

Interactive comment on “Discovering sounds in Patagonia, characterizing sei whale (*Balaenoptera borealis*) downsweeps in the south-eastern Pacific Ocean” by Sonia Español-Jiménez et al.

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We appreciate the suggestions and comments provided by reviewer one, specifically regarding the concern about the calls are actually from Sei whales. Much work has gone into making a more straightforward and easier to read manuscript. For example we introduces photos of sei whales in the area when we detected acoustically and a better description of the methods.

Specific comments and Technical corrections. Abstract P2, line 13: I don't agree with this statement given that there are many other whale species that are even less know. Least known baleen whale species could be, anyway, it is not a contest, so I would

C1

suggest to spend these words differently. Response: the sentence has been reword as follow: The sei whale (*Balaenoptera borealis*) is one of the least known whale species. Information on sei whale's distributions and its regional variability in the south-eastern Pacific Ocean are even more scarce than that from other areas. Vocalizations of sei whales from this region are not described yet.

Line 13-15: Information on their distribution and their occurrence – given that it is such a rare species - (that can be deducted from the PAM data) are of greater relevance than regional vocal variation, in my opinion. Response: The PAM data not only provide information about the regional vocal variation, but also it is a very useful tool to determinate distribution and occurrence as the reviewer state. However, a different experimental design is need it to archive that goal. It is the future work.

Line 17: calls were identified to be sei whale downsweeps or calls were attributed to sei whales Response: calls were identified to be sei whale downsweeps

Introduction P3, line 31: least known baleen whale species Response: the sentence has change to: It is also one of the least known whales.

Line 37-38: Kanda et al. 2006 investigated sei whale samples collected only in the Northern Hemisphere, so this is not the correct evidence for the statement that there is no clarified genetic separation between populations from different hemispheres. Responses: Sentence has change to: North Atlantic, North Pacific and Antarctic populations are separated and probably subdivided into geographic stocks (Horwood, 1987; Kanda et al., 2006); however, genetic studies have not investigated the separation between populations by hemisphere.

P5, line 59: pelagic whaling Response: change it as the reviewer suggestion.

Line 93-95: Replace: "...cetaceans by recording their vocal signals. Passive acoustic data can then be used to characterize..." Response: change it as the reviewer suggestion

C2

Line 96: "poorly known (Prieto et al., 2011). To date, vocalizations have been described..." Response: change it as the reviewer suggestion

P6, line 101-103: A description of the soundscape would encompass all biotic, abiotic and anthropophonic sound sources that occur in the area. Given that this study only describes the sei whale signatures, it is not a soundscape baseline. I also think it should be made clearer in the objectives of the study how passive acoustic recordings can add to knowledge about this population and species. What are the questions that you could answer once you know which sounds they produce? There is a lot of information provided in the paragraphs above on how their stock structure is so unclear, but these remain unconnected to what acoustics can add. This connection and clear stating of the objectives needs to be improved. Response: We appreciate the comments. However, all of those are part of the manuscript discussion, not part of the introduction.

Methods Line 109: Is this the actual name of the hydrophone? It sounds to me as if this is the icListen from Ocean Sonics, could this be? The frequency response does not go until 200kHz, is this correct? Response: the methodology has been modified as follow: Two different hydrophones were used for the recordings: an icListenHF hydrophone (sensitivity -171 dBV re 1 μ Pa with pre-amp; frequency response 10–200kHz from Ocean Sonic, Canada); and a SoundTrap 202 STD hydrophone (sensitivity -205 dBV re 1 μ Pa; frequency response 60000Hz \pm 3 dB from Ocean Instruments, New Zealand). Also, we made stereo recordings on several occasions with an HTI-96-MIN hydrophone (flat frequency response from 0.02 to 30 kHz) connected to a handy recorder (H4nPro from ZOOM).

Line 112: To what recording device were the hydrophones connected and what were the recording specs of these? Response: the response above explain better the idea.

Line 115: Was the engine still running during this time? Response: The question was explained by the following sentence: During all the recordings, the engine vessel was

C3

turn off.

P7, lines 121-123: There is a lot information missing here: How were these parameters measured? From the spectrogram? With which settings? Were these kept consistent, how? Were these done by hand or was the Raven tooling used? Why was the data first analysed with Audacity and the measurements done with Raven? What was the precision of the measurements (i.e. were the measurements repeated for a subset to see if the data could be reproduced and if so with which precision)? Response: the methodology was change as follow: Audio data were analyzed using Audacity 2.2.2 (Audacity[®] software [©] 1999-2018 Audacity Team) and Raven Pro 1.5 (Cornell University, Ithaca, NY). Low and high frequency (Hz), frequency range (Hz), peak frequencies (the frequency at which the maximum power occurred within a call) and duration (s) for all calls found and attributed to sei whales were analysed from spectrograms and waveform plots created in Raven Pro 1.5 (Hann window; 50% overlap; window size 14563 samples; DFT 16384 samples).

Line 123: Can you visualize how the parameters were extracted from the spectrogram? Response: the response above explain better the idea.

Results P 9, line 129: How were you sure that these were sei whales? Was there a visual confirmation that sei whales were in the vicinity? Response: the figure 01 visualize where sei whale were sighted. In addition, the results state sei whale sightings. The only other baleen specie sighted was a humpback whale one day in 2017.

Line 133: How was high quality defined? How was a high signal to noise ratio defined, was it measured? Was there a snr threshold? Response: the methodology was change as follow: only sei whale sounds were detected without associated calls. Only calls with high-visual quality were measured.

Line 134: Different naming of hydrophone then in methods Response: change it as: an icListenHF hydrophone// SoundTrap 202 STD hydrophone

C4

Line 135 and Fig 02: How did you distinguish from the frequency modulated signatures produced by other baleen whale species? Blue, fin and minke are all known to produce similar type calls. What characteristics distinguish the sei whale downsweeps from the sweeps produced by other species? I am highly sceptical that this is possible and if these are the only calls that were attributed the sei whales, there needs to be a clear elaboration added to the method section of the manuscript explaining the call characteristics that allowed attributing these to sei whales with certainty. Did you also look into associated calls (i.e. calls produced preceding and following these downsweeps)? Response: the results are explained as follow: In acoustic data from 2016, sei whale calls were detected when sei whales were sighted closer the vessel (fig 02). In 2017, between May 8th and 10th, sei whales were sighted in the area were after sei whale calls had been recorded (fig 02). Sei whale calls from 2016 were recorded around midday, while in 2017 they were recorded in the late afternoon or at night (Table 1).

Discussion: P 12, Line 154-157: This is not a very strong argument given that the calls recorded are also not that typical in acoustic structure. Baleen whale downsweeps have been estimated to still have a detection range in the orders of tens of kilometers, so do not necessarily have to be sighted to be heard. Especially given that the ship was on station during recording, the area that was 'acoustically surveyed' was not particularly large. I suggest a more elaborate explanation of why the recorded calls are not produced by fins, blues or minke. This would be strongest if you also had downswept calls of these species in your recordings that you attributed to other species than seis. Also for the community to be able to use your data and information to identify Chilean sei whales in their recordings, the description of the calls needs to be much more elaborate. Response: the following sentence has been added: Given that recordings from this project were opportunistic and without digital acoustic recording tags (DTAG) deployed in sei whales we cannot prove the origin of the calls. However, we can confirm with reasonable certainty that vocalizations recorded off The Penas Gulf were produced by sei whales, due to the sightings of this species during the recordings and the

C5

expeditions. Blue whales (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*) or minke whales (*Balaenoptera acutorostrata*) produce downsweep as well (Thompson et al., 1996; Schevill and Watkins, 1972; Watkins, 1981). Generally, fin whales downsweep have initial frequencies below 35 Hz and final frequencies around 20-18 Hz (Watkins, 1981), similar than minke whales but with shorter durations (0.2-0.3 sec) and higher frequencies (130-60 Hz) (Schevill and Watkins, 1972), both very different than our recordings. Only downsweeps from blue whales described in Chile, through the DTAG data, has a lower peak frequency and duration; low frequency are higher and downsweep had been accompanied in the recorders by the Southeast Pacific type 2 (SEP2) (Saddler et al., 2017), supporting our results, that these records are really from sei whales.

Line 157-165: This explanation and argumentation is not sufficient, blues, fins and minke also typically produce low frequency downswept calls as part of their vocal repertoire. Response: the response above explain better the idea.

P13, line 177-179: Do you mean the call described here in this manuscript, or is there another record of sei whale calls from these waters? Response: we were describing the call from this manuscript, there is no other acoustic study in these waters.

Line 182: Replace: "During this study, no four-call series were recorded as have been recorded in..." Response: change it as the reviewer suggestion.

Line 188-191: Given these facts, how can you assume that the recorded calls are sei whales? For a study to first describe the calls produced by a species that can be so variable in its acoustic signature, there seems to be no solid basis for the assumption that the calls recorded are produced by sei whales. Also, you write that seis were sighted during the expedition? How did the sightings relate in space and time to the recordings? Were they recorded long before the sighting or within minutes? Response: we have provided new information to the discussion to strength our results.

P14, line 214-217: Did you also investigate to what extent the background noise condi-

C6

tions differed between the recording sessions and if this might have affected the quality of the recordings in one year and as a result may have affected the measurements? How do you explain the differences in characteristics in the recorded calls between years? Response: Background noise was not part of this investigation. Future research will be conducted to characterize acoustic pollution background and traffic.

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