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# Population structure of humpback whales in the southeastern Caribbean: an update

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## Population structure of humpback whales in the southeastern Caribbean: an update

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As discussed by Clapham and Wade (2018), the status of the populations of humpback whales breeding in Caribbean waters remains unresolved. Briefly, there are two competing hypotheses to explain the stock status of humpback whales in Caribbean waters. The currently-accepted hypothesis is that all humpback whales using Caribbean waters as a breeding area comprise one stock (e.g. Bettridge et al 2015, Clapham and Wade 2018). A second, more recent, hypothesis is that there are two stocks of humpback whales breeding in Caribbean waters (e.g. Stevick et al 2016, 2018). One, larger, more northern stock occurs in Caribbean waters in December to early March, and a second, smaller population occurs in the more southeastern part of the Caribbean from mid-March to late May (e.g. Stevick et al 2018).

Some individual humpback whales identified in the southeast Caribbean have also been observed in the Cape Verdes Islands (Stevick et al. 2016, 2018). However, as Clapham and Wade (2018) note, it is impossible that the Cape Verdes breeding population (numbering less than 300 individuals, Ryan et al 2014) can account for all humpbacks that feed in the eastern North Atlantic. More individually-identified humpback whales than that have been enumerated from feeding grounds in the northeastern Atlantic. For example, the North Norwegian Humpback Whale Catalogue 2007-2017 ([hvalid.no](http://hvalid.no)) includes over 600 identified individual whales (as of 7<sup>th</sup> March 2019), or more than double the estimated abundance of whales breeding in the Cape Verdes islands.

In this note, we update this work with recent information that furthers our understanding of this status.

As observed previously (Clapham and Wade 2018, Stevick et al. 2018), there appears to be a difference between the times that humpback whales occupy the northern Caribbean, and the south-eastern Caribbean, with the latter's occurrence peaking approximately six weeks later (Stevick et al. 2018). However, further field data, directly comparable cross the length of the Caribbean chain, were needed to help evaluate the possibility that this observed difference could be due to temporal sampling biases (Clapham and Wade 2018). To resolve this, we led a multi-institutional cross-Caribbean survey using passive acoustic recorders, the Caribbean Humpback Acoustic Monitoring Project (CHAMP, Heenahan et al. submitted).

CHAMP involved the deployment of nine recorders off six islands from December 2016 to June 2017. Recorders were deployed in the waters off Silver Bank in the Dominican Republic, St. Martin, Guadeloupe, Martinique, Aruba and Bonaire. Humpback song was detected at all sites except Aruba and Bonaire. Song was detected from December on Silver Bank, but started four to six weeks later off Guadeloupe and Martinique. Song was detected into May at all sites (where song was detected), and it continued into June, when the recorder was retrieved, at St Martin. This extends – into at least May - the time over which humpbacks are known to be present in the waters off the Dominican Republic and St Martin, although the occurrence of calls is greatly reduced in Silver Bank after mid-March. It suggests that the concerns regarding biased photo-identification sampling in the southeastern Caribbean are misplaced, but raise questions as to whether sampling in more northern areas is curtailed too soon.

The data offer support for the two-population hypothesis for humpbacks using Caribbean waters.

A definitive answer will require a more substantial biopsy sampling program in the southeastern Caribbean, coupled with sampling in the waters off Iceland, Norway, and elsewhere off northern Europe, and matching across sampling programs. Until such a program is undertaken, comparison of humpback song recorded during CHAMP can be used to further test the two-population hypothesis. Humpback song differs between populations (Winn et al. 1981). From the CHAMP project, we already have the field recordings to conduct this test.

If there are two separate humpback populations using the Caribbean for breeding, the size of the “southeast Caribbean” population (*sensu* Stevick et al 2016, 2018) is unknown. Note that by “southeast Caribbean” we refer to humpback whales that occur not only in that area, but do so later in the year (late March to May/June), as the CHAMP (and other, Stevick et al 2018) data indicate that if these are a separate population, they use Caribbean waters in this later period.

The MONAH surveys (Clapham and Wade 2018) had insufficient spatial and temporal coverage to allow estimates of abundance of the putative “southeast Caribbean” humpback stock. Nor do the surveys adequately address the two-stock hypothesis for the Caribbean. The MONAH results will not provide information on the abundance of “southeast Caribbean” humpback whales.

Initial results from the CHAMP project do not support the contention that all humpback whales using Caribbean breeding grounds comprise one stock. Further analysis of CHAMP data and additional surveys proposed above will help resolve the two-stock hypothesis. Until then, the abundance of the stock of humpback whales occurring in the south-eastern part of the Caribbean, from late March to June, is unknown. If any of the humpback whales hunted in the St Vincent and the Grenadines Aboriginal Subsistence fishery are taken from late March to June, then they are likely being taken from a stock for which there is no estimate of abundance.

The most appropriate method for producing an estimate of abundance for these “southeastern Caribbean” humpbacks would be a mark-recapture estimate using photo-identification data collected from the waters of the southeastern Caribbean at the appropriate time (late March – June). The CARIMAM project, a network of Marine Protected Area managers from the Wider Caribbean, appears to be an appropriate regional organization to facilitate producing an estimate. The Specially Protected Areas and Wildlife (SPA) program of the United Nations Environment Program’s (UNEP) Caribbean Environment Program is another regional organization that could engage. Comparing this estimate with a photo-identification mark-recapture estimate of abundance of humpback whales occurring in the waters off Norway and Iceland will help resolve the disparity in abundances between whales in the eastern North Atlantic and those occurring off the Cape Verdes Islands. Both these estimates will probably require collaboration with the North Atlantic Humpback Whale Catalog, curated by Allied Whale, at the College of the Atlantic.

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