Received: 10 May 2019 | Revised: 4 February 2020 | Accepted: 19 February 2020

DOI: 10.1111/1477-8947.12193

ARTICLE

NRF NATURAL RESOURCES FORUM WILEY

Nature-based marine tourism in the Gulf of California and Baja California Peninsula: Economic benefits and key species

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Funding information
The Nature Conservancy, Grant/Award Number: Project #P104449, Activity #103823-MNCA OCEANS WEA; National Science Foundation (USA), Grant/Award Number: DEB-1632648

Abstract

Ecotourism can incentivize social and environmental benefits through marine conservation, in parallel with efforts to better manage fisheries, coastal development, and other human pressures. In Mexico's Gulf of California and Baja California Peninsula (GCBP), marine ecosystems support tourism activities in many communities, but to date there have been no region-wide studies to estimate their benefits or identify key species. Based on data collected in this study, each year nature-based marine tourism in the GCBP results in 896,000 visits, US$518 million in expenditures and at least 3,575 direct jobs from formal operations. In interviews with operators, over 40 species groups were named as important; sea lions, whale sharks, whales, and marlin were the highest ranked, highlighting the importance of ecosystem-wide health for nature-based tourism sustainability. Local employment and the ability to make economic and conservation goals compatible were noted by operators

as significant opportunities provided by nature-based marine tourism; challenges included pollution and declines in ecosystem health, a lack of infrastructure, poor resource management policies, and high operating costs. As nature-based marine tourism expands, a wider transition to true ecotourism, a focus on equitable benefits and collaboration between stakeholders and a cross-scale and ecosystem approach to management will be vital for achieving potential sustainable social, ecological and economic benefits.

KEYWORDS

Blue Economy, diving and snorkeling, ecosystem-based management, ecotourism, recreational fishing, whale and shark watching

1 | INTRODUCTION

Ecotourism has rapidly expanded across the world (Stronza, Hunt, & Fitzgerald, 2019) and can be a key component of a sustainable and equitable Blue Economy (Cisneros-Montemayor, Moreno-Báez et al., 2019). It is clear, however, that a careful consideration of its benefits and potential impacts is required to ensure that it contributes effectively to environmental conservation through economic incentives to local communities (Boley & Green, 2016; Stronza, Hunt, & Fitzgerald, 2019). The appropriate use of the term ecotourism has been extensively discussed for some time (Donohoe & Needham, 2006; Fennell, 2001), but there is wide agreement that it must be undertaken in a way that benefits local communities, and incentivizes healthy ecosystems and wild populations which in turn contributes to sustainability through the education of participants and direct support for conservation (Boley & Green, 2016; Sutcliffe & Barnes, 2018). These core aspects—nature conservation, cultural appropriateness, local benefits, and education— are essential for distinguishing these activities from mass tourism (Fennell, 2001) and to allow for sustainable benefits from marine ecosystem services (Ghermandi, Nunes, Portela, Nalini, & Teelucksingh, 2010; Martin, Momtaz, Gaston, & Moltschaniwskyj, 2016). However, wider definitions of nature-based marine tourism (NBMT) can include "ecotourish" activities (Townsel, 2016) that also benefit from natural systems but may not always be explicitly concerned with conservation or education (e.g., mass snorkeling tours, or angling trips with no bag or gear limits). In this context, regional planning is important to both expand benefits from NBMT and facilitate transitions to ecotourism proper when needed. This study provides a first regional overview of NBMT in Mexico's Gulf of California and Baja California Peninsula (GCBP; see Figure 1), focusing on identified information gaps regarding economic benefits, key species, and perceived benefits and challenges for communities and operators (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019).

NBMT activities such as whale and shark watching, snorkeling and scuba diving and recreational fishing attract over 120 million annual participants globally, generating at least US$50 billion and supporting over one million jobs (Cisneros-Montemayor & Sumaila, 2010). Maintaining environmental and socioeconomic sustainability of these activities requires improved knowledge on key target species (Gallagher & Hammerschlag, 2011), ecosystems (Spalding et al., 2017), impacts at different environmental and governance scales (Blane & Jaakson, 1994; Hammerschlag, Gallagher, Wester, Luo, & Ault, 2012; Wabnitz, Cisneros-Montemayor, Hanich, & Ota, 2017), and benefits including conservation perceptions, actions, and socioeconomic gains (Brightsmith, Stronza, & Holle, 2008; Clifton & Benson, 2006; Topelko & Dearden, 2005).

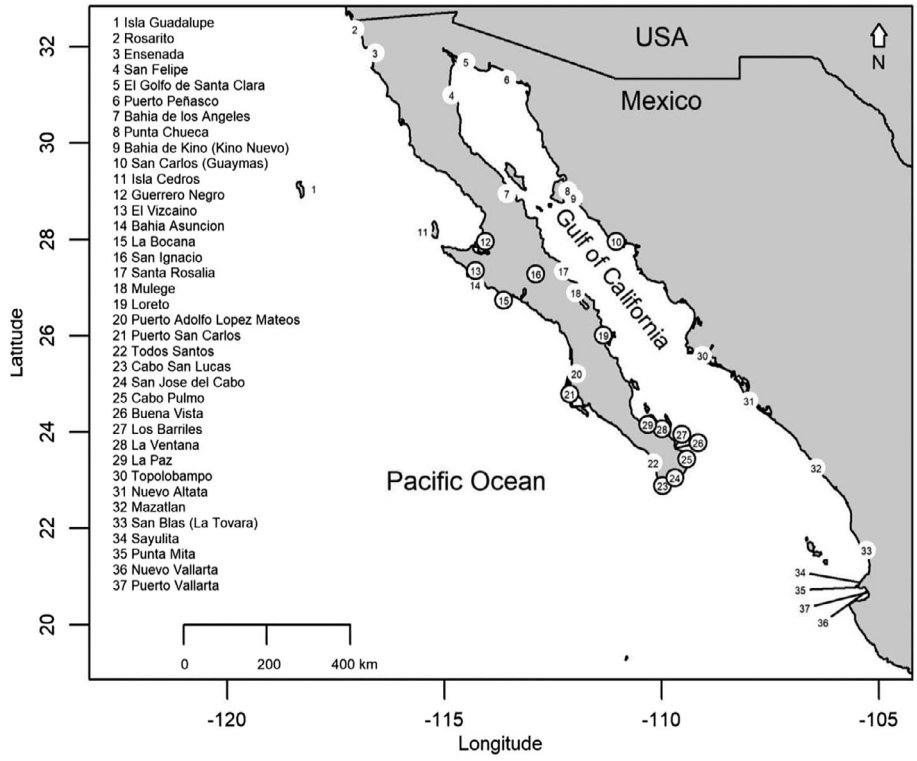

FIGURE 1 Gulf of California and Baja California Peninsula. Circles indicate locations with known nature-based marine tourism operations; filled circles were included in field surveys. Sites for each state are Baja California (1–4, 7, 11), Baja California Sur (12–29), Sonora (5–8, 9–10), Sinaloa (30–32), Nayarit (33–36), Jalisco (37)

Mexico attracts 29 million international visitors per year and tourism supports an estimated 2 million jobs in the country (UN-WTO, 2016). Total expenditures are estimated at US$16 billion per year, equal to 1.3% of Mexico's gross domestic product (GDP; BANXICO, 2016). In coastal areas, NBMT is an increasingly important component of tourism in Mexico; for example, shark watching revenue (US$12 million) already represents more than half the landed value from shark fisheries in the country (US$21 million) (Cisneros-Montemayor, Barnes-Mauthe et al., 2013), and sport fishing is key in large tourist hubs including Los Cabos, Mazatlán, and Puerto Vallarta. States in the GCBP region (Figure 1) receive 3.8 million annual tourists (INEGI, 2016), and the economic impacts of tourism in general in the state of Baja California Sur are estimated at approximately US$725 million (Gobierno, 2015).

Estimating benefits from NBMT (including ecotourism) is essential to inform resource management and ocean development, particularly as the growth of tourism overall and the impacts of climate change on marine fisheries have made NBMT a more important component of coastal economies and national planning (e.g., Wabnitz, Cisneros-Montemayor, Hanich, & Ota, 2017). Prior research includes estimates of the global value of whale watching (O'Connor, Campbell, Cortez, & Knowles, 2009), recreational fishing (Cisneros-Montemayor & Sumaila, 2010), shark watching (Cisneros-Montemayor, Barnes-Mauthe et al., 2013; Gallagher & Hammerschlag, 2011), and of wider marine ecosystems such as coral reefs (Spalding et al., 2017). There is a growing academic literature on NBMT in the GCBP region (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019), including on environmental carrying capacity (e.g., diving sites at reefs in Cabo Pulmo; Álvarez del Castillo Cárdenas, 2012), local economic benefits (e.g., for whale watching in communities in Laguna Ojo de Liebre [Rossing, 2006; Schwoerer, Knowler, & Garcia-Martinez, 2016]), and the historical development of ecotourism throughout the region (López-Espinosa de los Monteros, 2002).

Although there have been no region-wide studies on the economic benefits of this industry (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019), there are many in-depth studies focused on key species and activities that provide economic and well-being information at the level of the community, including insights on benefit distribution and challenges perceived by operators (Schwoerer, Knowler, & Garcia-Martinez, 2016). This is essential for coastal management and for reducing impacts on marine environments (Halpern et al., 2012). These human pressures can certainly include nature-based tourism activities if they are not properly managed (Cisneros-Montemayor, Becerril-García et al., 2019; Harriott, 2002), for example including recreational overfishing (Lewin, Arlinghaus, & Mehner, 2006) and physical impacts on whales, sharks and rays (Becerril-García, Hoyos-Padilla, Micarelli, Galván-Magaña, & Sperone, 2019; Hammerschlag, Gallagher, Wester, Luo, & Ault, 2012; Newsome, Lewis, & Moncrieff, 2004; Sullivan & Torres, 2018).

This study estimates the economic benefits of nature-based marine tourism in the GCBP region (including snorkeling and diving, shark and whale watching, nature tours and recreational fishing). To contribute to policy planning for the sector, we also identify the key species targeted by various activities and provide insights into local benefits and existing challenges as named by operators. As nature-based marine tourism expands in the region, the lack of systematic information on this industry has been highlighted as a barrier to the design of locally-appropriate policies for long-term sustainable benefits (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019). The regional-scale data and questions generated in this study can be used as baselines for further research and integrated policy planning.

2 | METHODS

2.1 | Overview

This study focused on the estimation of economic benefits (expenditures and employment) and not on evaluating the existence or efficacy of conservation and education actions by tour operators. Therefore, although some operations in the GCBP region are certainly ecotourism (i.e., integrating education and conservation as part of operations), we use the broader term of NBMT to avoid confusion. Activities included in our analysis are wildlife watching, scuba diving and snorkeling (henceforth, "diving"), recreational fishing, kayaking and general nature viewing.

Our research involved three main components: reviews of available information, field surveys with operators and tourists, and an estimation model for economic benefits. Some data was available from multiple sources and, though usually at different scales or using different methodologies, allowed for some comparisons and complementing of results. All research components are explained at length below in the "Study Area," "Data Collection," and "Estimation of Economic Benefits" subsections, but the overall flow of our methodology was as follows: (a) Lists of operators at each site (Figure 1 below) were compiled using official lists of registered operators and self-advertising data; (b) these operators were surveyed (in person) to obtain information on yearly tourists and total revenue, and key activities, species, and local issues; (c) upper and lower estimates of additional spending by tourists (outside of tours) was gathered through tourist surveys and from official government statistics; and (c) when information was lacking for a given operator, it was conservatively estimated based on information for other operators at the same site.

TABLE 1 includes all of our key indicator data, descriptions, and the sources for information.

2.2 | Study area

This study focuses on the GCBP in northwestern Mexico (Figure 1). This region's extensive coastline includes rocky reefs, mangroves, seagrass and kelp beds, many islands, and upwelling zones (Field & Francis, 2006; Lluch-Belda, Lluch-Cota, & Lluch-Cota, 2003). This highly productive marine region (Aburto-Oropeza et al., 2008; López-Mendilaharsu, Gardner, Seminoff, & Riosmena-Rodriguez, 2005) supports various marine tourism activities, and

TABLE 1 Indicator data, descriptions, and sources

Data	Units	Description	Source
Operators	Number	Individuals or companies (active per year) offering NBMT as a primary or complementary service.	1,2
Participation	Number	NBMT participants per month during slow and busy months.	1
Tourism expenditures	USD	Money spent by participants in NBMT locations, including tour costs, lodging, transport, etc. direct expenditure is solely attributable to NBMT activities (e.g., tour price, rentals); indirect expenditures are partly, but not solely, related to NBMT (e.g., lodging and meals). The use of indirect expenditures here is different from other common definitions, where it refers to secondary spending made by producers (tour operators).	1,3
Employment	FTE	Yearly employment in NBMT, in full-time equivalents (i.e., two half-time jobs = 1 FTE).	1
Locations	—	Places where NBMT operators are based, and the smallest unit of aggregation for results.	1,2
Operator revenue	USD	Total money received by operators from ecotourists. Note that revenues and direct expenditures should be equal and thus allow for cross-referencing.	1
Tourist arrivals	Number	Total yearly number of domestic and international tourists visiting each state or location (as available).	3–6
Vessels	Number	Vessels employed by operators, including open-deck and closed-deck nature viewing boats, dive boats, fishing yachts, kayaks, etc.	1
Key species	Rank	Operators and tourists were asked to rank species in order of importance at each site (for operators, importance for a successful tour; for tourists, motivation to see them during a tour).	1
Key sites	Rank	At each location, sites are the specific areas where NBMT takes place, for example, an island or dive spot. Operators were asked to rank sites in order of importance for their tours.	1

Notes: FTE, full-time equivalents; NBMT, nature-based marine tourism; USD, US dollars.
1 Field surveys; 2 Gobierno, 2015; 3 SECTUR, 2018; 4 INEGI, 2016; 5 BANXICO, 2016; 6 UN-WTO, 2016.

provides the majority of Mexico's marine fisheries catches (Cisneros-Montemayor, Cisneros-Mata et al., 2013; CONAPESCA, 2018).

NBMT is particularly important in Baja California Sur (where most interviews were conducted), though we also use available data and fieldwork results to provide preliminary estimates for other states along the GCBP. Key NBMT sites in these states are Puerto Peñasco and San Carlos in Sonora, Mazatlán in Sinaloa, Nuevo Vallarta and Sayulita in Nayarit and Puerto Vallarta in Jalisco (Figure 1).

2.3 | Data collection

In-person operator and participant questionnaires provided the main data used to estimate operator revenues and downstream economic impacts of NBMT activities (Haas, Fedler, & Brooks, 2017; O'Connor, Campbell, Cortez, & Knowles, 2009). Reviews focused on compilation of existing data from academic and government sources, as well as a formal literature review on NBMT academic research in the GCBP (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019).

A list of registered NBMT operators from the Secretaría de Turismo [State Tourism Secretariat] of Baja California Sur represented our baseline number of operators at each location (this information was not available to us for

other states). These were furthered screened during field surveys to ensure operations were active. To estimate the number of operators in other states, we compiled a dataset initially based on operator listings available from TripAdvisor (www.tripadvisor.com), the largest searchable website for travel-related information. This was a useful resource because users (for example, small tour operators) can post content directly. Searches were performed using location and activity keywords (i.e., "[city name] + [activity type]"). Results were then filtered manually and relevant information compiled into a dataset including the operator name and contact, location of offices and operations, seasonality, and activities specifically offered (e.g., a kayak tour advertising a "chance of seeing whales" was recorded as a kayaking operation, not whale watching). Whenever possible, we also differentiated between operations offering vessel-based or underwater activities.

It is possible that some of these postings were not active or otherwise misrepresented themselves as providers of NBMT, though research on the use of TripAdvisor suggests that content is relatively unbiased due to continuous public review (O'Connor, 2008). Nevertheless, to avoid overestimation, we furthermore reduced the number of operators per location identified through TripAdvisor based on the observed ratio between these lists and official operators at each location for Baja California Sur (where we had both sets of independent information). We caution that these are conservative estimates, both as a methodological approach but also due to an unknown number of illegal or otherwise unregistered (often seasonal) operators at larger sites including Los Cabos and La Paz (Whitehead et al., 2019) (see Discussion).

Following the above, we undertook field surveys from December 2015 to February 2016. Due to logistical constraints, we focused survey efforts at 28 locations in Baja California Sur (the state with the highest concentration of operators) and an additional location in Sonora (Figure 1); we address this potential limitation in the Discussion. The number of in-person surveys completed at each location was based on obtaining a representative sample (confidence level = ±5%; Cochran, 1977), and we provide the number of operators, target surveys, and actual surveys for each site in Table 1.

Surveys were pilot tested and slightly modified in collaboration with a small subset of operators, to ensure comprehension, identify reluctance to answering certain questions and to determine if there was potential for bias in responses (none were noted). Some operators preferred to make tourist questionnaires available themselves, while in other cases tourists were approached opportunistically (not inside operator offices unless so preferred by owners). The final operator and tourist questionnaires are included in supplementary files (freely available from the authors upon request). In the process of compiling survey data for analysis, any individual identifiers (names, contact information, etc.) were removed to maintain confidentiality in accordance with our agreement with respondents. Data for locations with less than three operators is presented in aggregation with other locations.

2.4 | Estimation of economic benefits

The economic impacts from nature-based marine tourism were estimated in terms of operator revenue, employment generated, and indirect expenditures by visitors. As explained in detail below, these estimates were based on the number of operators at each site, the number of yearly visitors per operator, spending per visitor on NBMT activities, and additional spending per visitor during their trip. Note that our results represent estimates based on field data gathered through surveys but also extrapolations based on this data for locations which we did not survey. The latter are useful for gauging the scale of NBMT benefits at these locations until field research can be carried out and should be considered preliminary estimates; we clearly differentiate between surveyed and estimated locations in the Results. Operator revenues gathered in surveys represent gross income for companies that offered NBMT activities as a primary service. Participant expenditures represent money spent by participants in NBMT activities during their stay at a given location in addition to the direct costs of a tour or activity. Calculating net profits of operators was beyond the scope of this research, though we did collect basic data (including vessel types and travel distances) that could be used for future estimates of operating costs.

Total participation per year was estimated by multiplying participation per month for high and low tourism months by the number of high/low months. When high/low months did not add up to 12 (for example, some operators noted that some months were "medium" and did not fall in either category), the balance of months was multiplied by the average number of clients per month in low months. Here and throughout our methods, we erred on the conservative side of estimations.

Data on tour pricing was converted to per capita units; for example, a tour price of $150 per vessel for a vessel with capacity for three clients would result in a per capita tour cost of $50. If operators charged a single per-person fee for services, revenue would simply be the product of this per capita price and the total number of clients during a given time period. However, each operator commonly offers a range of prices for specific services (for example, whale watching versus recreational fishing, or if equipment rental is charged separately), so this calculation becomes more complicated and must necessarily include confidence bounds. When multiple prices were indicated, values were first weighted based on the importance of each type of activity as ranked by operators. Subsequently, the lower bound for price per capita was equal to the minimum price, with the upper bound equal to the value of the third quantile using all prices. This results in conservative estimates by decreasing the chance that extreme high values skew average revenue values. Revenue from tours was then estimated as:

$$\textit{Tour Revenue} = \begin{cases} \textit{Clients} \cdot \min(\textit{Operator prices per capita}) & \textit{Lower Bound} \\ \textit{Clients} \cdot \text{3rdQuantile}(\textit{Operator prices per capita}) & \textit{Upper Bound} \end{cases}$$

Equipment rental revenue was estimated based on the mean price of equipment rentals, and the percentage of total clients per month requiring rentals in addition to the main tour price:

$$\textit{Rental revenue} = \textit{Clients} \cdot \%\textit{Renting Gear} \cdot \textit{Rental Price}$$

Subsequently, total revenue for each operator (OpR) was the sum of Tour Revenue and Rental Revenue. For each location, we distinguish between revenue estimated directly from survey data, and indirectly based on a value transfer approach (Cisneros-Montemayor and Sumaila, 2010; Shrestha & Loomis, 2003) that assigns operators without direct revenue data the mean value of operators with data. Thus, total revenue generated at each location (including both survey and estimated data) was equal to:

$$\textit{Total Revenue} = \sum \textit{OpR}\,(\textit{surveys}) + \left[\textit{OpR}\,(\bar{\textit{surveys}}) \cdot \textit{Operators without data}\right]$$

The equation above also provides upper and lower bounds for estimates by using the standard deviation of surveyed operator revenues at each site (see Table 1). The calculation of economic impacts is limited to revenues generated through tourist expenditures on marine-based tourism, which includes all their "direct" (tours, etc.) and "indirect" expenditures (hotels, meals and beverages, etc.); secondary expenditures by producers (for example, tour operators spending their profits in other parts of the economy) and induced effects occurring from other producer spending are beyond the scope of this study. Economic impact measures the contributions of an activity to the economy, whereas economic value is measured by estimating consumer and producer surplus and is beyond the scope of this study.

A key challenge in estimating indirect expenditures from tourists is the issue of double-counting unique tourists. For example, a single tourist can go on two separate tours with two unique operators. While this does not impact estimates of operator revenues (i.e., each operator reports and was paid for their trip), it may lead to overestimated indirect expenditures when these are based on reported operator trips (i.e., the same tourist only paid for one hotel room). Resolving this issue would require close collaboration between researchers and operators at multiple locations (as tourists can travel throughout the region), though for the purposes of this study it can be addressed by setting confidence bounds for indirect expenditure estimates based on assumptions on the degree of overlap between reported operator trips. The lower bound assumes that tourists will rest for one day between tours, and the upper

bound that all trips reported by operators represent unique tourists. To further address uncertainty, we also incorporate upper and lower estimates of expenditure per capita based on surveys and government data (BANXICO, 2016).

2.5 | Key species and qualitative data

Finally, because NBMT, by definition, is linked to ecosystems or species, operators were asked to identify the most important species or species groups for their activities. Operators were asked to rank at least three species (i.e., three points for a first-place rank, two for second, one for third or more), being as specific as possible but in species groups if they so preferred. This method accounts for species that are consistently included in rankings, even if they are not always ranked highest.

Whenever possible, operator interviews were undertaken with the company owners at a convenient time and place and with care to fully explain the study and its objectives. Following this protocol, there was a lot of interest in the research; no operators who could be reached declined to be interviewed and all respondents asked to be informed of final results. Spaces were provided for respondents to discuss or comment on related topics, further encouraging trust. Formally analyzing these qualitative responses was beyond the scope of this study, but we briefly highlight this information in the results in order to help contextualize the quantitative data and provide insights that may be further explored in future work.

3 | RESULTS

A total of 97 operator surveys were conducted in the study area, mainly in Baja California Sur where most operators were concentrated and ~70% of the all registered operators in the state (Table 2). An additional 120 dedicated NBMT operators were identified and screened from TripAdvisor data for the rest of the GCBP. From our collected data, this ratio equals 3.7, that is, Trip Advisor listings tend to over-advertise NBMT (or "ecotourism") in this region. Anonymized data from results is available from the authors upon request (except disaggregated income data for locations with one operator, to avoid disclosing private information).

Operator revenue data was based on operator surveys, but we undertook additional tourist surveys to complement information on additional trip spending. Of participants interviewed (n = 50, representing a total of 144 travelers), 61% were from the United States (mainly California), 24% from Mexico and 8% from Canada (mainly British Columbia). Almost half (48%) of the respondents noted that in recent years they had also traveled for NBMT in other parts of the world, including Australia, Canada, Chile, Ecuador, France, Germany, Honduras, India, Indonesia, Italy, Japan, other parts of Mexico, New Zealand, Peru, Thailand, Turkey, and the USA. Ecotourists in the GCBP spent a median of US$110 per day on tours (average of US$607), and US$387 in other expenditures including lodging, meals, and other non-tour costs. Government data suggest expenditures per day are US$635 (BANXICO, 2016), and these two values formed the lower and upper ranges for estimates of indirect expenditure.

Based on survey data, NBMT in BCS draws 522,000 visits per year (307,000—1 million), representing an estimated 520,000 unique visitors. These visitors generate a total of US$47 million (US$28 million—95 million) in direct expenditures (i.e., operator revenues) that support 136 operators and 2,088 direct jobs. Indirect expenditures total approximately US$267 million per year (US$59 million—674 million). This sector thus generates around US$314 million per year in BCS (US$88 million—769 million). For the entire GCBP, available data suggests a total of approximately 256 operators and an estimated 896,000 visits per year (Table 2). Note that some registered operators are essentially associations of multiple individuals offering similar activities (for example, fishing guides), so total employment is a better measure of direct jobs supported by NBMT. We also made the conservative decision to base estimates on officially registered operators; for example, for Cabo San Lucas there are 35 registered operators versus 283 advertising on TripAdvisor. Our estimates are therefore conservative and extrapolating results to informal

TABLE 2 Economic benefits from nature-based marine tourism in the Gulf of California and Baja California Peninsula region, with upper and lower estimates in parentheses

				Expenditures (US$ M)	
Location	**Operators**	**Visits ('000)**	**Direct jobs (FTE)**	**Direct**	**Total**
Baja California Sur	136	522 (153–1,000)	2,088	47 (28.5–95)	314 (88–770)
Cabo san Lucas	35 (35/19)	303 (84–700)	760	19 (11–48)	174 (43–492)
La Paz	34 (28/15)	84 (27–117)	490	13 (8–18)	56 (18–92)
Loreto	14 (6/11)	10 (3–30)	105	2.1 (1–6.6)	7.1 (2.2–25)
San Ignacio	11 (5/9)	12 (5–19)	216	1.1 (0.8–1.5)	7.2 (2.6–13.6)
Guerrero Negro	8 (2/7)	1 (0.2–20)	84	0.1 (0.05–3)	0.6 (0.1–18)
San José del Cabo	6 (3/5)	7 (3–14)	51	1.6 (1.3–1.9)	4.9 (2.3–10)
Cabo Pulmo	6 (6/5)	29 (11–38)	32	2.9 (2.1–3.7)	18 (6–27)
Adolfo López Mateos*	5	15 (5–27)	62	0.5 (0.4–1.1)	8.4 (2.2–18)
Puerto San Carlos	4 (4/4)	7 (2–10)	38	0.4 (0.1–0.6)	3.9 (0.8–7)
Buena vista	3 (2/3)	4 (0.3–6)	47	1.1 (0.3–1.9)	3.0 (0.4–6)
Los Barriles	3 (2/3)	28 (8–40)	113	4.6 (2.6–6.6)	19 (5.8–32)
Mulegé*	2	3 (1–5)	12	–	–
Bahía Asunción	2 (1/2)	6 (2–11)	25	–	–
Santa Rosalía*	1	–	12	–	–
Todos Santos*	1	–	12	–	–
Bahía de los Ángeles	1	–	10	–	–
La Bocana	1 (1/1)	–	17	–	–
Baja California	10	31 (19–54)	124	1.0 (0.7–2)	17 (7.2–33)
Ensenada*	6	19 (11–32)	75	0.5 (0.4–1.3)	10.1 (4.8–21)
Rosarito*	3	9 (6–16)	37	–	–
San Felipe*	1	–	12	–	–
Sonora	6	20 (13–30)	68	1.4 (1–2.2)	11.4 (5.9–21)
San Carlos	4 (3/4)	10 (7–13)	31	1.2 (0.7–1.5)	6.3 (3.5–10)
Puerto Peñasco*	3	9 (6–16)	37	0.3 (0.2–0.7)	5.1 (2.4–11)
Sinaloa	17	53 (32–92)	212	1.6 (1.2–3.8)	29 (13.7–62)
Mazatlán*	17	52 (32–92)	212	1.6 (1.2–3.8)	29 (13.7–62)
Nayarit	24	75 (31–130)	299	2.3 (1.8–5.4)	40 (14–88)
Nuevo Vallarta*	9	28 (17–49)	112	0.9 (0.7–2)	15 (7.2–33)
Sayulita*	8	25 (8–43)	100	0.8 (0.6–1.8)	13 (3.5–29)
Punta Mita*	7	22 (7–38)	87	0.7 (0.5–1.6)	12 (3.5–29)
Jalisco	63	196 (120–341)	784	6 (4.7–14)	106 (51–230)
Puerto Vallarta*	63	196 (120–341)	784	6 (4.7–14)	106 (51–230)
Total	256	897 (368–1,700)	3,575	59 (38–123)	518 (180–1,207)

Notes: In the "Operators" column we also note the number of Completed / Target surveys for a ± 5% confidence interval. FTE is full-time equivalents. *Are extrapolated from survey data. –Are omitted to avoid disclosing single-operator revenue but are included in state totals. Totals may not exactly add up due to rounding.

activity was beyond the scope of this study; this would be an interesting research project and would require much more field research to engage with guides that operate informally, potentially occasionally, and sometimes illegally.

Based on data on NBMT operators per location and assuming similar operator characteristics as BCS, activities in the GCBP is estimated to generate a total of US$518 million (US$180 million—1.2 billion) in total (direct and indirect) expenditures per year, supporting around 3,575,000 jobs (Figure 2; Table 2). For methodological consistency (i.e., we focus on spending made within the region), Table 2 does not include income generated from white shark cage diving tours to Isla Guadalupe (Site 1 in Figure 1) that are based in San Diego, USA, which reportedly generate US$2.6 million per year (Iñiguez-Hernández, 2008).

Ecotourism operations have increased rapidly since the 1970s and the average year of establishment was 2000 for the operators surveyed (Figure 3). Across the Baja California Peninsula, sport fishing and diving (including snorkeling) were the activities most commonly offered, followed by whale watching, kayak trips, and shark watching (Figure 3). A total of 482 vessels were used by operators surveyed, with an additional 219 kayaks and 77 paddleboards for rent. The most common type of vessels used by surveyed operators were converted artisanal fishing vessels (locally known as "pangas") used throughout the region, (n = 185), followed by sport fishing boats (175), sailboats (40), dive boats (37), and custom-made wildlife watching boats (26).

A second objective of this study was to identify key species targeted by various NBMT activities. Species groups ranked as most important by operators include reef and pelagic fish (37%), cetaceans (29%), sharks (20%), pinnipeds (11%), and others (2%; including mangroves, turtles, and seabirds). While iconic whale sharks, grey whales, and marlin were near the top of the list, the most important single species for NBMT in the GCBP, as named by operators, is the sea lion, a species with wide appeal and reliable location (Figure 3).

Most respondents (82%) provided qualitative observations to be included in the study, including benefits they perceived from ecotourism and thoughts on current challenges. Many (71% of those providing information)

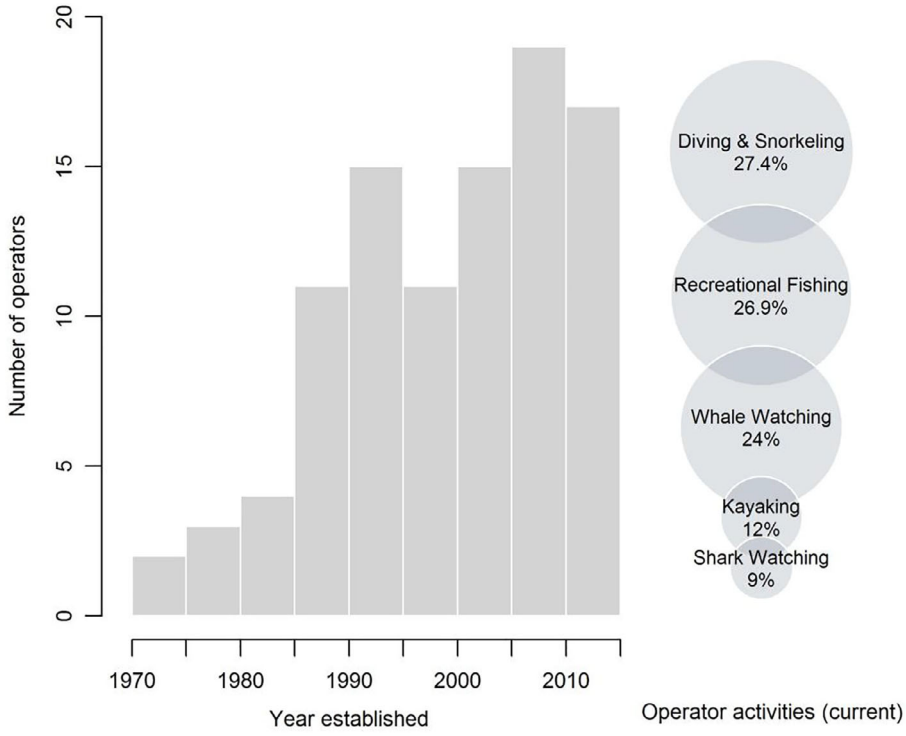

FIGURE 2 Year of establishment of nature-based marine tourism operators and current percentage of operators offering various activities

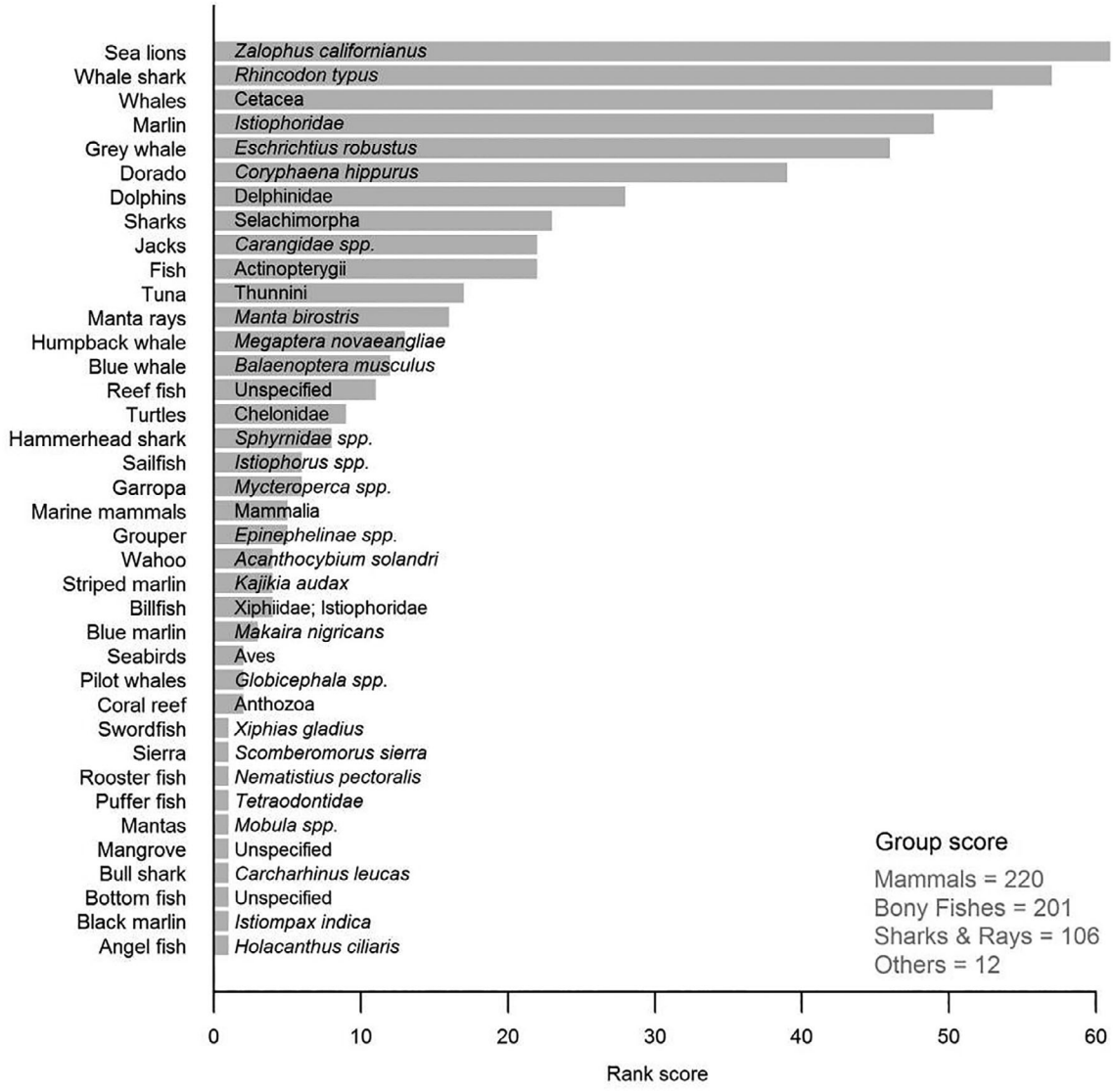

FIGURE 3 Most important species for nature-based marine tourism as named and ranked by operators in Baja California Sur and Sonora

respondents stated that the main benefits of NBMT for their communities included generation of employment and local economic impacts for their communities in what can be remote areas with few alternative industries. Indeed, NBMT was noted as an important way of promoting communities both at the national and international level. Furthermore, operators noted positive effects on conservation, with the opportunity to sustainably generate economic benefits while caring for "their" ecosystems. Potential employment alternatives included fishing, retail, food, and administrative services, among many others but it is noteworthy that a majority (63%) of respondents preferred working in NBMT to these alternatives.

The main self-identified challenges for NBMT operators was increased pollution and declining environmental state (named by 54% of respondents who provided information on this). Operators included nature-based tourism as a potential source of impacts if growth was unchecked and operators (particularly illegal ones) did not comply with agreed-upon environmental regulations. Other challenges mentioned included enduring low-tourism months,

innovating new products and activities to offer potential clients, a lack of investment in promotion and basic infrastructure (e.g., roads) on the part of the government, and challenges with competition from informal operators. Informally, several operators also noted challenges with declining tourism due to ongoing insecurity throughout Mexico, including what they viewed as media portrayals that were exaggerated or did not apply to their particular communities.

4 | DISCUSSION

Based on data collected in this study, NBMT in the Gulf of California and Baja California Peninsula region attracts 896,000 visits per year, generating a total of US$518 million in expenditures per year and supporting at least 3,575 direct jobs (Table 2). In the state of Baja California Sur, over 40% of overall tourist expenditures can be attributed to marine tourism, particularly whale and shark watching and recreational fishing (Table 2; Gobierno BCS, 2015). These values are based on formally registered operators (which are sometimes an association of several operators) and represents a minimum estimate. It was clear from the much higher number of TripAdvisor advertisements mentioning ecotourism and NBMT compared to actual operators (from official lists and confirmed during field surveys) that these activities are an important draw for tourism in this region.

The state of Baja California Sur is particularly important for NBMT in the Gulf of California region, contributing half of total employment (136 operators and 2,088 direct jobs) and 60% of total expenditures (US$314 million per year) (Table 2). The growth in the number of operators has been notable (López-Espinosa de los Monteros, 2002), although from conversations with operators it may have led to over-supply, particularly when considering informal seasonal or year-round operators (Whitehead et al., 2019). Regional challenges to establishing sustainable, equitable, and viable NBMT ventures include lack of infrastructure, resource management policies, operating costs, and, in the case of Mexico, realities and perceptions of violence. As tourism and human population sizes increase, it is important to have ecological and social information and recommendations ready for development committees wishing to create tourism hotspots (Vanderplank, Wilder, & Ezcurra, 2014). This must involve collaboration with multiple stakeholders and, as noted in ecotourism sites from Kenya (Wishitemi, Momanyi, Ombati, & Okello, 2015) to Indigenous territories in Canada (Bennett, Lemelin, Koster, & Budke, 2012) to coastal areas of Peru (García-Cegarra & Pacheco, 2017), must involve long-term economic plans for communities within or adjacent to ecotourism areas with special regulations that may make it difficult to practice traditional uses for living resources.

Economic valuations of regional NBMT are increasingly common across the world and, though there are significant research gaps for NBMT in the GCBP region (Johnson, Gonzales, Townsel, & Cisneros-Montemayor, 2019), there were some available studies for the GCBP to compare with our results. For La Paz, previous data collected specifically for shark watching from a subset of 11 operators resulted in an estimate of just over US$1 million per year (Cisneros-Montemayor, Barnes-Mauthe et al., 2013). This is reasonable when compared with our estimates that account for many more operators and their activities throughout the entire year (shark watching occurs for only ~3 months). In a study estimating tourist carrying capacity at Cabo Pulmo reefs (Álvarez del Castillo Cárdenas, 2012), notes a total of 8,600 visitors in 2011, with estimated direct expenditures of approximately US$130,000—US$235,000 for a mean per capita tour price of US$21. Our estimates for Cabo Pulmo are significantly higher, due to higher yearly tourist arrivals reported by operators (22,000—37,000) and higher mean per capita tour prices (US$100). These differences must be further investigated, but may reflect the growing interest in Cabo Pulmo as a tourist destination over the last decade, including attempts to build mass-tourism resorts, which were blocked due to resistance from the local community and evident issues with lack of water or waste disposal facilities in lands adjacent to a biodiversity hotspot (Vanderplank, Wilder, & Ezcurra, 2014). This has not slowed the growing appeal of this relatively isolated area, which may contribute to observed tour price increases; car rental companies at the San José del Cabo airport might now inquire if renters will be traveling to Cabo Pulmo (for insurance premium purposes, personal observation). In San Ignacio, there was an observed quadrupling in visitor numbers from 1994 to 2000, with a decrease in 2004 following the September 11th attacks on the US World Trade

Center and the economic recession in the early 2000s (Rossing, 2006). Our results for yearly direct expenditure estimates were similar, with US$800,000—1.5 million in our study compared with US$1.7 million (Rossing, 2006). Nevertheless, it is essential that the results from this first regional study be further validated in future local field studies, particularly to better understand the share of benefits to locals in each community (Schwoerer, Knowler, & Garcia-Martinez, 2016).

NBMT, if carefully developed and established as true ecotourism, has the potential to incentivize conservation among visitors and locals while providing livelihood opportunities in otherwise rural areas (García-Cegarra & Pacheco, 2017; Khan, 1997; Stem, Lassoie, Lee, Deshler, & Schelhas, 2003). This does not mean that it cannot take place in highly populated areas but rather that less-developed areas that tend to have higher abundances of wildlife are naturally more amenable to the types of activities offered by ecotourism (Garrod & Wilson, 2004). For example, Baja California Sur has a steady tourism stream (SECTUR, 2016) throughout the year despite being a relatively remote area (aside from a ~10–20 hour drive from the US border, visits require air or ferry travel). Ecotourism attractions can also add to an area's general appeal to tourists even if they themselves do not take part in ecotourism, as mentioned in operator surveys. This influence of NBMT could increase and shift the appeal of traditional mass-tourism locations (e.g., Los Cabos, Mazatlán, and Puerto Vallarta) and provide an incentive for more sustainable coastal development (Khan, 1997), beginning with a shift toward true ecotourism explicitly linked with wider sustainability and local benefits (Weaver, 2005). These positive benefits, aside from revenues, were noted in many of our interviews with both operators and tourists. Aside from our use of descriptive statistics (e.g., Table 1), finding correlations in the data was not one of our objectives. This would be interesting to explore in the future, particularly if spending patterns can be linked to characteristics of the participants and, more importantly, the types of tours offered and ecological state of the sites (Cisneros-Montemayor, Becerril-García et al., 2019; Hammerschlag, Gallagher, Wester, Luo, & Ault, 2012; Walker & Weiler, 2017).

There is less evidence for conservation actions by local governments and tourists themselves stemming from ecotourism compared to conservation attitudes, that is, appreciating nature versus taking actions to contribute to its conservation. It is possible that a "ceiling effect" occurs when people that choose to participate in ecotourism were already interested and aware of conservation issues, yet it is also clear that tourists can learn much about nature and conservation issues from tours that are well-designed (García-Cegarra & Pacheco, 2017; Sutcliffe & Barnes, 2018). Community and legal conservation actions have occurred in various parts of the world partly due to recognition of NBMT benefits, for example in the establishment of shark sanctuaries, marine mammal protections, and guidelines to minimize impacts on gamefish (Cisneros-Montemayor & Sumaila, 2010; Fedler, 2008; O'Connor, Campbell, Cortez, & Knowles, 2009). As healthy ecosystems as a whole are vital for maintaining NBMT operations throughout the year, it would be useful to further promote the importance of ecosystems—not only particular species—as conservation and resource management units (Chakraborty, 2019). Creating better disciplines for developing the NBMT industry can include the formation of rules governing sightings programs for whales (Heckel et al., 2003) and whale sharks (Cárdenas-Torres et al. 2007), but could also incorporate broader elements and approaches for avoiding and monitoring ecosystems impacts that have been developed for commercial fisheries management (Garcia & Cochrane, 2005). One essential component of this would be longitudinal studies that allow for monitoring the impacts and economics of tourism operations (Stronza, Hunt, & Fitzgerald, 2019), and would integrate well with similar monitoring needs for ocean climate and ecological dynamics (Palacios-Abrantes et al., 2019). This is relevant for all types of NBMT activities as all species rely on functioning ecosystems for diet and habitat, and particularly for reef-associated activities (e.g., snorkeling) that center on diverse species assemblages (Figure 3). As reflected in the array of tourist origins in this case study, relatively high-end tourism market can be accessed through ecotourism, but modern travelers have many destination options. With the increasing ease of travel and shifting preferences of tourists toward smaller-scale and nature-based tourism (Cracolici & Nijkamp, 2009), it is more important than ever to offer these potential ecotourists healthy and attractive marine ecosystems.

That sea lions topped the list of species important for NBMT (due to their reliability and wide appeal; Figure 3) is particularly interesting because their value is often underappreciated, with even past calls for culling due to perceived negative impacts on commercial fisheries (Zavala-Gonzalez & Mellink, 2000). The importance of this species

for regional tourism clearly merits further attention and stronger management measures to mitigate potential tourism impacts on local populations (French, González-Suárez, Young, Durham, & Gerber, 2011). Less surprisingly, iconic species including whale sharks, whales, and marlin were the next most important as ranked by operators (Figure 3). These species indeed support important NBMT operations around the world (Gallagher & Hammerschlag, 2011; Gómez, Ivanova, Ponce, & Ángeles, 2011; O'Connor, Campbell, Cortez, & Knowles, 2009), and yet the importance of multiple species and indeed of the environment as a whole has been proposed as a fundamental aim of ecotourism (Chakraborty, 2019). As NBMT matures as an industry, many operators are shifting to work year-round, modifying their practices in accordance with seasonality of different ecosystem components. Recreational fishing is the largest NBMT activity around the world (Cisneros-Montemayor & Sumaila, 2010) and in our study (Figure 2), as it has very few physical boundaries of operation and the flexibility to change sites and target species based on weather conditions, time of year, and participant preferences. Though of course there may be particularly important tourism seasons (for example, coinciding with local abundance of iconic species, or vacation periods) the same strategies for maintaining operations year-round are clearly being used by operators focused on wildlife viewing in various forms.

Logistical constraints, including travel costs and the availability of business owners to meet during busy tourism seasons, make it difficult to undertake field research over large areas such as the GCBP. We focused survey efforts in Baja California Sur (Figure 1) given the known concentration of NBMT activities in the state; our results (Table 2) suggest that these activities represent over 40% of total tourism revenues and almost 5% of the state's gross domestic product. Though we consider uncertainty in estimates for sites without field data, it would be useful to focus future research on these sites so that better baselines can be established throughout the region. Furthermore, because activities vary throughout the year based on economic and oceanic conditions, a more complete analysis would require surveys across a whole year and could feed into dedicated integration of seasonality in tourism management plans as has been done for hiking trail management (Santarém, Silva, & Santos, 2015). This would also help build closer collaboration with researchers and different levels of government or non-government organizations that may not be present or aware of issues year-round. Such cooperation is essential for achieving sustainable growth of benefits (social, economic, and ecological) and for gaining trust of operators with possible incentives to under-state or over-state certain figures (e.g., due to tax purposes, licensing, etc.). In particular, future research and policies should focus on the wider governance and institutional frameworks necessary for the careful expansion of the industry from small, place-based operations to larger regional scales (Weaver & Lawton, 2007).

NBMT—and ecotourism more specifically—is a highly significant and growing industry across the world's oceans and is often directly related to local and regional social, economic, and environmental benefits (Stronza, Hunt, & Fitzgerald, 2019). There is a lot of room for improving and expanding data collection and research into sustainability policy planning but, as shown in this study and similar analyses around the world, there is already a wealth of information available to build upon and researchers, policy-makers, and managers need not begin with a blank slate. In the context of a growing interest in a diversified and equitable Blue Economy (Cisneros-Montemayor, Moreno-Báez et al., 2019), true marine ecotourism can indeed be an essential contributor to coastal livelihoods but its multifaceted benefits are not automatic and policies must consider social equity. Furthermore, broader challenges with pollution, infrastructure, poverty, and resource management cannot be addressed through tourism alone (Garrod & Wilson, 2004). Fully achieving economic and ecological benefits from marine ecotourism requires collaboration by multiple stakeholders and cross-scale institutions to ensure sustainability strategies are appropriately developed and implemented.

ACKNOWLEDGEMENTS

This work was supported by The Nature Conservancy (Project #P104449, Activity #103823-MNCA Oceans Wealth Award ID#101255). AMCM acknowledges support from the Nippon Foundation Ocean Nexus Program. AFJ was also funded by NSF grant DEB-1632648 (2017/18). We thank the Baja California Sur State Tourism Secretariat for their assistance and proving operator lists. We thank Octavio Aburto-Oropeza, Mariana Walther, and four anonymous reviewers for their comments on the manuscript.

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How to cite this article: Cisneros-Montemayor A, Townsel A, Gonzales CM, et al. Nature-based marine tourism in the Gulf of California and Baja California Peninsula: Economic benefits and key species. *Nat Resour Forum*. 2020;1–18. https://doi.org/10.1111/1477-8947.12193