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INTERNATIONAL
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Preliminary analysis of blue and fin whale acoustic presence off Hokkaido Japan

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ABSTRACT

During 2012, low frequency acoustic data were recorded off Hokkaido Japan. These data were analyzed for presence of blue (*Balaenoptera musculus*) and fin (*B. physalus*) whale calls. A new blue whale song type was detected in the data, along with previously reported song from the Northwestern and central North Pacific Ocean. Both song types had seasonal presence, with largest fraction of days with calls during late summer or early fall and no call detections during the spring. Fin whale calls were detected during most of the year, except during June and July, but they were most common from October to February. Possible sei (*B. borealis*) and minke whale (*B. acutorostrata*) calls were also detected.

METHODS

One year of acoustic data was collected off Japan at 41.94 N, 145.06 E, in a water depth of 3428m (Fig 1) during 2012. Data were processed into long-term spectral averages (LTSAs) and analyzed using Matlab-based software *Triton* (Wiggins and Hildebrand 2007) for daily presence of baleen whale signals, with special focus on known and possible new blue whale (*Balaenoptera musculus*) songs, as well as fin whale (*B. physalus*) calls. Occurrence of calls was marked in a logging sheet. Percent of days each month with occurrence of each call type is reported. In addition, average frequency and temporal features for different units of each song type were measured.



Figure 1: Location off Hokkaido where acoustic recordings were collected.

RESULTS

An entirely new type of likely blue whale song (Fig. 2) that has not been documented elsewhere was detected in these data. For the purposes of this report, we term this song Japan type song. In addition to this new song type, a blue whale song type more similar to that previously reported across central and western North Pacific (called Northwest Pacific song by Stafford et al. 2001, and North Pacific song in McDonald et al. 2006) was also found in the data and is termed Northwest Pacific song here (Fig. 3). Both songs consisted of tonal units and some sweeping units, but patterns of the Japan-type song were more complex. In addition, they were typically longer duration (Figs. 2 and 3).

The Japan type song was detected in January and February, and again from June to December, except in October (Fig. 4). The Northwest Pacific song was detected on a larger fraction of days, but it had a similar seasonal occurrence; it was detected between June and December (but not in November).

Fin whale calls were detected most of the year, with no calls in June and July and peak per percent of days with calls between October and February (Fig. 4).

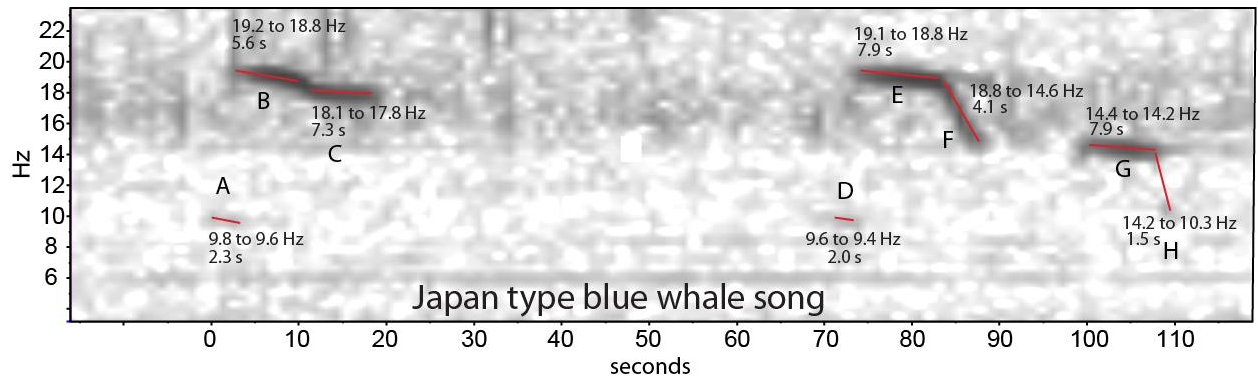


Figure 2: Spectrogram of the new "Japan-type" blue whale song. Individual units of the song are marked with letters and average frequency and temporal features of each unit are indicated.

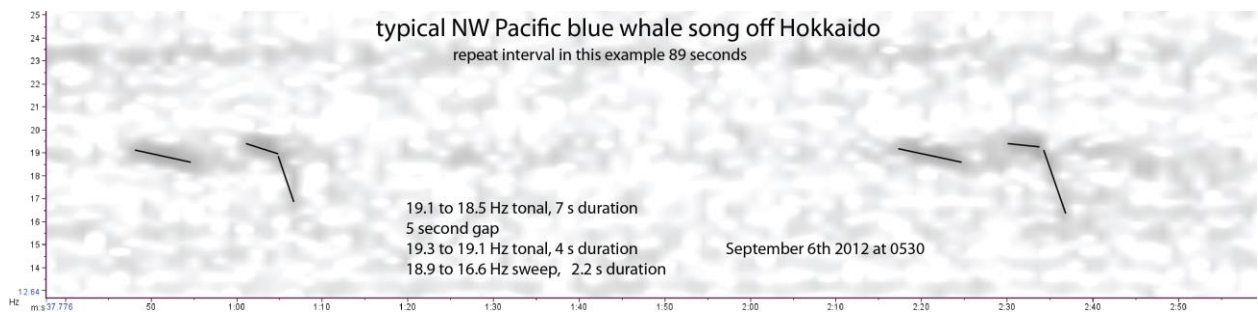


Figure 3: Spectrograms of calls resembling the typical Northwest Pacific blue whale song type. Average frequency and temporal features of different units are indicated.

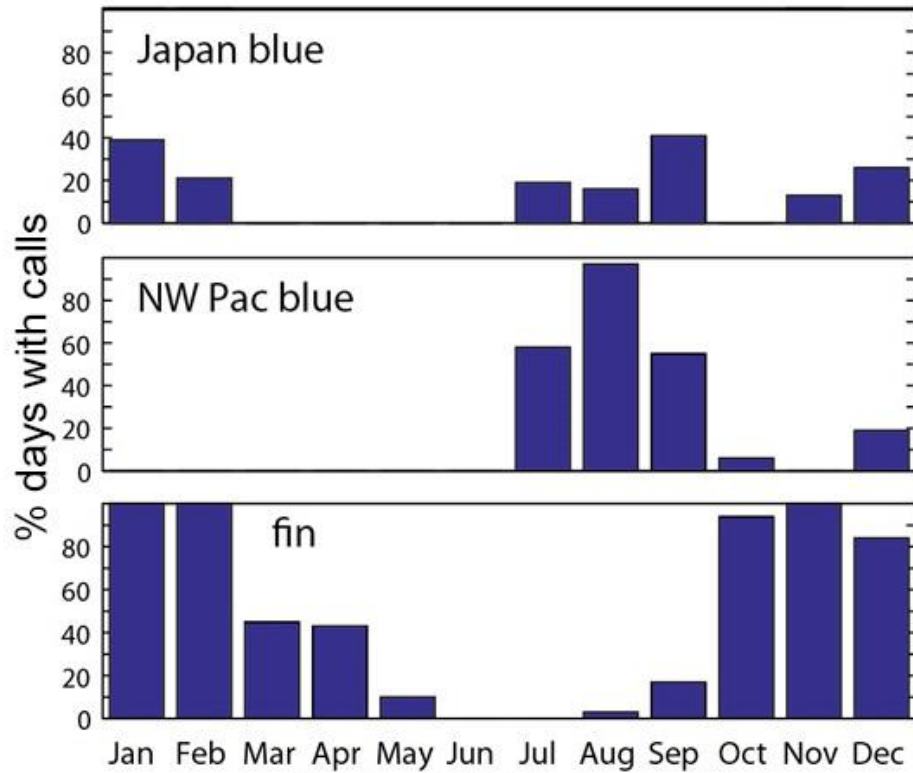


Figure 4: Percent of days each month with the three types of whale calls: blue whale Japan-type song, Northwest Pacific blue whale song type, and fin whale calls.

The phrasing of units within Japan-type blue whale song was variable. An example of this phrasing variability is illustrated in Fig. 5.

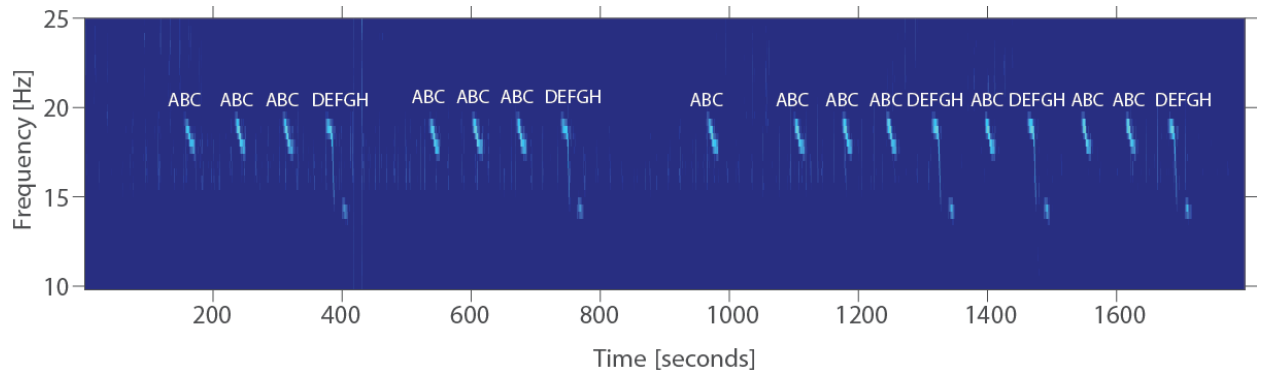


Figure 5: A sequence of Japan-type blue whale songs from November 5, 2012.

Even though sei (*B. borealis*) and minke whales (*B. acutorostrata*) were not the focus of this study, a number of signals speculatively identified as being from these two species, were also detected in the data.

DISCUSSION

This is the first known report of a new blue whale song type in the vicinity of Japan. Relatively rare presence and nearly year-round occurrence may indicate that this “Japan-type” blue whale song may be analogous to the New Zealand song type (McDonald 2007) in that the range may be limited to a few

hundred miles around Japan, with only limited seasonal migrations. For example, this song has not been detected in passive acoustic recordings deployed off Northern Mariana Islands (Saipan and Tinian), where effort has been expanded since 2010. More data, particularly off Southern Japan would be beneficial for testing this hypothesis of limited regional range. Seasonality of the Northwestern Pacific type song is consistent with what is known of this song type central North Pacific (Hawaii) and elsewhere.

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