Final Evaluation Report

Your Details	
Full Name	Omar García Castañeda
Project Title	Development of a proposal to guide the sustainability of the whale watching industry in Baja California Sur, Mexico.
Application ID	35804-2
Date of this Report	August 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
Workshop with the various stakeholders and key actors that are related to WW in Baja California Sur (BCS)				
Document that will include the results of the surveys from the educational, scientific, governmental, recreational, biological and socioeconomic sectors.				There was a change in the survey implementation. Surveys couldn't be conducted in Cabo San Lucas due to expert recommendations, so we refocused our studies on the northernmost area. However, we also included another community from the area that was not initially considered.
Informative workshop detailing the final results of this study.				

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

a). An outreach was successfully established with various communities in Baja California Sur engaged in whale watching, which currently face multiple social conflicts and are impacted by the effects of climate change on gray whales. This impact was utilised to emphasise the necessity of transitioning the activity towards a more sustainable state. These communities have been provided with the necessary information to comprehend the climate issue and acknowledge the need to address these changes in a way that benefits them economically while reducing the impact on the whales.

b). Through a hybrid methodology that encompassed bibliographic information, scientific monitoring, and participatory activities such as interviews, surveys, and workshops, the socio-ecological system of gray whale watching in Mexico was characterised. With a focus on climate change resilience, this approach aims to contribute to a more sustainable tourism system.

c). A conceptual model is formulated that theoretically explains the interactions among the different components that constitute the socio-ecological system of gray whale watching, and how this system can be resilient and more sustainable in the face of climate change.

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

Within this project, we encountered significant challenges associated with complex socio-ecological systems. As part of the whale watching system in small and medium-sized communities, social issues emerged across various domains, which posed considerable obstacles to the project's advancement. For instance, at the project's inception, a decline in the gray whale population was already evident in the area. Some tourism service providers propagated a rumour suggesting that the scientists' presence was linked to this decline, assuming that the methodological processes of biological data collection were repelling the whales. This assumption was corroborated through comments from service providers and in-depth interviews. Consequently, in our inaugural workshop, we dedicated a specific segment to comprehensively discuss the techniques employed in scientific monitoring. We also delved into the repercussions of climate change on the gray whale population, specifically addressing its effects on feeding and reproductive zones. This educational effort effectively conveyed to service providers and community members the genuine causes behind the decline in whale numbers, clarifying the indispensability of scientific work and dispelling the misconception that it negatively impacts the whales – quite the opposite, it aids them.

Another challenge arose during the project's progression when government agencies decided to halve the number of permits issued throughout the entirety of Baja California Sur. This decision engendered distrust among certain members of the community, as they suspected that, being the sole group of researchers working with gray whales in the area, we may have advised the government to reduce the permit count. In response, our access was restricted in one of the communities. They stipulated that the research be carried out aboard a designated vessel operated by a specific individual, ensuring oversight of our work. We willingly complied with their requests and, in the ensuing workshop, addressed the permit reduction matter, unequivocally clarifying our lack of involvement in the decision and rectifying the situation with the community.

In the Cabo San Lucas (CSL) region, NOM evaluations were unable to proceed in 2022 due to issues with the monitoring vessel and the allocated complementary resource, which was diverted for repairs. However, the evaluation was successfully conducted in 2023.

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

In this project, communities actively engaged in various ways. On one hand, leaders of tourism service providers participated in in-depth interviews, offering their insights into the key challenges facing whale watching in their communities, their perceptions of climate change, and the critical needs where our scientific expertise could assist. On the other hand, leaders of service providers, operators of tourist vessels, and the general public participated in workshops. Throughout these workshops, they reaffirmed or added to the information gathered from interviews, discussed issues, and explored potential solutions. Furthermore, participants gained knowledge about fundamental concepts in gray whale biology, ecology, and the main threats they encounter. Their global biological

significance was emphasised, along with the potential for tourism associated with whale watching. The effects of climate change on the gray whales were explored, detailing how these impacts manifest in the populations that visit these communities. A comprehensive analysis of the Mexican Official Standard NOM-131-SEMARNAT-2010, which establishes guidelines and specifications for whale watching, was conducted.

Possible scenarios for upcoming seasons were discussed, and adaptation strategies were explored. Ultimately, the importance of gray whale conservation and the implementation of preservation actions to ensure their wellbeing in tourism areas were underscored.

Tourists who participated in surveys also received detailed information about gray whale biology and conservation, as well as the NOM-131 regulations. Additionally, informational material about gray whale biology and the guidelines of NOM-131 was created and distributed to all workshop and interview participants, as well as surveyed tourists. This material was based on a calendar and supplemented with a poster provided by the Marine Mammal Research Program (PRIMMA) at the Autonomous University of Baja California Sur (UABCS).

5. Are there any plans to continue this work?

The project funded by The Rufford Foundation achieved positive outcomes in its first year of implementation (during 2022), leading to the involvement of other organizations in financing the expansion of activities for 2023. However, to achieve lasting impacts, ongoing support is needed to guide the design and implementation of climate change adaptation strategies in these communities and some neighbouring areas facing similar situations.

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

To date, the results have been shared in workshops held within different communities, as well as at two scientific conferences and a student symposium. Furthermore, we are in the process of preparing a popular science article and a scientific paper, both of which are expected to be submitted for review in the coming months.

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

The next immediate and significant steps involve establishing climate change adaptation strategies to ensure the resilience and sustainability of whale watching in the region, as well as assessing the interest and feasibility of extending this project to nearby areas. We hope to continue having the necessary funding support.

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?

Certainly, all the material used in this project that came into contact with participants prominently featured The Rufford Foundation's logo. Specifically, the 500 calendars distributed included the logo. Additionally, all workshop presentations contained the logo, as did the materials such as presentations and posters showcased at conferences and the student symposium.

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

M.C. Omar García Castañeda.
Project Leader. Fieldwork organization, workshop design and presentation, interview and survey design and implementation. Fund administration, report writing.

PhD. Enrique Martínez Meyer.
Review of interview and survey questions, as well as data related to climate change.

PhD. Lorena Villoria Gomora.
Fieldwork organization, workshop design and presentation.

PhD. Pamela Martínez Loustalot.
Biological monitoring, compliance record keeping in the Los Cabos area.

M.C. Roberto López Espinosa de los Montero:
Workshop design and facilitation.

PhD. Jafet Quintero.
Interview and survey design and evaluation.

Volunteer students in tourist survey application:
Itzel Betzabe Pérez Arias
M.C. Citlali Cuevas Flores

10. Any other comments?

Regarding the change in one of the communities for the provider surveys, the Cabo San Lucas community encountered difficulties in obtaining non-extractive utilisation permits for whale watching, leading to conflicts of varying scales. Moreover, based on input from tourism experts, it was advised to narrow down the social study to a single area with smaller communities sharing similar characteristics. Given that Cabo San Lucas is a hub for mass tourism while the communities of Bahía Magdalena consist of smaller, more comparable ones, it becomes more feasible to implement changes that promote sustainability. On the other hand, an extensive area like Cabo San Lucas would require different strategies. As a result of these considerations, the Puerto Chale community was incorporated into our study, enabling us to draw comparisons with Puerto San Carlos and Puerto Adolfo López Mateos. These three communities utilise the three gray whale breeding lagoons within the Bahía Magdalena – Bahía Almejas Lagoon Complex.

Furthermore, we introduced semi-structured surveys aimed at tourists, which helped us understand factors associated with activity satisfaction, the extent of perceived compliance with regulations, and the quality of information provided during excursions.

Supplementary Material

Project: Development of a proposal to guide the sustainability of the whale watching industry in Baja California Sur, Mexico.
35804-2

Omar García-Castañeda

Table I. List of variables obtained in tourist surveys and used in a regression tree.

Socioeconomic variables	**Acronym**	**Description**	**Specification or how the variable was queried**
Origin	PROC	Mexican, foreigner	Boolean
first-timers	PRIM	If it is the first time you do the activity	Boolean
Reason for visit	MOT	Visiting family, friends, for work or sightseeing	Boolean
Gender	GENE	man, woman, other	Boolean
Age	AGE	Years old	discreet
educational level	NOR IS	Elementary, middle school, high school, college, graduate	discreet
Income level	NONE	Average monthly income in pesos or dollars, equivalent to less than 8,000 to more than 40,000	discreet
Perception variables			
NOM compliance	NOM	Perception of compliance with NOM-131-SEMARNAT-2010	likert scale
learn new information	APRE	If you considered that the amount of information was sufficient	likert scale
What they liked the most	MGUS	In a word, indicate what you liked the most	open question
What they liked least	LGUS	In a word, indicate what you liked the most	open question
Satisfaction Variables			
Satisfaction with the information	SYNF	If you are satisfied with the information given to you during the tour	likert scale
Satisfaction to see pups	SVCR	If you are satisfied with the baby whales you have seen	likert scale
Satisfaction number of whales	SCBA	If you are satisfied with the number of whales you have seen	likert scale
Satisfaction with the climate	SCLI	If you are satisfied with the weather conditions	likert scale
overall satisfaction	SGEN	How satisfied are you with the activity you did?	likert scale

According to the correlation tree, tourists' satisfaction was primarily linked to satisfaction with the information provided during the tour, followed by the perception of having learned new information and the tourist's level of education. Ultimately, overall satisfaction depended on whether the respondents were local tourists residing in BCS; non-local national tourists were generally less satisfied, particularly with the quality of the information (Fig. 1).

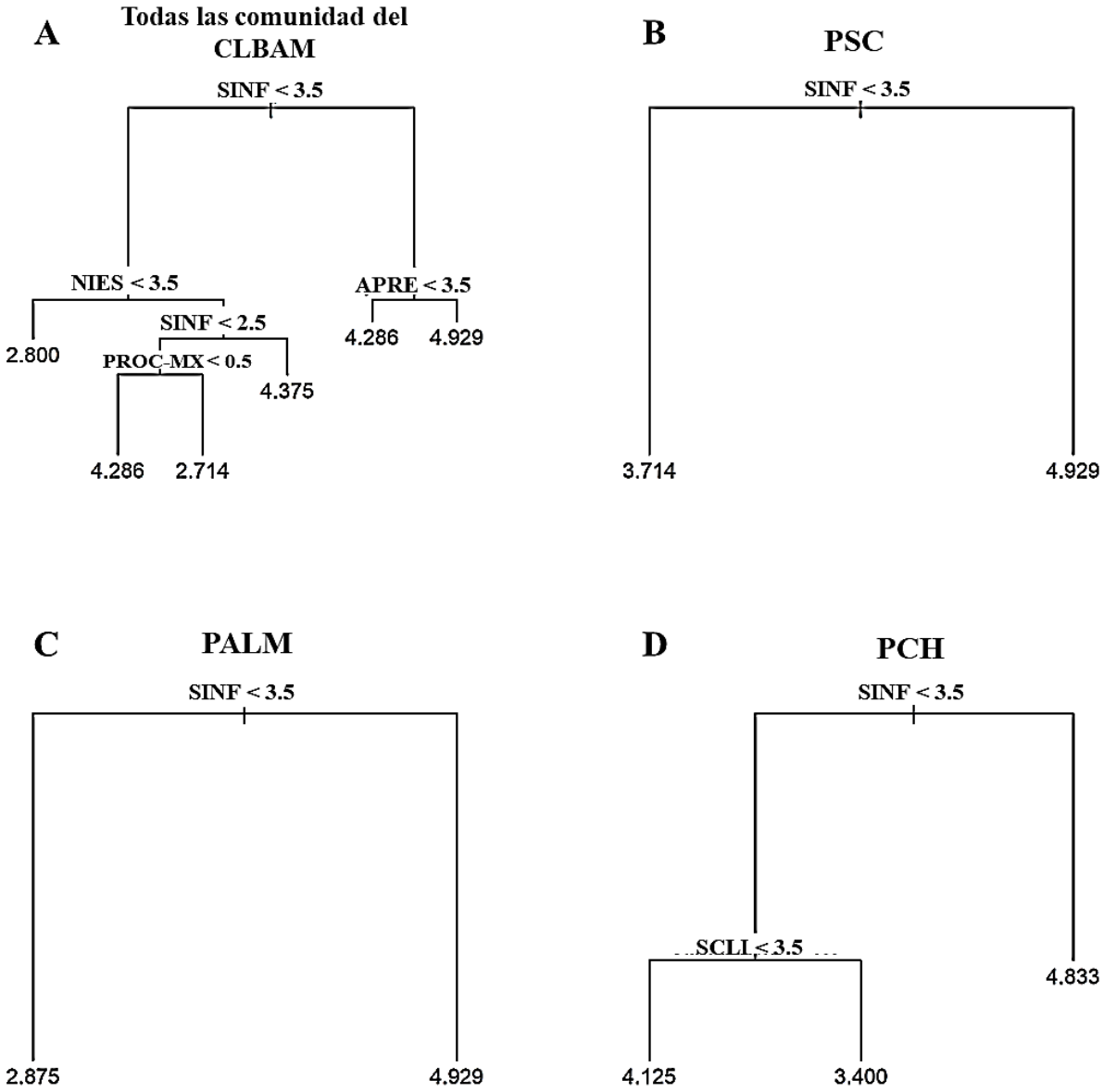


Figure 1. Segmentation of tourists according to their overall satisfaction with gray whale watching. SINF: Satisfaction with information, APRE: Acquiring new information, NIES: Level of education, PROC-MX: Mexican non-local origin, PSC: Puerto San Carlos, PALM: Puerto Adolfo López Mateos, PCH: Puerto Chale.

Regarding compliance with the Official Mexican Standard NOM-131-SEMARNAT-2010, a clear association was found between the Puerto San Carlos community and the lack of adherence to the established time limit for groups of three or more whales. In the sightings of solitary whales, there was a failure to respect the observation time and approach trajectory. In Puerto Chale and Puerto Adolfo López Mateos, there was a tendency observed to navigate at high speeds when encountering solitary whales (Fig. 2).

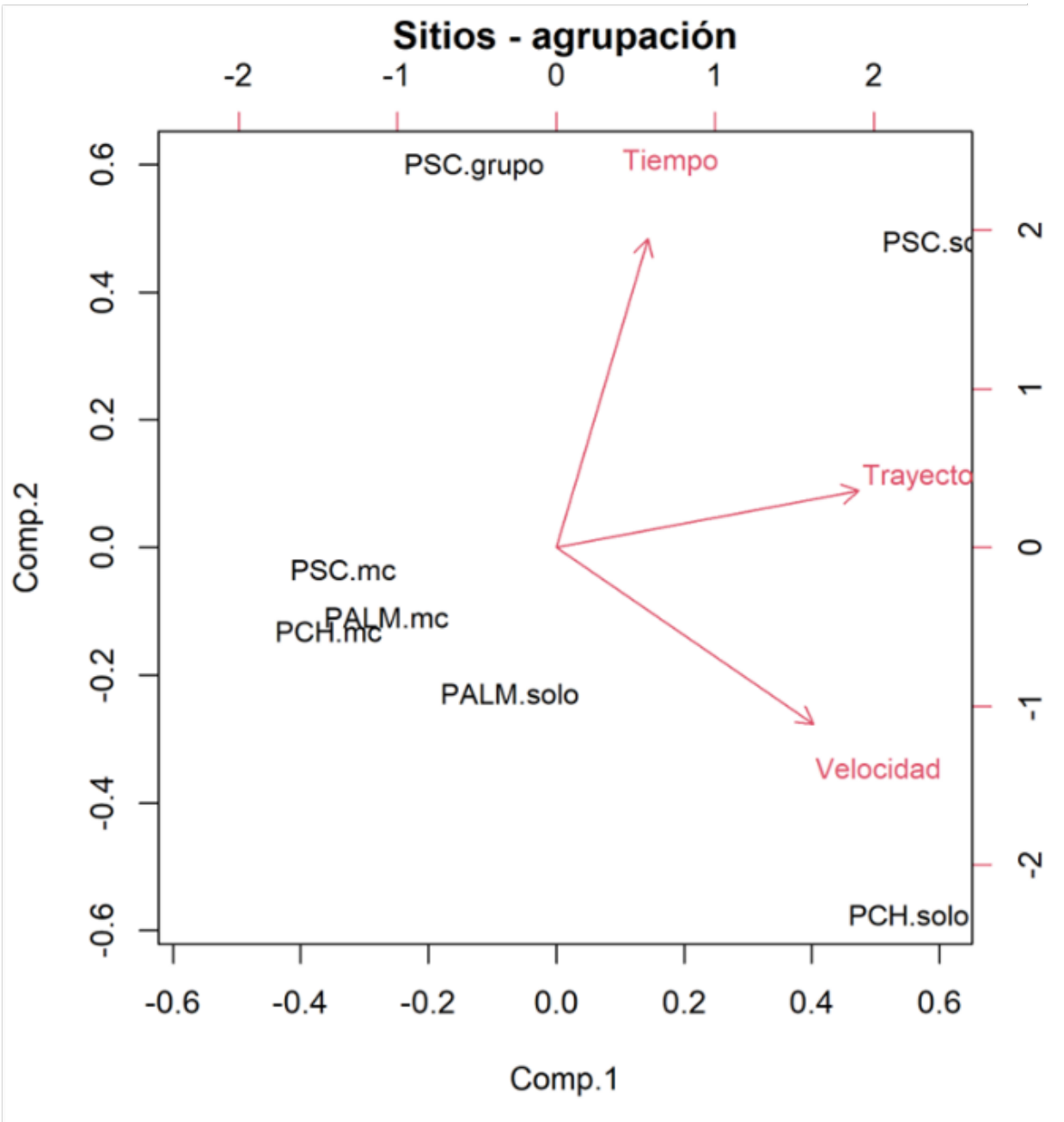


Figure 2. Principal Component Analysis Diagram. Representative violations of regulations among different groups of gray whales in the communities of CLBAM. PSC: Puerto San Carlos, PALM: Puerto Adolfo López Mateos, PCH: Puerto Chale. Group: groups of 3 or more whales, mc: mothers with calves, solo: solitary whales.

Conceptual model of the Socio-Ecological System of whale watching

Key variables describing the Socio-Ecological System of whale watching in the region were explored. Ice coverage in the feeding area and the sea surface temperature adjacent to the breeding zones were the identified stressors that environmentally explain the number of whales present in the Bahía Magdalena - Bahía Almejas Lagoon Complex. Compliance with Official Standard 131-SEMARNAT-2010 and tourist satisfaction were the state variables related to the conservation and sustainability of the system. Overall, the system would respond to these variables to maintain economic income and the well-being of the whales (Fig. 3).

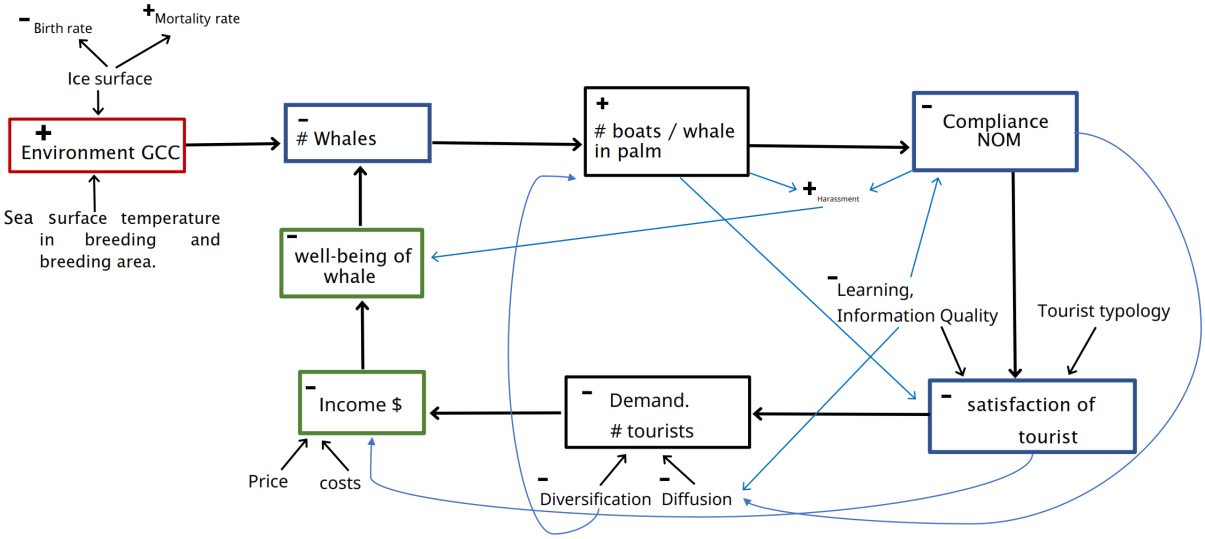
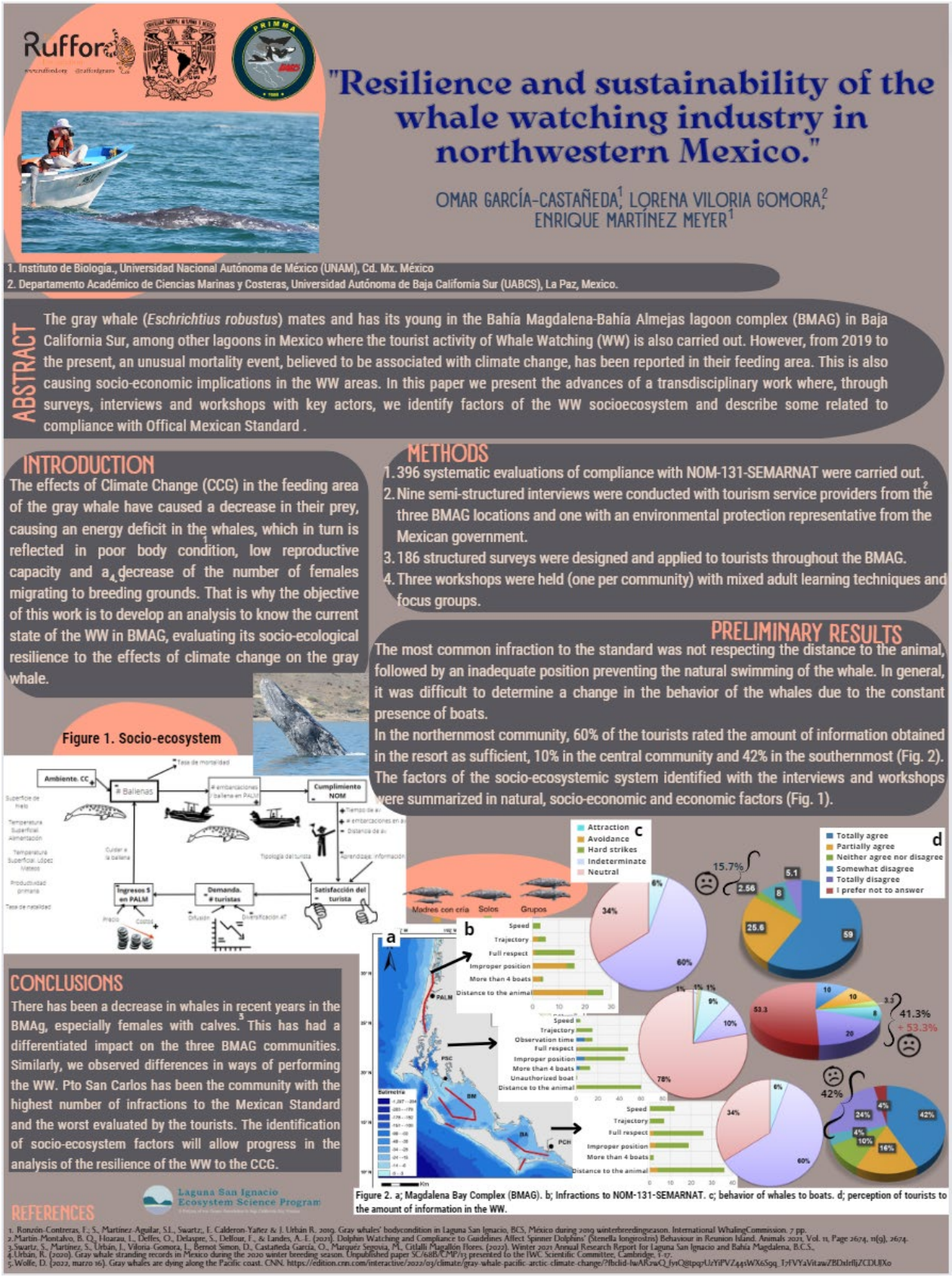


Figure 3. Conceptual model of the Socio-Ecological System of whale watching. The blue outlined box indicates state variables, the red represents the system stressor, and the dates indicate feedback between variables.

Material used: Gray whale calendar and Drawstring bags featuring elements of the NOM-131-SEMARNAT-2010. This resource was employed to educate tourists about the importance of the regulation and provide them with an understanding of how many aspects were fulfilled during the tour. Additionally, it was given away as a commemorative souvenir.

Avistamiento de Ballenas
Normatividad para garantizar el bienestar de los turistas y las ballenas
NOM-0131-SEMARNAT 2010
4 Número máximo de embarcaciones por ballena o grupo de ballenas
30 min Tiempo máximo de observación
2 Nudos o 4 km/h velocidad máxima al estar observando una ballena
240 m Embarcaciones en espera
Embarcaciones menores a 10 m
60 m
80 m Embarcaciones mayores a 10 m
DEBEMOS:
Observar a 60 m de distancia
Observar con motor en posición natural
Acercarnos por la parte lateral de la ballena
PROHIBIDO:
Tirar basura
Acosar a las ballenas u obstruir su camino
Nadar
Bucear
Hacer kayak
Usar motos acuáticas
¡Por un avistamiento responsable de Ballenas!
CONACYT
Ruffo

Poster presented at conferences



"Resilience and sustainability of the whale watching industry in northwestern Mexico."

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ABSTRACT

The gray whale (*Eschrichtius robustus*) mates and has its young in the Bahía Magdalena-Bahía Almejas lagoon complex (BMAG) in Baja California Sur, among other lagoons in Mexico where the tourist activity of Whale Watching (WW) is also carried out. However, from 2019 to the present, an unusual mortality event, believed to be associated with climate change, has been reported in their feeding area. This is also causing socio-economic implications in the WW areas. In this paper we present the advances of a transdisciplinary work where, through surveys, interviews and workshops with key actors, we identify factors of the WW socioecosystem and describe some related to compliance with Offical Mexican Standard .

INTRODUCTION

The effects of Climate Change (CCG) in the feeding area of the gray whale have caused a decrease in their prey, causing an energy deficit in the whales, which in turn is reflected in poor body condition[1], low reproductive capacity and a decrease[4] of the number of females migrating to breeding grounds. That is why the objective of this work is to develop an analysis to know the current state of the WW in BMAG, evaluating its socio-ecological resilience to the effects of climate change on the gray whale.

METHODS

1. 396 systematic evaluations of compliance with NOM-131-SEMARNAT were carried out.
2. Nine semi-structured interviews were conducted with tourism service providers from the[2] three BMAG locations and one with an environmental protection representative from the Mexican government.
3. 186 structured surveys were designed and applied to tourists throughout the BMAG.
4. Three workshops were held (one per community) with mixed adult learning techniques and focus groups.

PRELIMINARY RESULTS

The most common infraction to the standard was not respecting the distance to the animal, followed by an inadequate position preventing the natural swimming of the whale. In general, it was difficult to determine a change in the behavior of the whales due to the constant presence of boats.

In the northernmost community, 60% of the tourists rated the amount of information obtained in the resort as sufficient, 10% in the central community and 42% in the southernmost (Fig. 2). The factors of the socio-ecosystemic system identified with the interviews and workshops were summarized in natural, socio-economic and economic factors (Fig. 1).

Figure 1. Socio-ecosystem

Figure 2. a; Magdalena Bay Complex (BMAG). b; Infractions to NOM-131-SEMARNAT. c; behavior of whales to boats. d; perception of tourists to the amount of information in the WW.

CONCLUSIONS

There has been a decrease in whales in recent years in the BMAg, especially females with calves.[3] This has had a differentiated impact on the three BMAG communities. Similarly, we observed differences in ways of performing the WW. Pto San Carlos has been the community with the highest number of infractions to the Mexican Standard and the worst evaluated by the tourists. The identification of socio-ecosystem factors will allow progress in the analysis of the resilience of the WW to the CCG.

Laguna San Ignacio Ecosystem Science Program

REFERENCES

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2. Martin-Montalvo, B. Q., Hoarau, L., Deffes, O., Delaspre, S., Delfour, F., & Landes, A.-E. (2021). Dolphin Watching and Compliance to Guidelines Affect Spinner Dolphins' (Stenella longirostris) Behaviour in Reunion Island. Animals 2021, Vol. 11, Page 2674, 11(9), 2674.
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ENCUESTA DE TURISMO Y CONSERVACIÓN

E-mail_____

Estimado visitante, ¡Muchas gracias por su tiempo para completar esta encuesta. Es **VOLUNTARIA** Y **CONFIDENCIAL**. Serán menos de 10 minutos de su tiempo cada una, y nos proporciona información muy valiosa para un estudio de Conservación en el Estado de Baja California Sur. De nuevo… ¡Gracias!

Es la primera vez que realiza esta actividad? Sí ☐ No☐. **¿Cuántas veces ha realizado esta actividad**? _____

Motivo principal de la visita (elija solo uno):

Visitar amigos☐ Visitar familia ☐ trabajo☐ Descanso☐ Hacer ecoturismo☐ Otro☐ _____

¿Con quién realizará el tour/actividad? Amigos ☐ Familia☐ Pareja☐ Solo/a☐ Otro☐ _____

¿Ha realizado alguna vez otra actividad de ecoturismo? Sí ☐, No☐ ¿Cuál?_____

Seleccione su grado de interés en la actividad que realizó (marque sólo uno):

Nulo ☐ Bajo☐ Medio ☐ Alto☐ Muy alto☐

En una escala desde Malo a Excelente, indique el grado de satisfacción con los siguientes ítems:

	Malo	Regular	Bueno	Muy bueno	Excelente
Información proporcionada en la actividad					
Con la cantidad de ballenas que observé					
Satisfacción general con el servicio					

Para esta sección pida ayuda al encuestador:

Cumplimiento de la NOM de su embarcación					
Cantidad de embarcaciones en la zona					

Lo que más me gustó de la experiencia fue_____
Lo que menos me gustó de la experiencia fue_____

Por favor indique cuan de acuerdo o en desacuerdo está usted con las siguientes afirmaciones:

	Totalmente en desacuerdo	Algo en desacuerdo	Ni de acuerdo ni en desacuerdo	Algo de acuerdo	Totalmente de acuerdo
Mi visita me ha hecho preocupar más por el bienestar de los animales en general					
Me encontré imaginándome como se sentían estos animales					
Esta visita me hizo pensar en mi deber de cuidar el medio ambiente					

Marca con una "X" bajo que circunstancias regresarías a ver ballena gris aquí:

	Más	Menos	Igual	No me afecta
Cantidad de embarcaciones				
Cantidad de información				
Cantidad de madres con cría				
Cantidad de ballenas en general				

¡Última! ☺ Por favor indique cuan de acuerdo o en desacuerdo está usted con las siguientes afirmaciones:

¿Qué cambiarías de este tour para que fuera aún más disfrutable?

_____

_____

_____

Edad _____ **Sexo:** M☐ F☐ **Estado y País de procedencia** _____

Ocupación: Estudiante☐ Empleado/a☐ Profesional☐ Retirado/a☐ Encargado/a del hogar☐

Empresario/a☐ Obrero/a-Mecánico/a☐ Técnico/a☐ Ejecutivo/a-Gerente☐ Otro☐ _____

Estado civil: Casado/a ☐, Soltero/a ☐, Viudo/a ☐, Divorciado/a ☐, Separado/a☐ Conviviente☐ Otro☐ ____

Número de hijos ___, Edades___, ___, ___, ___

Nivel de ingresos mensuales (Mx): <8.000☐, 8.000-20.000☐, 20.000-40.000 ☐, >40.000☐

Gasto promedio en este viaje (Mx): <5,000☐; 5,000-10,000☐; 10,000-20,000 ☐; >20,000 ☐

Nivel de estudios: Primario ☐, Secundario ☐, Preparatoria ☐, Universitario ☐, Posgrado ☐

¡Gracias por su tiempo!

Format for Compliance Record of NOM-131-SEMARNAT-2010

PROGRAMA DE INVESTIGACIÓN DE MAMÍFEROS MARINOS
REGISTRO WHALE WATCHING

FECHA _____
PUERTO DE SALIDA _____
EMBARCACIÓN _____
ANOTADOR _____

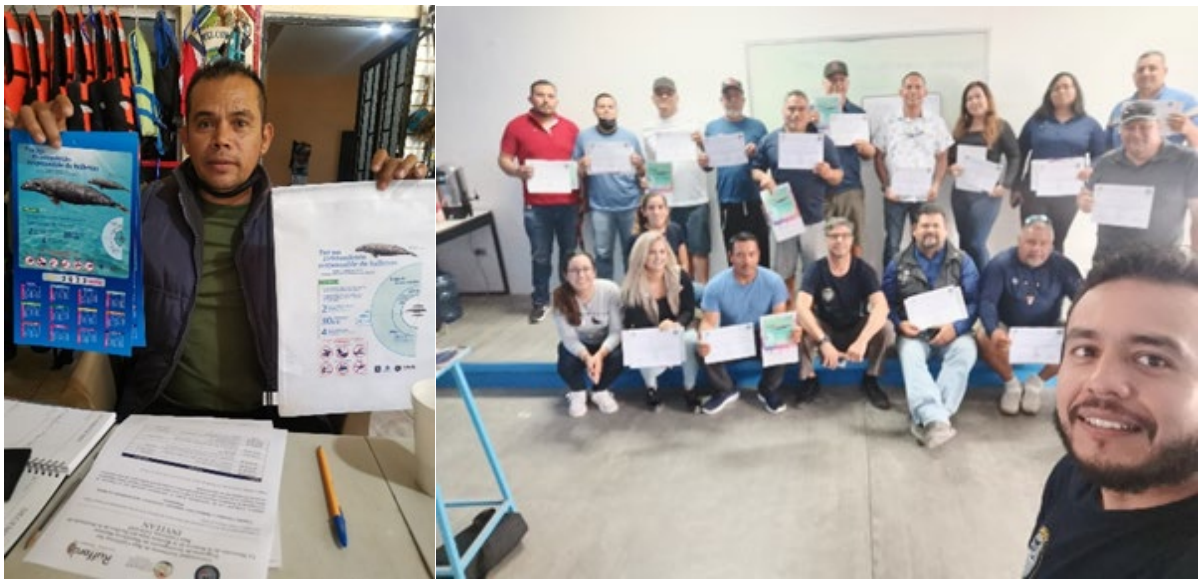
Hora	Núm AV	Latitud N	Longitud W	WPT	Sp	# Ind.	Comp Grupo	Conducta ballenas	Conducta Superficie	Reacción a Embarcaciones	# barcos menores	#barcos mayores	Frec Respiratoria incial	Frec Respiratoria final	Tipo Infracción NOM 131	Duración de infracción	Notas/fotos

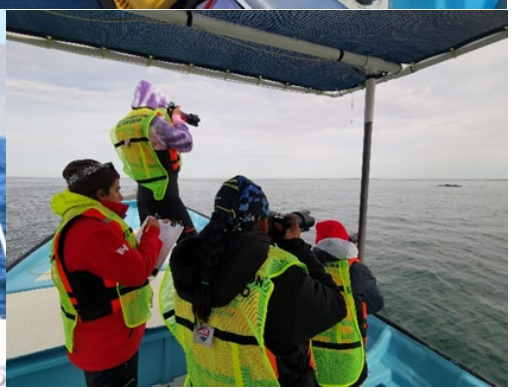
Códigos: Com. Grupo 1 Individuo solo, **2** Madre-cría, **3** Madre-cría-escolta, **4** Par, **5** Grupo de más de 3 adultos, **6** Delfines adultos, 7 Delfines con juveniles o crías en el grupo. **Conducta** mostrada por más de 50% de los individuos del grupo: **1** Navegación, **2** Descanso, **3** Navegación errática por la zona, **4** Alimentación, **5** Socialización, **6** Reproducción, 7 Actividad en superficie, (**1** Espiar, **2** Salto, **3** Golpe con aleta caudal, **4** Golpe con aleta pectoral, **5** Acelerar el nado). **Reacción a e embarcaciones**, **1** Esquivar o interposición entre individuos, **2** Huida, **3** Acercamiento a la embarcación, **4** Indiferencia, **5** nado en la proa en caso de delfines, **6** Comportamiento agonístico hacia las embarcaciones (comportamiento agresivo como saltos cerca de la embarcación, golpes fuertes con aleta caudal, salir a respirar fuerte), 7 Indeterminada. **B. Menor:** Panga de turismo (PT); Panga de pescadores (PPe); kayak (Kay). **B** mayor (Yate (YA); Velero (VE). **Infracción**: **1** Sí hay respeto total de la reglamentación, **2** > 4 embarcaciones, **3** Velocidad (>4nds), **4** Distancia del animal (<60m para ballena gris y jorobada), **5** Posición de las embarcaciones inadecuado (rodeando a la o las ballenas), **6** Trayectoria de aproximación inadecuado (de frente), **7** Tiempo de observación más de 30min.

Photographic Report

Tourist survey application

Collage of photos from workshops with the communities



Collage of photos from biological monitoring and compliance records of NOM-131-SEMARNAT-2010.

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