proposed LRP since 2008 (Figure 1). A high level of uncertainty is indicated by the wide confidence interval.

Cusk are a long-lived slow-growing species; any response to reduced fishing removals will take several years (around 10 years) as they recruit slowly to the adult population and fishery.

Indicator of Stock Status

The 3-year geometric mean (2014-2016) of the survey index for Cusk is 15.1 kg (Figure 1).

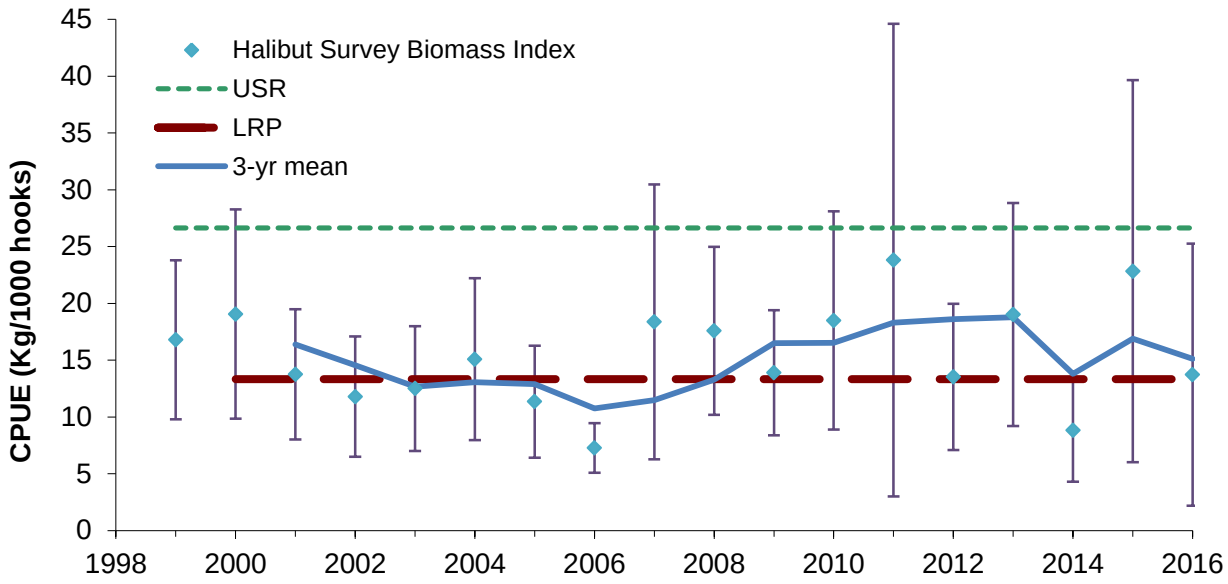

Figure 1. The green dashed reference line represents the Upper Stock Reference (USR) point, the red dotted reference line represents the Limit Reference Point (LRP), the blue diamonds represent the biomass index for Cusk in the Halibut Survey, including the 95% confidence interval, and the solid blue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

Conclusions

The 3-year geometric mean (2014-2016) of the Halibut Survey biomass index for Cusk remains above the LRP at 15.1 kg.

Changes are expected to the Halibut Survey in 2017, which will impact the Cusk index. A review of indices for Cusk may be needed.

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