

Final Evaluation Report

Your Details	
Full Name	Ana María García Cegarra
Project Title	Whale-watching in northern Peru: promoting best practices and assessing effects on nursing behaviour
Application ID	29456-2
Date of this Report	January 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
To understand whether whale-watching disrupts nursing and group cohesion between mother-calf pairs of humpback whales				We were able to perform fieldwork in Los Organos (northern Peru) during July and August 2022. We performed 63 h of boat surveys and 89 h of land-based surveys to obtain data of humpback whales. We observed a total of 323 humpback whales individuals and 27 mother-calf pairs. We obtained drone images and 5 hours of high-quality drone videos of 23 humpback whale mother-calf pairs with and without the presence of whale-watching boats. During the videos we were able to analyse their behaviour (breathing frequency, diving time, surface time, number of rollings, fluke slaps and jumps) of both mother and calf. The results of the study and being analysed and they are part of a Bachelor student thesis from the Universidad Científica del Sur (in Lima, Peru).
To understand whether adult humpback whales fast during nursing season in northern Peru				To achieve this objective, we planned to have humpback whale skin biopsy samples for stable isotope analysis (C, N and S) at the beginning and end of their breeding season (August and October 2022). However, we were able to obtain skin biopsies at the beginning of the season. We obtained 16 skin tissue samples of adult humpback whales and their potential preys in northern Peru (zooplankton and Peruvian anchovies) which are currently being analysed at the Stable Isotope laboratory at the University of Antofagasta (Chile).
To promote sustainable whale-watching to local tour operators in the nursing area of				We performed two workshops on whale-watching best practices to local tour operators and fishermen of Los Organos and El Ñuro villages. A total of

humpback whales in northern Peru				44 participants assisted to both workshops. Moreover, we were invited by one of the man whale-watching companies to perform talks to their tour guides to provide information about our research and the importance of maintain best practices when observing mother-calf pairs (Figure 1, 2)
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2. Describe the three most important outcomes of your project.

- a) To main outcome of this study was to train a Peruvian marine biology student in the fieldwork to study humpback whales, such as take biopsy samples, perform photo identification of humpback whale flukes, obtain zooplankton and small pelagic fish samples and operate the drone to study humpback whale behaviour. As part of this project, I met Piero, a marine biology student of the Universidad Científica del Sur in lima. Piero performed the field work with the help of me and my team from Chile who travelled to Los Organos in Peru to train Piero and perform the field work in 2022. We trained Piero in the use of the drone from both the boat and the cliff in order to register the behaviour of mother and calf humpback whales' pairs with and without the presence of whale-watching boats to assess their effect on nursing behaviour. We obtained high quality drone images which are being analyzed at this moment by Piero using the software Boris and Morphometrix.
- b) To be able to promote whale-watching best practices among tour operators in northern Peru and raise their awareness and impulse a behaviour changes during whale-watching. We performed two workshops on whale-watching best practices with an assistance of 40 participants. During the workshops we gave a questionnaire to the participants to understand their view and thoughts regarding whale-watching impacts on humpback whales (especially mother-calf pairs). Whale-watching is growing very fast in the region, from one whale-watching boat in 2009 to 13 observed in 2022. During our fieldwork and with the help of the drone we were able to obtain high quality images of mother-calf pairs being harassed by whale-watching boats. Later, during our workshops we showed these images to participants, and they realised about the changes of behaviour of humpback whales during the presence of whale-watching boats (Figure 3). We showed how mother-calf pairs are the most susceptible groups to be harassed as the calf was defenceless and had to suckle on its mother's milk. We even were able to register lactation behaviour with the calf positioned under the belly of the mother for more than 1 minute.
- c) To register for the first time the presence of a mother and calf southern right whales (*Eubalaena australis*) in northern Peru. During our boat survey we register the presence of mother-calf southern right whales swimming very close to shore in el Ñuro village (Figure 4). We were able to fly the drone and obtain the first images of this species at this latitude and register 10 minutes of their communication sounds with the hydrophone. The southern right whale Chile-Peru subpopulation is listed as Critically Endangered in the IUCN Red List of

Threatened Species. The northernmost record of the species was in Lima by Koen Van Waerebeek et al., (2009). However, we observed the northernmost record in 2022 at latitude 4°S. The results are being published in Aquatic Mammals journal jointly with new records of Chile and Ecuador for this species. In addition, other important achieve was the observation and record of entangled humpback whales in the study area. During the study period we observed three entangled humpback whales. The behaviour of one of them was register with the drone (Figure 5). The video is being analysed to publish a short communication with the swimming speed of entangled humpback whales. These observations are very important for this area as humpback whales are susceptible to entangled in fishing nets or ghost nets and they may die due to entanglement.

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

Due to Covid-19 pandemic we were not able to perform fieldwork during the humpback whale breeding season in 2021. We had to ask for an extension of the project from The Rufford Foundation, which was accepted, and in 2022 season we performed the fieldwork with incredible results for our study.

During fieldwork, the first difficulty was to get a motorboat with a 60 HP outboard engine to obtain skin tissue samples of humpback whales. As we work during the whale-watching season, overall boats were occupied with tourists and skippers preferred to do whale-watching instead to work with us as they earn more money with tourism. Hence, the price of boat rent increased, and we spent more money than budgeted on boat rental. We decided to stop boat rent when we got 16 skin tissue samples.

The second difficulty was weather conditions to take humpback whale biopsy samples, and wind blows early in the morning 10 am, we had to start navigations during sunrise to be able to spend much time as possible before wind started.

Due to Peru political crisis, we were not able to obtain skin tissue samples at the end of nursing season. Hence the stable isotope analysis will be performed just with the skin tissue samples obtained at the beginning of the humpback whales nursing season.

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

We have helped to train marine biology Peruvian students in the use of drone to study large baleen whales and to obtain skin tissue biopsy samples.

We have trained fisherman and tour operators in good navigation practices around whales and promote whale-watching best practices.

We have contributed to follow the Peruvian whale-watching regulation protocol among whale-watchers.

We have promoted other marine biology students to pursue a career in cetacean research in Peru.

We involved the Peruvian Navy in Los Organos to promote best practices for the whale-watching industry.

Involvement of tourist in humpback whale research during our boat surveys onboard whale-watching tours.

5. Are there any plans to continue this work?

Absolutely! As the whale-watching industry in northern Peru is growing so fast and without legislation we aim to continue our research every humpback whale breeding season to promote best practices and inform about whale-watching regulations in order to prevent harassment to whales.

We plan in the long-term:

- Continue the long-term research programme regarding the effects of whale-watching on the behaviour and health status of humpback whales, especially those vulnerable groups of mother and calves.
- Publish the results of our studies in international scientific journals but also among local community and authorities in order to raise their conservation awareness in humpback whales and pursue the Peruvian Government in regulate whale-watching tourism, such as the number of boats allowed to observe a group of whales, or the total number of boats that the system (that is the area where whale-watching is being performed) can support.
- To train more young Peruvian biologists in whale research using new techniques such as drone, biopsy samples, genetics, pollutants or stable isotopes to know better humpback whale life history and threats faced by cetaceans in northern Peru.
- To start research on entangled humpback whales in northern Peru. We are very worried about the number of entangled humpback whales we observed during our study period. Hence, we would like to start research in the distribution of ghost nets and if they co-occur with the humpback whale distribution. We would like to understand the effect of entanglement in the survival of humpback whales in this area.

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

- Scientific publications: we aim to publish two scientific papers this year with the results obtained in this study. We aim to assist to the Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Marina which will take place in Ecuador (2024) with the results of the project.

- Social media: we have published the activities performed during field work in CIFAMAC social media (Facebook and Instagram) with a very high participation. Moreover, we published when we found entangled whales in our social media to other tour operators contact us during the day to monitor the behaviour of entangled whales and try to release them (Figures 6, 7 and 9).
- Workshops: workshops are needed at least at the beginning of each humpback whale breeding season to inform whale-watching tour operators about the best practices to avoid humpback whales' harassment during observation. We realised that after our workshops the behaviour of whale-watching boats captain changed, and they maintained distance during whale observations and spent less time observing whales.

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

The most important next step is to perform whale-watching best practices workshops every humpback whale breeding season in northern Peru to local tour operators. The whale-watching industry is growing so fast, with new boats every year and skippers and owners are not aware about best practices. It is necessary to do this every year at least at the beginning of the whale-watching season.

It is necessary to continue the research and perform valuable data on the effects of whale-watching on humpback whale behaviour and health status. With this the next step is to have meetings with Peruvian authorities of Ministerio de la Producción de Peru and show the carrying capacity of the system, as there should be a regulated number of boats performing whale-watching in los Organos village. I will apply for the next funding of The Rufford Foundation to get this objective.

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?

Yes! The Rufford Foundation logo was used in every power point presentation talk, as for workshops and meetings (as the images showed below). The Rufford Foundation logo was used in t-shirts of the project and social media publications. Moreover, the logo was used in the brochure of whale-watching guidelines to observe humpback whales.

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

Ana M. García-Cegarra – Main Scientific Advisor, design and organize project activities. Coordinate field work in Los Organos. Perform stable isotope analysis of humpback whale skin tissue samples and their potential preys.

Piero Uceda – Bachelor student and Research Assistant. Perform field work in Los Organos including boat surveys for biopsy samples, photo identification, zooplankton sampling and drone flights from boat and land. Data analysis of humpback whales' mother-calf pairs behaviour.

Luis Aguilar – Research Assistant. Take biopsy samples and drone flights.

Juan Menares – Skipper and technical support. Skipper.

Shaleyia Kelez – Logistic and technical support. Logistics in Los Organos, help with the permits requirements to obtain skin biopsy samples in Peru.

10. Any other comments?

I want to thank The Rufford Foundation for provide the necessary funds to perform this study in whale-watching effects on humpback whales' behaviour and promoting best practices to whale-watchers. Without the help and support of The Rufford Foundation it would have been impossible to perform this study, train new whale researchers and promote best practices among tour operators. These funds are very important to perform research and education in poorly studied regions such as northern Peru. Thank you to the Rufford Foundation!



Figure 1: Whale-watching best practices workshop performed in El Ñuro.



Figure 2: whale-watching best practices workshop performed in Los Organos.

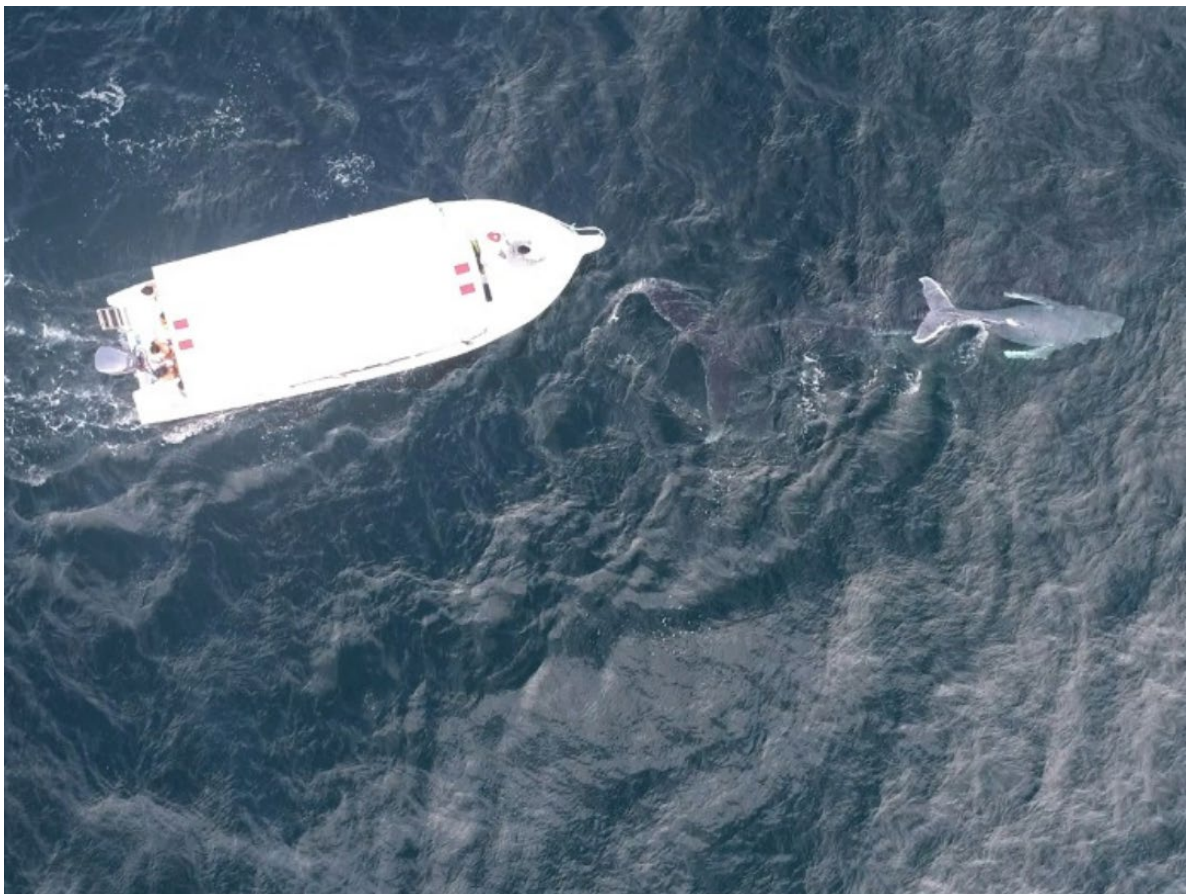


Figure 3: Image of a very close encounter of a whale-watching boat with a mother-calf pair of humpback whales.

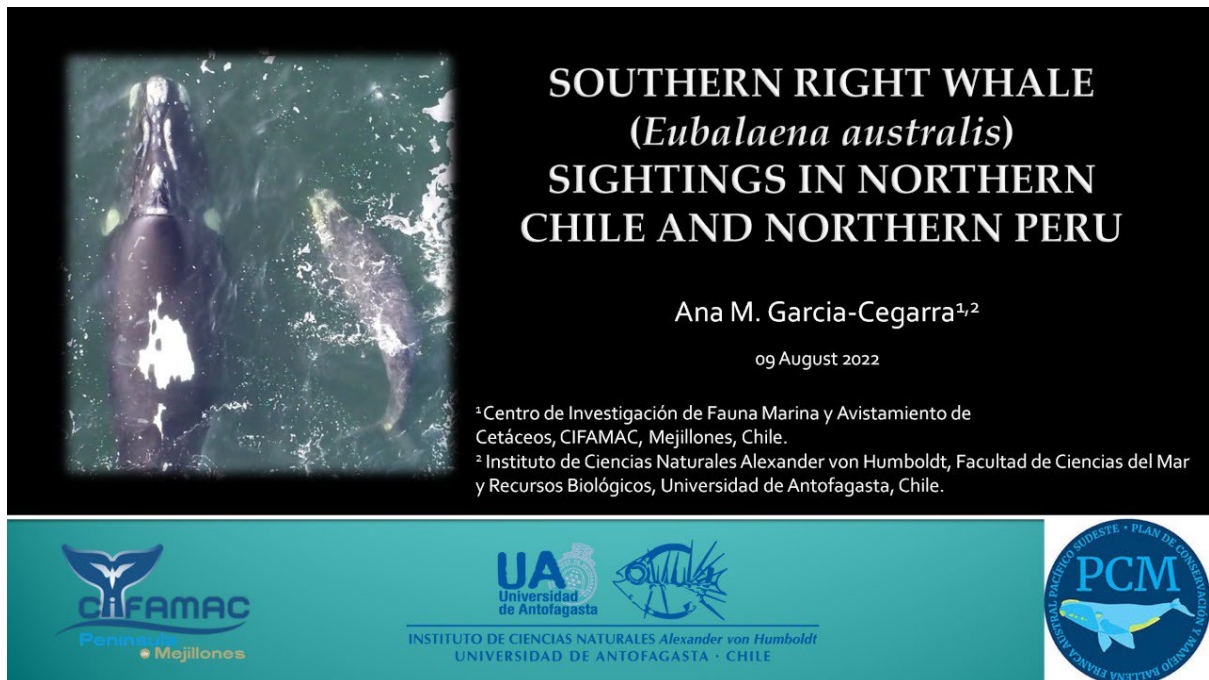


Figure 4: Participation in the southern right whale workshop organized by the Plan de Conservación y Manejo de Ballena Franca Austral del Pacífico Sureste to show our northernmost record of mother-calf southern right whales.



Figure 5: Entangled juvenile humpback whale in a fishing net in its fluke.

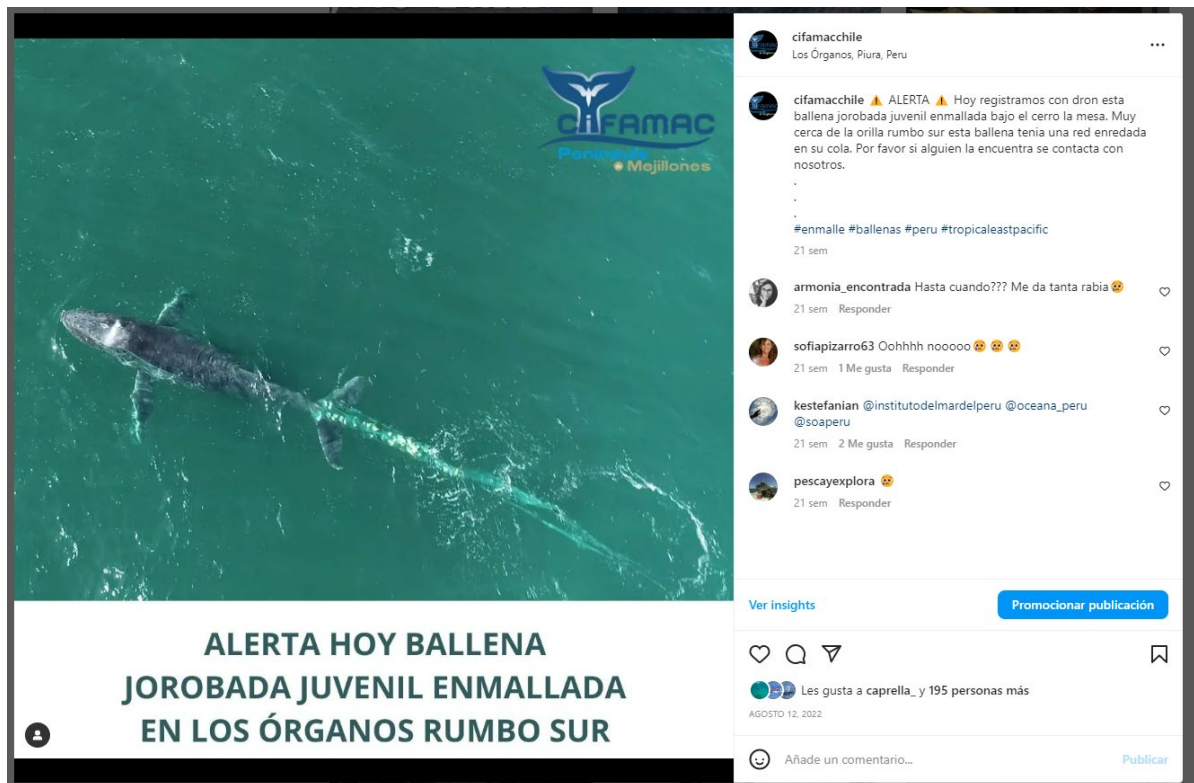


Figure 6: Instagram publication of and entangled humpback whale in Los Organos.

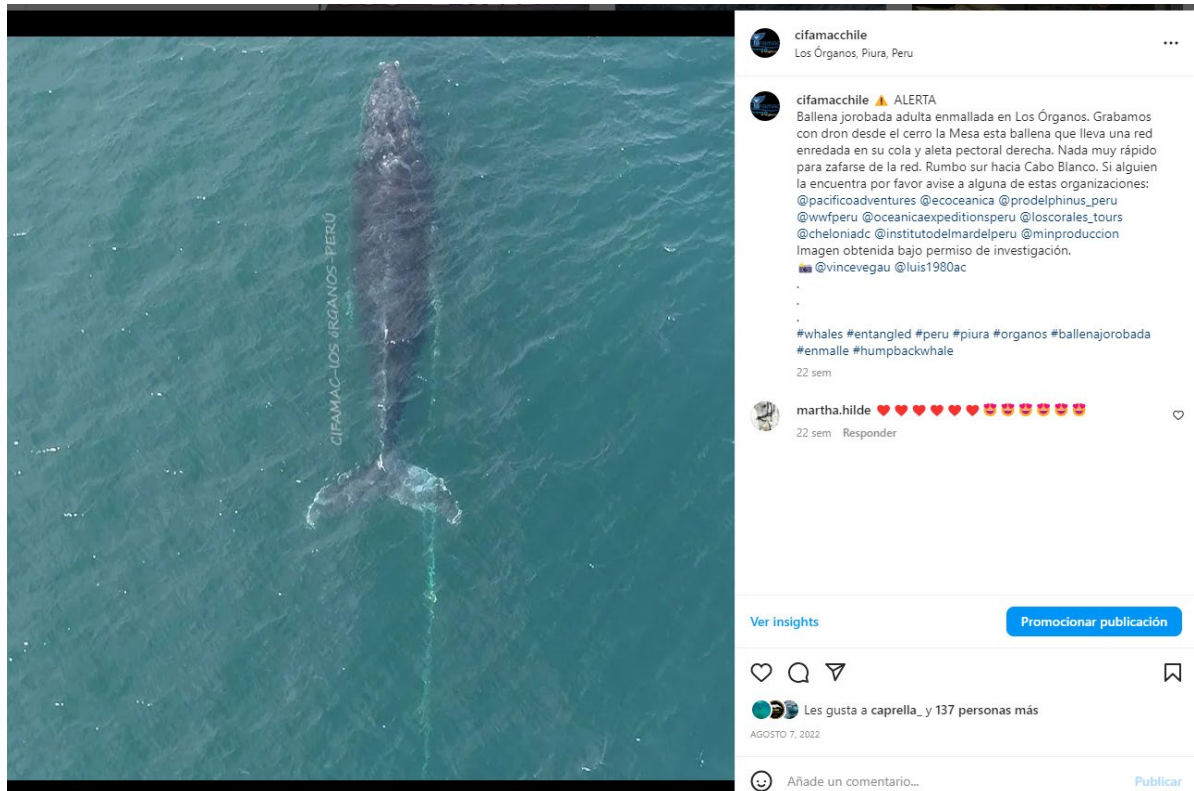


Figure 7: Instagram publication of an entangled humpback whale in Los Organos.



Figure 8: Presentation of the objectives and preliminary results of the study at the Universidad Científica del Sur by Piero Uceda for the Simposio de Investigadores en Formación de Biología Marina, December 2022.



Figure 9: Piero during his talk in the Simposio de Investigadores en Formación de Biología Marina (Lima, December 2022).



Figure 10: The Rufford Foundation logo in t-shirts of the project.

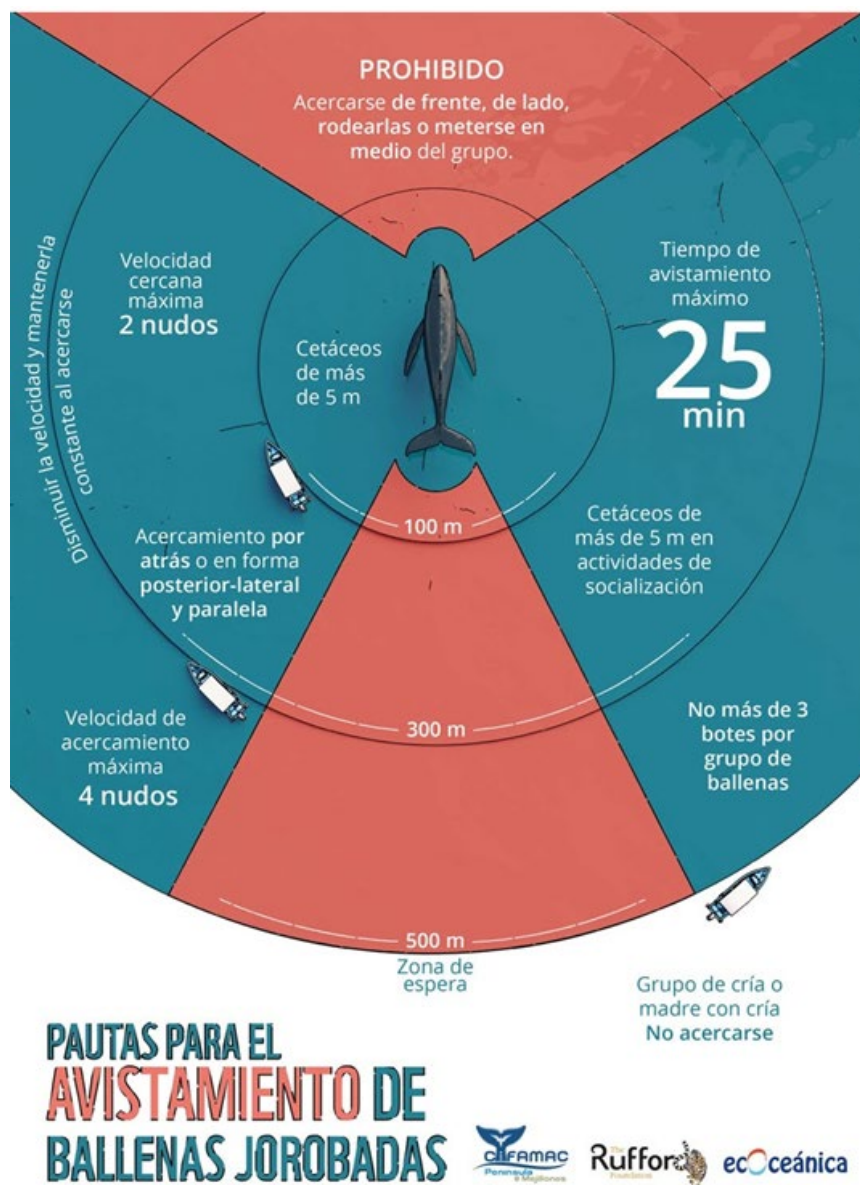


Figure 11: Brochure designed and distributed to whale-watching tour operators during best practices workshops.