Report of the intersessional correspondence group that reviewed the Icelandic humpback whale abundance estimates

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Palka (convenor), Cañadas, Donovan, Freitas, Gunnlaugsson, Herr, Pike, Vikingsson, Weinrich, Zerbini

Abstract

The terms of reference for this intersessional correspondence group (ICG) were to review several papers that estimated abundance of humpback whales from surveys around Iceland (Pike et al. 2002a, 2005, 2009, 2010, 2018, and Paxton et al. 2009). The objectives of these papers were to provide the best abundance estimates for each year the survey was conducted and to investigate trends over the time series. After discussions, the ICG concluded that the 2015 perception bias corrected shipboard abundance estimate of 10,031 (95% CI 4,962 – 20,278) be classified as a Category I for the Icelandic/Faroese study area. After small modifications and conducting another review of the new analysis, the 2007 abundance estimate may be a candidate to be classified as a Category I for the Icelandic/Faroese study area. In additions a few suggestions were made to assist in developing a complete and comparable time series that could be used in investigate trends.

Background and Objectives

The Scientific Committee will be assessing North Atlantic humpback whales so following the current Committee's guidelines the previously reported abundance estimates that may be used in the assessment need to be reviewed, included in the IWC Abundance Table and classified to their level of usage. The levels of usage are:

- **Category 1**: acceptable for use in in-depth assessments or for providing management advice;

- **Category 2:** underestimate - suitable for 'conservative' management but not reflective of total abundance;

- **Category 3:** while not acceptable for use in (1) or (2), adequate to provide a general indication of abundance;

- **Category P:** provisional estimates.

The terms of reference for this intersessional correspondence group (ICG) were to review several papers that estimated abundance of humpback whales from surveys around Iceland (Pike et al. 2002a, 2005, 2009, 2010, 2018, and Paxton et al. 2009). The objectives of these papers were to provide the best abundance estimates for each year the survey was conducted and to investigate trends over the time series.

Abundance estimates of humpback whales in the Central North Atlantic have been derived from the North Atlantic Sightings Surveys (NASS) during 1987-2007 (Gunnlaugsson and Sigurjónsson 1990, Pike et al. 2001, 2002a, 2002b, 2005, 2009, 2010, and Paxton et al. 2009). The estimates were derived from conventional line-transect methods conducted from ships and aircraft. In addition spatial modelling was applied to the 1995 and 2001 survey data (Paxton et al. 2009). The Central North Atlantic has been covered jointly by Iceland and the Faroes and the data analyzed together. The surveys were conducted from 3-4 vessels and the Icelandic continental shelf area was covered by aircraft.

Double platforms were used on all vessels starting in 2001. Aerial surveys have always used a double platform on one side. In 2001 and 2007, the Buckland-Turnock mode was used on the ship surveys. In 2015, independent symmetrical platforms (I/O) were used. Also trends in abundance were investigated using the 1986-2001 data (Pike et al. 2009).

Discussion of Papers

Of the shipboard surveys, the 2007 and 2015 shipboard estimates were corrected for perception bias (Pike et al. 2010, 2018) and since they were shipboard surveys availability bias was expected to be minimal. None of the aerial estimates were corrected for availability bias. Consequentially, the ICG focused their review on the 2007 and 2015 shipboard estimates because these estimates were potentially the best estimates available for the study area.

For the 2007 and 2015 shipboard surveys, in general, the ICG concluded the survey designs appeared to be appropriate, the resulting coverage and collected data were adequate, and the analyses were appropriate. The ICG had a detailed dialogue on several general issues which are discussed below.

One issue that the ICG discussed was the potential effects on the abundance estimate when using the last perpendicular distance recorded for sightings that had multiple recorded locations. There was concern that this practice could result in biased abundance estimates if there was reactive movements between the time of the first and last recorded locations. On the other hand, it was recognized that when a group was closer to the ship the radial distance measurements were most likely more accurate than when the group was far from the ship. The ICG reviewed what the Committee reported when it discussed this issue previously (IWC 2012). In conclusion, the ICG agreed with the previous Committee's comments that this practice probably did not bias the abundance estimates, particularly for humpback whales where it was believed reactive movements were minimal. However to be more certain, the ICG suggested the authors should more fully discuss this non-standard practice. For example, provide more information to indicate there is none or limited reactive movements in these cases; indicate the percent of time this choice was made; and perhaps as a sensitivity analysis compare the abundance estimate when using the first recorded locations to the reported abundance estimates.

The ICG requested additional information on the data collection and analysis methods used on the 2015 data (Pike et al. 2018). After hearing the additional information the ICG determined there was most likely not any problems but the ICG suggested more information be added to the final version of the 2015 abundance paper that will be presented to the Committee at the 2018 Committee meeting. In particular:

    a. Since the survey takes 2 months to collect the data for a point estimate, the authors could in the discussion provide information about movements of previously tagged humpbacks to support that, within the survey time period, there were not large distribution shifts or that the whales were not moving consistently in the same direction.

    b. Provide additional explanation on the criteria used to determine the group size and species identification in the cases when both teams saw the same group.

    c. Indicate which method in Innes et al. 2002 was used to estimate the variances.

    d. Provide the typical plots of goodness-of-fit for the detection functions.

The ICG also discussed availability bias and agreed with the authors that availability bias is likely not an important issue for the shipboard surveys of large whales, but it is a significant source of bias for aerial surveys. Thus, the aerial surveys were considered negatively biased.

In regards to the transit track lines that were surveyed in the 2015 survey, the ICG agreed with the authors that those unplanned track lines should not be included in the design-based line transect analyses.

The ICG discussed the practice of using sightings of humpbacks for which the species identification was either of medium confidence or low confidence. In particular, it was noted that the 2015 sightings that were included in the analysis were those identified as humpback whales with certainty, medium confidence and low confidence, but did not include whales that were unidentified to a species. After discussion, the ICG agreed with the authors, that especially for humpback whales it was acceptable to use sightings that were identified with certainty, medium confidence and low confidence. This strategy was not used for the 2007 data, so the ICG suggested that the 2007 abundance estimate resulting from using these three levels of certainty would be the most appropriate and also produce comparable abundance estimate. Since this combination was not reported in the paper for the 2007 data, it was suggested this new estimate be reported to the Committee.

Another issue discussed was the decision in the 2007 analysis to post-stratify the survey area to remove the regions that were ice-covered and therefore was not surveyed. The ICG agreed that this post-stratified study area was the most appropriate area to be used to expand the estimate to.

The ICG considered the methods used to estimate g(0) were acceptable.

As one of the goals of these analyses was to look at trends over time within the study area, the ICG provided several analytical suggestions. One suggestion was the authors could extend the analyses in Pike et al. 2005 and post stratify all of data to the common area and then describe trend patterns. Also the authors could report the single team g(0) from the 2015 two-team survey that is most comparable to the earlier one team surveys, if ships or platform heights are similar, and then consider applying it to the previous one team abundance estimates and use this series of g(0) corrected abundance estimates in a trends analysis. Alternately, uncorrected abundance estimates from the primary or combined platforms in the later double-platform surveys (whichever are most comparable to the earlier single platform surveys) could be used in the trend analysis. Again assuming g(0) is constant over time. Because the abundance estimates presented were not all of a common area and a trend analysis using data up to 2015 was not presented, the ICG could not fully review these types of estimates and analyses.

Conclusions

In conclusion the ICG made these final recommendations:

a) The 2015 perception bias corrected shipboard abundance estimate of 10,031 (95% CI 4,962 – 20,278) be classified as a Category I for the Icelandic/Faroese study area.

b) The 2007 perception-bias corrected abundance estimate resulting from using the post-stratified study area and using humpback whale sightings that were identified with certainty, medium confidence and low confidence was most likely the best abundance estimate for that year. This estimate should be presented to the SC at the 2018 meeting and is a candidate to be classified as a Category I for the Icelandic/Faroese study area.

c) When a complete trend analysis is presented, the SC would be able to review these comparable estimates and/or the trend analysis.

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