Final Evaluation Report

Your Details	
Full Name	Chiara Lucila Guidino Bruce
Project Title	Comparing effectiveness of bycatch reduction of whales and small cetaceans using acoustic alarms implementation in northern Peru
Application ID	37817-2
Date of this Report	1/12/2023

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Implementation of an onboard observer program, with an emphasis on monitoring small cetacean bycatch and large whale entanglements.			■	We trained and implemented onboard observers to monitor cetaceans while trialling the acoustics alarms.
Field tests with acoustic devices to reduce cetacean bycatch and whale entanglement.			■	We completed 12 months of field tests with acoustic devices to analyse the effectiveness of the acoustic alarms.
Workshops with fishers and local authorities. Disseminate information on cetaceans and the project to the local community, specifically to fishers.			■	Three workshops were held with onboard observers, fishers, local authorities, and women. We have disseminated educational materials about the project in the workshops and through ProDelphinus social media.

2. Describe the three most important outcomes of your project.

a) **We were able to record tracks of whales monitored in the theodolite trial. This allowed for visualisation of the proximity and overlap of the whale tracks from the pinger when the alarm is off (a. control) and revealed a deviation and a slight separation of the whale tracks from the pinger when the alarm is on.** In Figure 1(a), the tracks are shown when the alarm is switched off (control), while in Figure 1(b), the tracks illustrate the situation when the alarm emits a 5.3 kHz tone. Each track represents the surfacing of an individual whale, including the approach, within range, and beyond the alarm. A black circle with a 500 m radius around the alarm mooring represents the estimated acoustic detectability range. To enhance clarity, surfacings that occurred outside of the measured zones were excluded from the analysis. A total of 104 whale tracks were monitored, with 80 tracks having to be eliminated because they were outside of the estimated acoustic detectability range. Therefore, we had a total of 20 tracks inside the sound range, 14 tracks with the pinger on and six tracks during the control period. We monitor for a total of 36 days, with 137 hours of observation with both 'pinger on' and 'pinger off'.

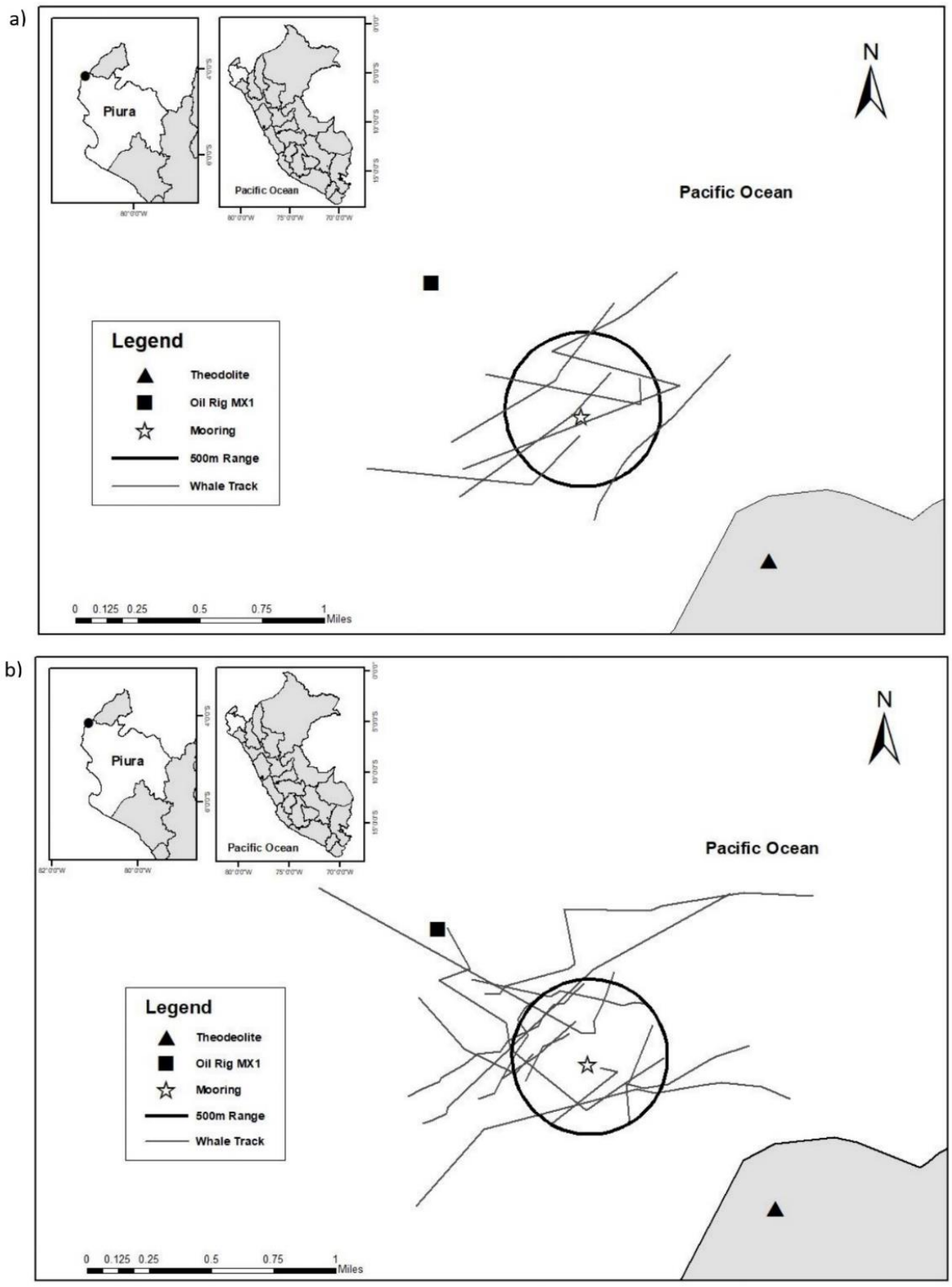


Figure 1. Maps with tracks of humpback whales a. control (no pinger) and b. with pinger.

b) **We analysed the tracks examining a. directness index, b. dive time, c. breathing frequency, and d. surfacing time, and found only minimal differences in a and c when the pinger was turned on (Figure 2).** These results Indicate that the alarm did not influence surfacing time and dive duration. However, the directness index demonstrated a possible decrease when the alarm was activated, with this we could imply that whales swam straighter when the alarm was on. Mean breathing frequency showed an increase when the alarm was on, implying a potential impact on whales in the presence of the alarm. This is an important result, as it may be evidence of pinger effectiveness.

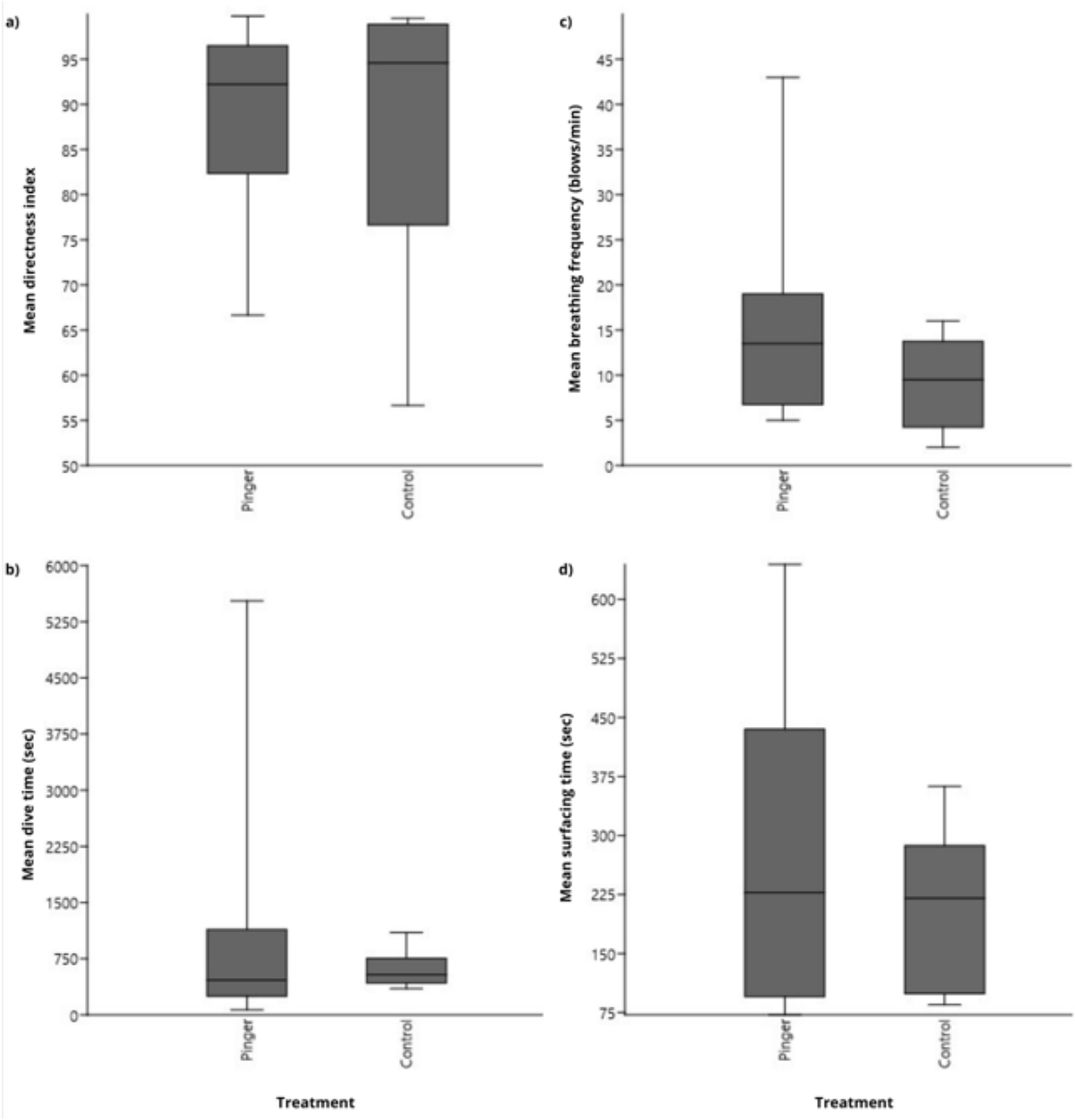


Figure 2. Boxplot of variable measured for the theodolite trial.

c) **3 kHz pingers were effective at reducing whale bycatch:** We monitored a total of 107 trips sets, with a total of 26 incidents of entanglements, mainly for whales

(Table 1). We observed that fishing sets that used the 8-12 kHz pinger had less total bycatch of whales compared to those sets with 3 kHz pingers. This could be because the fishing vessel used different fishing areas and we had only one vessel, the 8-12 kHz pinger. For the 3 kHz 'whale' pinger we had a total of eight whales entangled, while with the control sets (no pinger) we had a total of 16 whales entangled. Therefore, preliminary results indicate that the 3 kHz pinger was effective at reducing whale entanglements.

Fishers were more interested in reporting bycatch of whales than small cetaceans as they have experienced an increase in bycatch of whales. They also reported 9 entanglements with whale sharks while monitoring the pingers.

Table 1. The number of cetaceans observed captured in control (no pinger) and experimental (pinger) sets, for both types of pingers tested.

	3 kHz pingers		**8-12 kHz pingers**	
	Control	Treatment	Control	Treatment
Unidentified Whale	16	5	1	1
Humpback whale	0	3	0	0
Total	16	8	1	1

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Some challenges and obstacles that had to be faced in the field were:

For the theodolite trial two buoys with acoustic alarms attached (pingers) were lost during the monitoring (i.e., probably stolen at sea). To overcome this, we installed posters and shared with fishers through text messages information about the research study and the importance of safeguarding the buoy (Figure 3). This helped to receive an anonymous report to recover the lost gear, which allowed us to continue field experiments.

The daily sightings schedule was shortened because the winds increased after 11 am and made monitoring difficult. Therefore, due to weather conditions, the planned amount of data could not be obtained, but we managed to monitor more days than we calculated because of the few hours we could monitor per day.

Landslides (due to intense rain events) and riots (due to political instability in the country) occurred in the study area, during the project. This delayed our travel to the study site. Therefore, we were obliged to prolong the project to be able to complete the workshops and data collection for the pinger trial. Another unforeseen difficulty was the challenge of communication and scheduling of meetings with fishers through their local authorities. We were able to tackle this by holding repeat workshops at different locations. This was made possible through our previous contacts with fishers in Mancora port. But Mancora is a difficult place to work with fishers because of the presence of more illegal fisheries, high fishery bycatch rates, and because fishers there generally think that the presence of NGOs means attention from the government with

more regulations. This stresses the importance of maintaining continued work and contact with theses fishers.

Figure 3. Poster shared to the community to safeguard the buoy.

4. Describe the involvement of local communities and how they have benefitted from the project.

Our project involved local fishers and women from the port of Mancora. A total of 58 fishers, their children, and women attended workshops (Table 2). Here members of the communities learned about the basic biology and identification of the most common bycatch species and threats to cetaceans in Peru. Presentations also included general information on how to release cetaceans in the case of entanglements and the potential benefits of using pingers (Figure 4).

From the fishers that attended the workshops, four were trained to be the onboard observers for the pinger trials. These observers were provided constant training in data collection during the project. These individuals may have benefitted from the project through increased awareness of cetacean entanglements, by creating new alliances with other fishers, through the trialing with pingers, and by engaging in more organized conversations on potential solutions to their bycatch problems.

Table 2. Attendees to the workshops in Mancora.

Location	**Date**	**Attendees**
Mancora port	10 Aug 2022	8
Mancora port	24 Nov 2022	18
Mancora port	15 Nov 2023	32
Total		58

Figure 4. Meetings and training with fishers and the community of Mancora.

5. Are there any plans to continue this work?

There are plans to continue using the pingers in Mancora and to extend their use to other ports that also have large numbers of fishing vessels using gillnets (e.g., Zorritos and Acapulco). Fishers have demonstrated interest in using the pingers as the problem of losing their nets is constantly increasing. Also, ProDelphinus will continue with their collaboration with different projects with fishers from ports in northern Peru. We want to continue working on trying to mitigate further entanglements with different initiatives with humpbacks and other marine megafauna.

6. How do you plan to share the results of your work with others?

We shared the results of our work through the ProDelphinus Instagram profile, Facebook and phone messages to the fishers that participated. We had a virtual presentation of the project to students and professors of the Universidad Cientifica del Sur (Peru) and are currently working on two scientific publications summarizing study findings. One of these publications will be the BSc thesis of an undergraduate student of the Universidad Cientifica del Sur (this dissertation will be available to the public). We also plan to present the results of the scientific publications at different scientific events. Once we have our publications finished, we will share results with the two fisheries-related governments institution in Peru: IMARPE (Institute of the Sea of Peru) and PRODUCE (Ministry of Production). These results will be translated into Spanish and a version suitable for distribution to the general public will also be prepared.

7. Looking ahead, what do you feel are the important next steps?

One important next step will be to continue trials of the pingers with fishers in the area. We need to continue developing more robust data (i.e., also try different brands and frequencies of pingers) to demonstrate the functionality of this technology. We also need to gather more funds to be able to buy more pingers for fishers who wants to use them in their gillnets. For this, identifying key fishers to contribute to this work and provide leadership will be crucial in establishing greater participation and adoption of any new regulations of use of mitigation gear.

As mentioned in our previous project, fishers invest approximately $500 per net pane, and they use approximately 43 panes per vessel. This is a substantial burden considering their financial situation. Therefore, a financial aid programme and mitigation strategies for fishers that use gillnets is urgently needed. Additionally, Information on the scope of the problem is still necessary, including about bycatch rates and the total numbers of whales killed and injured as bycatch each year.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

The Rufford Foundation logo was used on all slideshow presentations, informational flyers, data sheet documents, and attendance lists. It was used during the three presentations we organised for fisher workshops. For each of these presentations, the Rufford logo was included on the slides. We also printed and donated the informational flyers which credit Rufford. We regulalry provided evidence of our work including photographs, updates and educational materials to The Rufford Foundation over the course of the project (Figure 5).


LISTA DE ASISTENCIA

TEMA:

FECHA: 10 / 08 / 22 HORA DE INICIO: 5:00 pm

LUGAR: Máncora

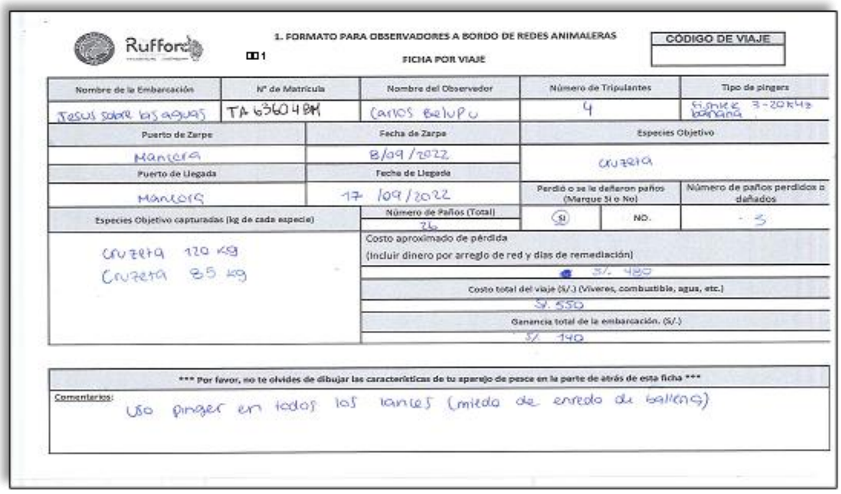
NOMBRE Y APELLIDO	N° DE CONTACTO	OCUPACIÓN

RESPONSABLE DEL REGISTRO: FIRMA:


LISTA DE ASISTENCIA

NOMBRE Y APELLIDO	N° DE CONTACTO	DNI

RESPONSABLE DEL REGISTRO: FIRMA:


1. FORMATO PARA OBSERVADORES A BORDO DE REDES ANIMALERAS

001

FICHA POR VIAJE

CÓDIGO DE VIAJE

Nombre de la Embarcación	N° de Matrícula	Nombre del Observador	Número de Tripulantes	Tipo de pingers
Jesus sobre las aguas	TA 63604 BM	Carlos Belupu	4	fisher 3-20kHz banana

Puerto de Zarpe	Fecha de Zarpe	Especies Objetivo
Mancora	8/09/2022	cruzeta
Puerto de Llegada	Fecha de Llegada	
Mancora	17/09/2022	

Especies Objetivo capturadas (kg de cada especie)	Número de Paños (Total)	Perdió o se le dañaron paños (Marque Si o No)		Número de paños perdidos o dañados
	26	SI (marked)	NO	3

Especies Objetivo capturadas: cruzeta 120 kg; cruzeta 85 kg

Costo aproximado de pérdida (Incluir dinero por arreglo de red y días de remediación): S/. 480

Costo total del viaje (S/.) (Víveres, combustible, agua, etc.): S/. 550

Ganancia total de la embarcación. (S/.): S/. 140

*** Por favor, no te olvides de dibujar las características de tu aparejo de pesca en la parte de atrás de esta ficha ***

Comentarios: Uso pinger en todos los lances (miedo de enredo de ballenas)

Figure 5. Samples of materials produced during the project: a final poster, datasheets of the onboard observers, and attendance lists.

9. Provide a full list of all the members of your team and their role in the project.

Chiara Guidino Bruce

- Trips logistics and project supervision.
- Lead logistics with fishers (i.e., called fishers, arranged meetings, trained onboard observers) analysis of the data, conducted presentations, presented results.

Daniela Thorne

- Helped with the onboard observer training and with the second workshop.

Vania Arrese

- Helped with the onboard observer training, educational material and with the first workshop.

Adrian Custodio

- Helped to process the data of the pinger trial.

Stephanie Annette Galan

- Conducted the field study for the theodolite trial, analysis of the data from the theodolite trial. B.S. student.

Saba Hajek

- Field assistant for the theodolite trial, educational materials and help to process the data.

Field assistants that oversaw assisting in field activities:

- **Sergio Pingo**
- **Danitza Sanchez**
- **Carlos Belupu**
- **Pedro Anton Fiestas**

10. Any other comments?

We are very thankful to The Rufford Foundation for providing us with this grant to start working to understand the effects of pingers on reducing bycatch for cetaceans in northern Peru. Thanks to the project, more is known about possible solutions to reduce bycatch, but a definitive answer has not yet been found, and the team will continue seeking funds to further this work.