Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration

NATIONAL MARINE SANCTUARIES CONSERVATION SCIENCE SERIES

Whale Watching in Channel Islands National Marine Sanctuary: Understanding Passengers and their Economic Contributions

August 2021 | sanctuaries.noaa.gov
National Marine Sanctuaries Conservation Science Series ONMS-21-08

U.S. Department of Commerce
Gina Raimondo, Secretary

National Oceanic and Atmospheric Administration

National Ocean Service
Nicole LeBoeuf, Assistant Administrator

Office of National Marine Sanctuaries
John Armor, Director

Suggested citation: Shea, R., Schwarzmann, D., Leeworthy, V., Hastings, S., Knapp, L., & Tracy, S. (2021). Whale watching in Channel Islands National Marine Sanctuary: Understanding passengers and their economic contributions. National Marine Sanctuaries Conservation Series ONMS-21-08. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

Cover photo: Blue whales swim through Channel Islands National Marine Sanctuary. Photo: NOAA

About the National Marine Sanctuaries Conservation Series

The Office of National Marine Sanctuaries, part of the National Oceanic and Atmospheric Administration, serves as the trustee for a system of underwater parks encompassing more than 600,000 square miles of ocean and Great Lakes waters. The 15 national marine sanctuaries and two marine national monuments within the National Marine Sanctuary System represent areas of America's ocean and Great Lakes environment that are of special national significance. Within their waters, giant humpback whales breed and calve their young, coral colonies flourish, and shipwrecks tell stories of our nation's maritime history. Habitats include beautiful coral reefs, lush kelp forests, whale migration corridors, spectacular deep-sea canyons, and underwater archaeological sites. These special places also provide homes to thousands of unique or endangered species and are important to America's cultural heritage. Sites range in size from less than one square mile to almost 583,000 square miles. They serve as natural classrooms and cherished recreational spots, and are home to valuable commercial industries.

Because of considerable differences in settings, resources, and threats, each national marine sanctuary has a tailored management plan. Conservation, education, research, monitoring, and enforcement programs vary accordingly. The integration of these programs is fundamental to marine protected area management. The National Marine Sanctuaries Conservation Series reflects and supports this integration by providing a forum for publication and discussion of the complex issues currently facing the National Marine Sanctuary System. Topics of published reports vary substantially and may include descriptions of educational programs, discussions on resource management issues, and results of scientific research and monitoring projects. The series facilitates integration of natural sciences, socioeconomic and cultural sciences, education, and policy development to accomplish the diverse needs of NOAA's resource protection mandate. All publications are available on the Office of National Marine Sanctuaries website (sanctuaries.noaa.gov).

Disclaimer

The scientific results and conclusions, as well as any views or opinions expressed herein, are those of the authors and do not necessarily reflect the views of NOAA or the Department of Commerce. The mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Report Availability

Electronic copies of this report may be downloaded from the Office of National Marine Sanctuaries website at https://sanctuaries.noaa.gov.

Contact

Danielle Schwarzmann, Ph.D.
Chief Economist for Office of National Marine Sanctuaries
1305 East West Highway
SSMC4, 11th Floor
Silver Spring, MD 20910
Danielle.Schwarzmann@noaa.gov

Table of Contents

Abstract

This report presents the methods used to estimate the expenditures and resulting economic contributions and understand the attitudes and perceptions of for-hire whale watching operations' passengers in Channel Islands National Marine Sanctuary. Understanding whale watchers includes estimating their attitudes and perceptions, determining other activities they participated in, and developing a profile of their socio-demographic characteristics (such as where they come from, how long they stay, age, race, and party size). This report documents the approach used to collect and analyze these data. Results include the economic contribution (jobs, income, value added, and output) of whale watchers, the characteristics they find most important and are most satisfied with, the number of whale watching days and trips they make to the region, and the types of wildlife they most like viewing. These findings will be used to inform education and outreach efforts related to whales, provide additional information to for-hire wildlife viewing operators about their passengers and economic contributions to the region, and aid in the conservation of whales.

Key Words

Channel Islands National Marine Sanctuary, whale watching, importance/satisfaction, economic contribution, expenditures, for-hire operators

Executive Summary

Ecosystem services are benefits that people receive from the environment. This report focuses on the economic contribution of whales relative to recreation and tourism through wildlife viewing. Understanding the importance and economic contributions of the whale watching sector, including for-hire operators and the whale watching public, is important for wildlife management and the local economy. This study surveyed whale watchers who pay for boat-based tours in the Channel Islands region. There are two main whale watching seasons: gray whales (December–April) and big whales (May–November). The gray whale (winter) season provides the opportunity to see migrating gray whales, in addition to seals, sea lions, several species of dolphins, and potentially orca whales. During the big whale (summer) season, in addition to the marine mammals previously listed, large whales such as fin, humpback, and blue whales are attracted to the region due to optimal feeding conditions that occur in summer months.

Data collection had two components: 1) an on-site survey and 2) a longer return survey that was completed online or via a paper version that was returned in the mail. The on-site survey used an intercept method. Surveyors were hired from the University of California, Santa Barbara Bren School of Environmental Science and Management. These surveyors intercepted whale watching passengers on the return portion of a whale watching trip and at the dock upon return to complete the on-site survey and recruit them into the longer return survey.

The longer return survey was completed via a mailback survey or using an online survey platform (based upon the respondent's preference). Findings from the mailback survey include information about the respondent's socio-demographic characteristics, non-market economic value of whales and other marine animals, environmental attitudes, preferences for marine mammals, attitudes and perceptions toward their trip experience, and expenditures. This report will focus on all of these results except for the non-market economic value of whales. The non-market valuation results can be found in Schwarzmann et al. (2021).

The response rate for the on-site screener was roughly 91% (of the 2,256 people intercepted), and roughly 42% (of the 2,049 respondents who completed the on-site survey) completed the longer follow-up survey.

Respondents were also asked about the various attributes of their experience in the region. They rated how important the considered and how satisfied they were with 17 different items associated with the whale watching experience and facilities. The results of these responses were analyzed by whale season to identify any differences.

For the *winter season*, the items passengers considered most important were:

- clean water,
- clean air, and
- the current level of protection for whales.

The items with the highest levels of satisfaction for the *winter season* were:

- the opportunity to see whales,
- the availability of tour guides, and
- the availability of public restrooms.

For the *summer season*, the items passengers considered most important were:

- clean air,
- clean water, and
- the current level of protection for whales.

The items with the highest levels of satisfaction for the *summer season* were:

- the availability of public restrooms,
- the availability of tour guides, and
- the opportunity to see whales.

The analytical framework provided in importance-satisfaction analysis allows for a four-quadrant presentation and provides information to the sanctuary for their management plan reviews, visitor center proposals, and education and outreach initiatives. The four quadrants are formed by placing the importance measurement on the vertical axis and the satisfaction measurement on the horizontal axis (see Figure 4.2). This allows for interpretation of the ***"relative importance***" and ***"relative satisfaction"*** of each item. The use of the four quadrants provides a simple and easy-to-interpret summary of results. Scores falling in the upper left quadrant are relatively high on the importance scale and relatively low on the satisfaction scale. This quadrant is labeled "*Concentrate Here*." Scores falling in the upper right quadrant are relatively high on the importance scale and relatively high on the satisfaction scale; these are labeled "*Keep up the Good Work.*" Scores falling in the lower left quadrant are relatively low on both the importance and satisfaction scale and are labeled "*Low Priority.*" Finally, scores in the lower right quadrant are relatively low on the importance scale but relatively high on the satisfaction scale; these are labeled "*Possible Overkill.*"

Some of the items categorized as "Keep up the Good Work" in the *winter season* were:

- clear water,
- clean water, and
- clean air.

Items categorized as "Concentrate Here" for the *winter season* were:

- current level of protection for whales and
- different types of other marine mammals.

Some of the items categorized as "Keep up the Good Work" in the *summer season* were:

- clean water,
- clean air, and
- number of whales.

The only item categorized as "Concentrate Here" for the *summer season* was:

- current level of protection for whales.

The most common age group among survey respondents was people over the age of 60, and a majority of respondents were female. Over 90% of respondents were white and about 71% earned $75,000 or more annually. The highest reported spending category was "whale watching tours," followed by "hotel/motel," and "tickets for motion pictures, theaters, musical performances, concerts, etc." The spending profile for visitors did not differ from that of residents with the exception of "lodging" and "food and beverage;" visitors spent more in these categories compared to residents. Overall, spending associated with whale watching by residents

and non-residents contributes about $14.6 million in output, $8.8 million in value added, $6.0 million in income, and 114 full- and part-time jobs to the local economy (Figure 1.1).

Chapter 1:
INTRODUCTION

Channel Islands National Marine Sanctuary

Channel Islands National Marine Sanctuary (CINMS) protects 1,470 square miles of ocean waters around the Northern Channel Islands: Anacapa, Santa Cruz, Santa Rosa, San Miguel, and Santa Barbara islands. A special place for endangered species, sensitive habitats, historic shipwrecks, and cultural resources, the sanctuary provides protection through research, education, conservation, and stewardship. The sanctuary also provides many different recreational and commercial opportunities, including, fishing, diving, wildlife viewing, and boating.

Whale watching in and around CINMS occurs in two seasons. The spring/summer season starts around May 15 and continues until November 15. The winter season begins around the end of December and continues through April. The exact start and end date of the seasons are determined by the presence of whales, driven by their migration patterns and the location and availability of their food. The winter whale watching season focuses on gray whales, but also includes opportunities to see seals, sea lions, several species of dolphins (such as Risso's and common), and the occasional orca whale pod. The spring/summer whale seasons provides an opportunity to see larger baleen whales, such as blue, humpback, orca, and fin whales. Great white sharks are also occasionally seen throughout the year. Because whales tend to be closer to the mainland coast in winter, whale watching trips are shorter in the winter season, lasting 2–4 hours. Spring/summer whale watching trips are longer, lasting, on average, 5–6 hours, as whales are typically found farther offshore during this season.

The Santa Barbara Channel region is heavily transited by large commercial vessels traveling into and out of the ports of Los Angeles and Long Beach, two of the nation's busiest ports. Thousands of cargo ships transit through the region each year. The presence of vessels overlaps with the summer aggregations of endangered blue, fin, and humpback whales. Ship strikes on endangered whales is a leading cause of mortality that compromises the recovery of these endangered species. CINMS and its partners work to reduce the risk of fatal ship strikes on whales through vessel speed reduction programs and adjusting ship routes to avoid whale aggregations.

Ecosystem services are benefits that people receive from the environment. This report focuses on the economic contribution of whales relative to recreation and tourism through wildlife viewing. Whales also provide many other ecosystem services, such as contributions to sense of place, education, research, and even climate regulation through carbon storage. By absorbing carbon dioxide from the atmosphere, whales can accumulate up to 33 tons of carbon dioxide. They also support communities of microorganisms that absorb carbon dioxide from the atmosphere. As a result of these benefits, the value of an average great whale (such baleen and sperm whales) is estimated at around $2 million over its lifetime (Chami et al., 2019).

Whales also contribute to sense of place (as defined in NOAA Office of National Marine Sanctuaries Condition Reports), which is the aesthetic attraction, spiritual significance, and location identity of a place, including its level of recognition. The Chumash people recognize humpback whales as a culturally significant endangered species. The loss of culturally significant species threatens the ability to practice culture and connect to a place, heritage, and ancestors (NOAA Office of National Marine Sanctuaries, 2019). To some communities (such as

the Makah Tribe in the Olympic Coast National Marine Sanctuary region), whales have historically provided food through subsistence harvest, which allows tribal members to connect to their heritage.

Education focused on whales may occur both on the water and on the land. Channel Islands Naturalist Corps (CINC) volunteers are trained to provide interpretation about CINMS and Channel Islands National Park on local whale watch vessels, island hikes, and at community outreach events. One hundred fifty CINC volunteers donate nearly 30,000 hours annually, reaching thousands of visitors, community members, and schools. The CINC volunteer program involves a robust citizen science component that supports NOAA's ship strike prevention efforts, as well numerous research partners. CINC volunteers are trained to collect marine mammal sightings and whale photo IDs using the Whale Alert Spotter Pro app.

Whales provide research opportunities. Research centered around whales includes:

- tagging and tracking,
- aerial and boat-based monitoring,
- acoustic tracking with underwater hydrophones that 'listen' for whales,
- identifying prime whale habitat and predicted presence through modeling, and
- citizen scientists sharing whale sightings via Whale Alert and Spotter Pro, custom apps.

This report focuses on the economic contribution of the whale watching industry to the United States and local economy in the CINMS region, respectively.

Study Area

The local CINMS region (also referred to as the study area), for the purposes of this report, is composed of a nine-county region within Southern California (Figure 1.1). Primary counties are those directly adjacent to the sanctuary. Secondary counties are determined by looking at commuter flow data from the 5-year American Community Survey estimates. The American Community Survey provides data on where people live versus where they work and vice versa. If total flow between a given county and a primary county was above 5,000, that county was identified as a secondary county (U.S. Census Bureau, 2021).

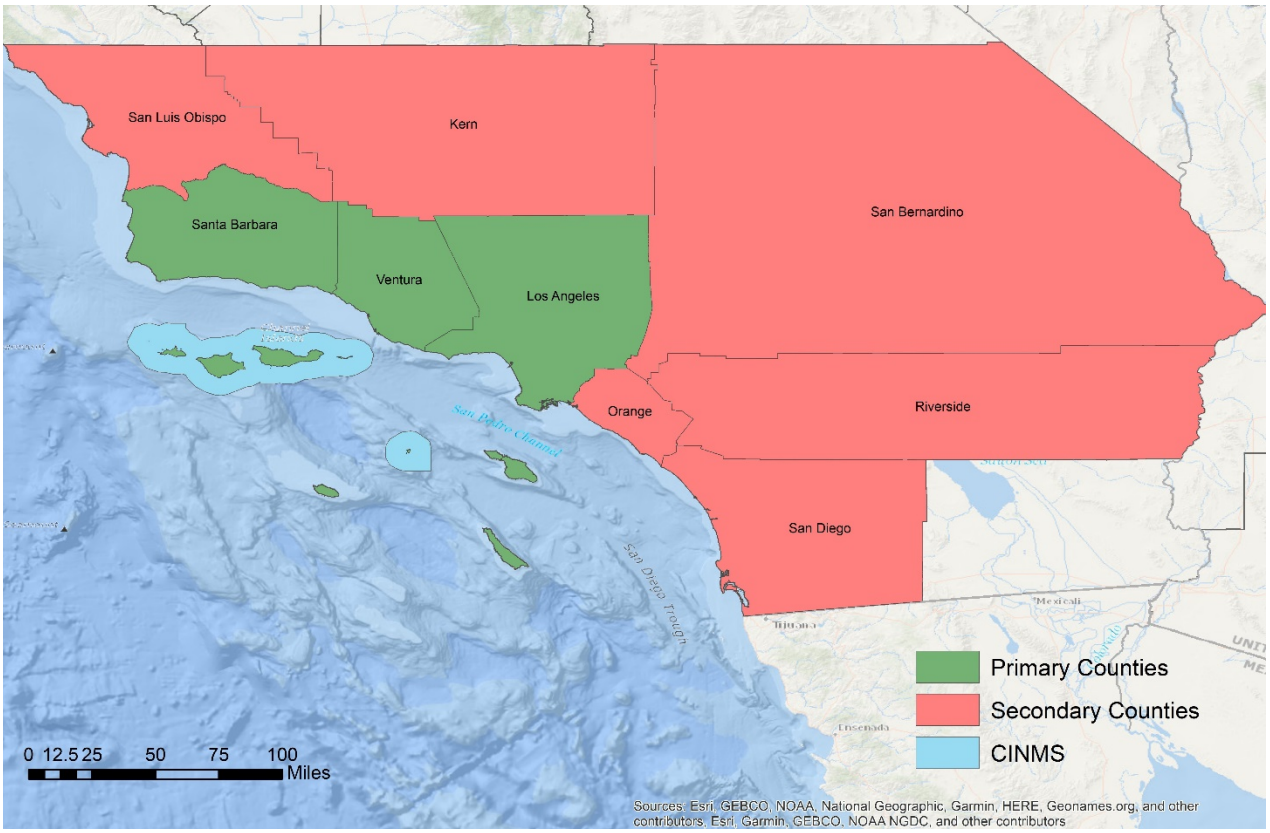

Figure 1.1 Channel Islands National Marine Sanctuary study area.

Sampling Methodology

Individuals who participated in whale watching boat tours in the Channel Islands region were surveyed from 2018 to 2019. There are two main whale watching seasons: winter/gray whales (December–April) and summer/big whales (May–November).

Data collection had two components: 1) an on-site screener survey and 2) a return survey. Surveyors intercepted whale watching passengers on the return portion of a whale watching trip and at the dock upon return to ask them to complete the on-site survey and recruit them into the return survey. Interviewers would start at one end of the boat and intercept one person from each group who was responsible for paying the majority of the expenses, as that person would best be able to answer the expenditure portion of the survey.

The longer return survey was completed via a mailback survey or using an online survey platform (based upon the respondent's preference). The longer survey was used to get information about the respondent's expenditures and their importance-satisfaction ratings for 17 natural resource attributes, facilities, and services. The return survey and/or web link to complete the survey was provided to respondents intercepted who agreed to participate.

The questionnaire was developed in consultation with CINMS staff, went through internal peer review within NOAA, and was approved by the White House Office of Management and Budget. The survey did not undergo focus group interviews or a pre-test.

Response Rates

Of the 2,256 people who were asked to participate in the on-site screener, 2,049 completed it (a response rate of approximately 91%). About 93% of people asked completed the screener in the winter season and about 87% of people asked completed the screener in the summer season. Of the 2,049 people who agreed to participate in the longer return survey, 861 completed the survey for a response rate of 42.0% (a response rate of 38.1%). A majority of the respondents chose to complete the return survey online instead of by mail. The mailback survey had a response rate of 37.6% and the online survey had a response rate of 42.4%. The winter and summer seasons also had similar response rates (43.1% and 40.3%, respectively) for completion of the longer survey.

Table 1.1 Response rates by survey format.

Format	On-Site Screener	Longer Return Survey	Longer Return Survey Response Rate
By Mail	165	62	37.6%
Online	1,884	799	42.4%
Total	2,049	861	42.0%

Table 1.2 Response rates by season.

Season	On-Site Screener	Longer Return Survey	Longer Return Survey Response Rate
Winter	1,270	547	43.1%
Summer	779	314	40.3%
Total	2,049	861	42.0%

Chapter 2:
USER PROFILES OF RETURN SURVEY RESPONDENTS

This section presents the profiles (socio-demographics) of the respondents to the longer return survey. It is important to note that these are the demographics of the respondents who completed this survey, and may not represent the actual distribution of all users. The respondents were selected based upon who would have the best information within their trip group to complete the expenditures section. Although this may have resulted in some bias within the sociodemographic section, collection of accurate expenditure data was prioritized. All statistical tests were conducted at a significance level of $\alpha=0.05$.

Age

The tables below show the age distribution for passengers in the winter and summer seasons. A chi-square goodness of fit test between the two distributions gave a p-value less than 0.01, which means that the difference in age distribution between the two seasons is statistically significant with more than 99% confidence. The most common age category in both seasons was the "over 60" age group; 36.9% of winter respondents and 30.3% of summer respondents fell within in that age category. The summer season had a larger percentage of people in younger age groups compared to the winter season (38.3% and 20.1% of people were below the age of 41 in each season, respectively).

Table 2.1 Winter age distribution.

Age Category	Frequency	Percent
18–30	59	11.4%
31–40	45	8.7%
41–50	91	17.6%
51–60	131	25.3%
Over 60	191	36.9%
Total	517	100.0%

Table 2.2 Summer age distribution.

Age Category	Frequency	Percent
18–30	40	21.3%
31–40	32	17.0%
41–50	26	13.8%
51–60	33	17.6%
Over 60	57	30.3%
Total	188	100.0%

Gender

The tables below show the gender distribution for the winter and summer whale watching seasons. Since no respondent marked their gender as "other," a two-proportion z-test was performed to test whether the proportion of female respondents was significantly different between the two seasons. The test gave a p-value of less than 0.01, which means that the proportion of female respondents differed between seasons with over 99% confidence. The majority of respondents in both seasons were female, however the winter season had a lower percent (63.4% female respondents compared to 74.8% female respondents in the summer season).

Table 2.3 Winter gender distribution.

Gender	Frequency	Percent
Female	329	63.4%
Male	190	36.6%
Other	0	0%
Total	519	100.0%

Table 2.4 Summer gender distribution.

Gender	Frequency	Percent
Female	235	74.8%
Male	79	25.2%
Other	0	0%
Total	314	100.0%

Race

The vast majority of respondents to the return survey were white (over 90% of respondents). No other race category accounted for more than 5% of responses individually. There were not enough respondents in each category to perform a chi-square test between the summer and winter seasons. Instead, a two-proportion z-test was used to determine whether the proportion of white respondents differed between seasons. The test returned a p-value of 0.18, which indicates that there was no statistically significant difference between the two seasons. Table 2.5 shows the results for both seasons combined.

Table 2.5 Race distribution of survey respondents (winter and summer seasons combined).

Race	Frequency	Percent
White	481	90.6%
Asian	23	4.3%
Mixed	21	4.0%
Black	6	1.1%
Native American	0	0.0%
Hawaiian	0	0.0%
Total	531	100.0%

Household Type

The most common household type for respondents was two adults with no children under the age of 18 (over 45.8% of respondents). The least common category was a single adult with children under 18 (less than 2.8% of respondents). Three-quarters of respondents went whale watching without children. A chi-square test was performed to test for differences in the distribution of household types between the summer and winter seasons. The test returned a p-value of 0.66, which means there was no statistically significant difference between seasons. Table 2.6 shows the results for both seasons combined.

Table 2.6 Household composition of survey respondents (winter and summer seasons combined).

Household Type	Frequency	Percent
Two adults with no children 18 or under	248	45.8%
Single adult with no children 18 or under	117	21.6%
Two adults with children 18 or under	94	17.3%
More than two adults with no children 18 or under	41	7.6%
More than two adults with children 18 or under	27	5.0%
Single adult with children 18 or under	15	2.8%
Total	542	100.0%

Household Income

The most common income category for respondents was an income level of over $150,000 (about 36% of respondents). Around 72% of respondents made over $75,000 annually. The least common income category was $5,000–$19,999, with only 14 respondents (1.8% of respondents). These results are not unexpected given that whale watching in the region is expensive, with an average minimum price of at least $68 per person in the winter and $38 per person in the summer. A chi-square test was performed to test for differences in the distribution of household income between the summer and winter seasons. The test returned a p-value of 0.62, which means that there was no statistically significant difference between seasons. Table 2.7 shows the results for both seasons combined.

Table 2.7 Household income of respondents (winter and summer seasons combined).

Household Income	Frequency	Percent
$150,000 or more	183	36.2%
$100,000 to $149,999	101	20.0%
$75,000 to $99,999	79	15.6%
$60,000 to $74,999	34	6.7%
$50,000 to $59,999	22	4.4%
$40,000 to $49,999	28	5.5%
$30,000 to $39,999	24	4.8%
$20,000 to $29,999	20	4.0%
$5,000 to $19,999	14	2.8%
Total	505	100.0%

New Ecological Paradigm

The "New Ecological Paradigm (NEP)" (Dunlap et al., 2000; Dunlap, 2008) was included in the survey questionnaire to explain willingness-to-pay for outdoor recreation (Aldrich et al., 2007). Respondents were asked to indicate their level of agreement or disagreement with 15 statements that characterize the NEP. Responses were coded using a seven-point Likert scale. In the original survey scale, 1 corresponded to "strongly agree" and 5 corresponded to "strongly disagree"; however, for this analysis, the rating scale was reversed. Agreement with eight particular NEP statements indicates endorsement of the NEP pro-environmental stance, whereas agreement with the remaining seven statements indicates endorsement of the Dominant Social Paradigm (DSP), or pro-development stance. On average, the statement that respondents agreed with the most was that "humans are subject to the laws of nature," and the statement that they disagreed with the most was that the current "'ecological crisis' facing humankind has been greatly exaggerated." Table 2.8 shows the combined results for both seasons.

Table 2.8 New Environmental Paradigm response results. A score of 5 corresponded to "strongly agree," and a score of 1 corresponded to "strongly disagree."

Item	Category	Mean Score	Standard Deviation	Count
Despite our special abilities, humans are still subject to the laws of nature.	NEP	4.37	0.64	571
Humans are seriously abusing the environment.	NEP	4.25	0.93	575
Plants and animals have as much right as humans to exist.	NEP	4.11	0.97	574
If things continue on their present course, we will soon experience a major ecological catastrophe.	NEP	4.08	0.97	574
The balance of nature is very delicate and easily upset.	NEP	4.04	0.90	571
When humans interfere with nature it often produces disastrous consequence.	NEP	4.02	0.96	574
The Earth is like a spaceship with very limited room and resources.	NEP	3.77	1.02	570
We are approaching the limit of the number of people the Earth can support.	NEP	3.63	1.1	574
The Earth has plenty of natural resources if we just learn how to develop them.	DSP	2.93	1.17	569
Human ingenuity will insure that we do not make the Earth unlivable.	DSP	2.79	1.03	570
Humans have the right to modify the natural environment to suit their needs.	DSP	2.37	1.00	574
Humans will eventually learn enough about how nature works to be able to control it.	DSP	2.34	0.95	571
Humans were meant to rule over the rest of nature.	DSP	2.06	1.08	569
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	DSP	1.90	0.88	572
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	DSP	1.83	0.94	572

Animal Likeability

The tables below show the animal likeability scores for the winter and summer seasons. Two-proportion t-tests were performed to see if any animals had significantly different likeability scores. The tests showed that the difference in scores for seagulls, seals, terns, cormorants, pelicans, fin whales, and murrelets significantly differed between seasons; therefore, results are presented for each season below. Respondents in the winter season gave higher likeability scores to all of the animals listed above. Respondents were presented with different animals and asked to give each one a likability score from one to seven (1–7); one (1) corresponded to "strongly like" and seven (7) corresponded to "strongly dislike". However, in this report, the results are presented with the scale reversed so that one (1) indicates "strongly dislike" and seven (7) indicates "strongly like". The top three liked species according to the species likeability score were dolphins, humpback whales, and blue whales for both seasons. In the winter season, the lowest scores were given to seagulls and sharks. In the summer season, the lowest scores were given to murrelets and seagulls. Despite having the lowest scores, these species still were 'liked' (i.e., had a mean score greater than four) by respondents.

Table 2.9 Animal likeability results for the winter season. A score of seven (7) corresponded to "strongly like," and a score of one (1) corresponded to "strongly dislike."

Animal	Mean	Standard Deviation	Count
Dolphins	6.82	0.50	379
Humpback whales	6.66	0.62	379
Blue whales	6.65	0.65	371
Seals	6.61	0.74	381
Gray whales	6.53	0.72	350
Killer whales	6.53	0.84	376
Fin whales	6.50	0.79	311
Sperm whales	6.48	0.80	343
Right whales	6.43	0.84	256
Minke whales	6.38	0.92	289
Sei whales	6.35	0.97	216
Pelicans	6.25	1.08	380
Cormorants	6.12	1.06	292
Terns	6.10	1.06	283
Murrelets	6.09	1.12	184
Plovers	6.08	1.21	260
Sharks	5.75	1.55	378
Seagulls	5.50	1.56	380

Table 2.10 Animal likeability results for the summer season. A score of seven (7) corresponded to "strongly like," and a score of one (1) corresponded to "strongly dislike."

Animal	Mean	Standard Deviation	Count
Dolphins	6.78	0.47	187
Humpback whales	6.68	0.63	186

Animal	Mean	Standard Deviation	Count
Blue whales	6.61	0.79	185
Gray whales	6.60	0.65	184
Killer whales	6.47	0.90	186
Sperm whales	6.47	0.83	179
Seals	6.40	0.83	187
Right whales	6.34	0.84	163
Fin whales	6.32	0.93	172
Minke whales	6.32	0.95	158
Sei whales	6.25	0.95	146
Pelicans	6.03	1.04	186
Plovers	5.99	1.10	145
Cormorants	5.86	1.14	152
Sharks	5.85	1.38	186
Terns	5.83	1.12	149
Murrelets	5.80	1.20	108
Seagulls	4.88	1.68	187

Sources of Information

Survey respondents were asked how they learned about the whale watching tour they selected. The most common source of information regarding whale watching tours was documentaries/films/aquariums, with 42.3% of respondents listing this as their primary source of information. The least common source of information was classrooms, with no respondents listing this as a source. A chi-square test was performed to test for differences in the distribution of sources of information between the summer and winter seasons (the "classrooms" category was excluded since it had no observations in either season). The test returned a p-value of 0.31, which means that there was no statistically significant difference between seasons. Table 2.11 shows the results for both seasons combined.

Table 2.11 Sources of information respondents used to learn about whale watching tours.

Source of Information	Frequency	Percent
Documentaries/films/aquariums	597	42.30%
Social media	275	19.50%
Other	218	15.40%
Newspapers	192	13.60%
Radio	85	6.00%
Blogs	46	3.30%
Classrooms	0	0.00%
Total	1,413	100.0%

Chapter 3:
TESTING FOR DIFFERENCES IN ON-SITE AND RETURN SURVEY RESULTS

Introduction

Non-response bias occurs when the group that responds to the mailback survey is different from the population for which you want to estimate certain measurements. The group that responds is considered different from the population if their responses differ significantly based on one or more characteristics. For example, average expenditures per-person per-trip for lodging may be a function of age. If those over 60 have higher expenditures and replied to the survey at higher rates than the population of users, then applying the higher average to all visitors would result in an overestimate of lodging expenditures. This overestimation would be the result of non-response bias.

Two variables were included in the in-person screeners to test for non-response bias in two components of the return survey: trip expenditures and importance/satisfaction. Both age and gender were questions on the on-site screener and the return survey. If non-response bias existed, it would be necessary to weight the data when analyzing the results of the longer return survey. In other words, because demographics were collected during the on-site screener survey, non-response bias can be tested for in the longer return survey.

The approach used to test for non-response bias has two steps. The first step was to determine whether completion of the return survey was related to various socioeconomic factors. The research question was: Were the visitors that responded to the return survey any different from those that did not respond? Second, if any of the socioeconomic factors (age and gender) were found to be significant in determining whether or not a person completed the survey, then tests were completed to see whether there was a relationship between socioeconomic factors and mailback question responses. For non-response bias to exist, the likelihood of respondents completing the mailback survey must vary based on one or more socioeconomic factors, and responses to the mailback survey must also differ based on those same factors. In the present study, the likelihood of completing the mailback survey varied by age; however, age was not significant in predicting the response of respondents. Therefore, the data were not weighted.

Winter Season

The results of the non-response bias testing for the winter season return survey are presented below. A logistic regression was performed to test whether or not demographics (age and sex) were significant in predicting whether or not a person completed the mailback survey. Respondents were asked to give their age category, and responses were coded to dummy variables for ages 18–30, 31–40, 41–50, 51–60, and over 60 years. Age groups 18–30, 31–40, and 41–50 were significant in determining whether a person completed the return survey. The respondent's gender was not significant in determining whether a person completed the return back survey.

Table 3.1 Statistical results for the effect of demographics on the likelihood of completing the return survey.

Variable	Coefficient	Standard Error	Wald Chi-Square	Pr > ChiSq
gender_male	-0.0475	0.1224	0.1506	0.6979
age_18to30	**1.0515**	**0.1923**	**29.8952**	**<.0001**
age_31to40	**0.7891**	**0.1991**	**15.7071**	**<.0001**
age_41to50	**0.6395**	**0.172**	**13.8224**	**0.0002**
age_51to60	0.1813	0.1596	1.2912	0.2558
Intercept	-0.0681	0.1159	0.3449	0.557

Observations: 1,231

These results indicate the potential for non-response bias. However, to confirm non-response bias, we next determined whether any of these age groups were significant in predicting how a person responds to the importance/satisfaction/expectations and/or expenditures questions. There were questions in the survey that asked about various attributes and characteristics regarding the respondent's experience in the region. For expenditures, the total lodging and total food expenses per-person day (continuous variables) were both used as dependent variables to test whether age was a significant predictor. For importance-satisfaction, the average score for the importance attributes and the average score of the satisfaction attributes were used as the dependent variables (continuous variables). For expectations, the average score for the expectation level and the average score of the how much each item met expectations were used as the dependent variables (continuous variables). The results of these comparisons are presented below. None of the age groups were significant in determining responses in the return survey. Given these results, it was not necessary to weight the data for demographics.

Although gender was significant in predicting lodging expenditures and satisfaction, it was not significant in determining whether or not a person responded. For this reason, expenditures and satisfaction scores do not need to be weighted for gender.

Table 3.2 Statistical results for the effect of age on satisfaction variables (winter season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
gender_male	**-0.20708**	**0.07513**	**-2.76**	**0.0062**
age_18to30	0.08453	0.12705	0.67	0.5063
age_31to40	0.06099	0.13695	0.45	0.6564
age_41to50	0.09049	0.10616	0.85	0.3946
age_51to60	0.0187	0.09418	0.2	0.8427
Intercept	3.39878	0.06483	52.43	<.0001

Observations: 347

Table 3.3 Statistical results for the effect of age on importance variables (winter season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
gender_male	-0.11235	0.07884	-1.42	0.1551
age_18to30	0.09849	0.13353	0.74	0.4613
age_31to40	-0.25405	0.14396	-1.76	0.0785
age_41to50	-0.00892	0.11084	-0.08	0.9359
age_51to60	0.00264	0.09887	0.03	0.9787
Intercept	3.43960	0.06761	50.87	<.0001

Observations: 347

Table 3.4 Statistical results for the effect of age on food expenditures (winter season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
gender_male	36.67643	24.55725	1.49	0.1363
age_18to30	-37.53015	42.11496	-0.89	0.3735
age_31to40	14.90254	43.80819	0.34	0.7339
age_41to50	48.9924	34.32621	1.43	0.1545
age_51to60	34.0544	30.77955	1.11	0.2694
Intercept	97.51397	21.00555	4.64	<.0001

Observations: 327

Table 3.5 Statistical results for the effect of age on lodging expenditures (winter season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
gender_male	**162.22227**	**70.52648**	**2.3**	**0.0221**
age_18to30	-86.80434	117.76266	-0.74	0.4616
age_31to40	-25.39663	125.30845	-0.2	0.8395
age_41to50	21.03617	97.76643	0.22	0.8298
age_51to60	98.31445	87.64843	1.12	0.2628
Intercept	235.23766	60.39697	3.89	0.0001

Observations: 328

Summer Season

The results of the non-response bias testing for the summer season return survey are presented below. A logistic regression was performed to test whether or not demographics (age and sex) were significant in predicting whether or not a person completed the return survey. Respondents were asked to give their age category, responses were coded to dummy variables for ages 18–30, 31–40, 41–50, 51–60, and over 60 years. Age group 41–50 was significant in determining whether a person completed the return survey. The respondent's gender was not significant in determining whether a person completed the return survey.

Table 3.6 Estimation of demographics on whether or not a person completed the return survey (summer season).

Variable	Coefficient	Standard Error	z	Pr > |z|
gender_male	0.1734	0.204	0.849	0.396
age_18to30	-0.5368	0.288	-1.861	0.063
age_31to40	-0.2839	0.288	-0.985	0.325
age_41to50	**-0.8675**	**0.35**	**-2.476**	**0.013**
age_51to60	-0.1815	0.304	-0.597	0.551
Intercept	-1.4139	0.208	-6.792	0

Observations: 1,231

Like in the winter season, there was some potential for non-response bias; thus, the next step was to determine whether any of the age groups were significant in predicting how a person responded to the importance/satisfaction and/or expenditures questions. The results are presented below. Age group 41–50 was not significant in determining responses in the return survey. Given these results, it was not necessary to weight the data for demographics.

Table 3.7 Statistical results for the effect of age on satisfaction variables (summer season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
age_18to30	**0.3803**	**0.132**	**2.881**	**0.004**
age_31to40	-0.0136	0.140	-0.097	0.923
age_41to50	0.0826	0.149	0.555	0.579
age_51to60	0.0795	0.142	0.560	0.576
Intercept	3.0732	0.085	36.035	0.000

Observations: 347

Table 3.8 Statistical results for the effect of age on importance variables (summer season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
age_18to30	**-0.3523**	**0.142**	**-2.477**	**0.014**
age_31to40	**-0.4026**	**0.152**	**-2.641**	**0.009**
age_41to50	-0.1578	0.161	-0.978	0.330
age_51to60	-0.0640	0.151	-0.424	0.672
Intercept	3.4482	0.093	37.236	0.00

Observations: 347

Table 3.9 Statistical results for the effect of age on food expenditures (summer season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
age_18to30	28.1266	28.561	0.985	0.328
age_31to40	-17.7201	34.689	-0.511	0.611
age_41to50	-18.3297	58.087	-0.316	0.753
age_51to60	28.0996	34.689	0.81	0.421
Intercept	39.5797	19.731	2.006	0.049

Observations: 327

Table 3.10 Statistical results for the effect of age on lodging expenditures (summer season).

Variable	Coefficient	Standard Error	t Value	Pr > |t|
age_18to30	45.5228	81.422	0.559	0.578
age_31to40	108.9427	98.893	1.102	0.275
age_41to50	-34.2391	165.596	-0.207	0.837
age_51to60	11.2154	98.893	0.113	0.910
Intercept	235.23766	60.39697	3.89	0.0001

Observations: 328

Chapter 4:
IMPORTANCE AND SATISFACTION

For many years, the U.S. Forest Service and many other federal, state, and local agencies that manage parks and/or other natural resources have used the National Satisfaction Index for measuring visitor satisfaction. Satisfaction is a complex feature of the recreation/tourist experience, and most researchers now agree that "importance-performance" or "importance-satisfaction" is a much more complete measure and provides a much simpler interpretation than the National Satisfaction Index. First described in the marketing literature by Martilla and James (1977), it has been described and/or used in such studies as Guadagnolo (1985), Richardson (1987), Hollenhorst et al. (1992), and Leeworthy and Wiley (1996). Since then, this approach has been used in Florida Keys National Marine Sanctuary (Leeworthy & Ehler, 2010) and Olympic Coast National Marine Sanctuary (Leeworthy et al., 2015).

A satisfaction questionnaire was developed and divided into two sections to obtain the necessary information for importance-satisfaction analysis. The first section asked the respondent to read each statement and to rate the importance of each of the 17 items with regard to visitor experiences during the summer and winter whale watching seasons, respectively. Each item was rated or scored on a one to five Likert scale (1–5) with one (1) meaning "not important" and five (5) meaning "extremely important." The respondent was also given the choices of answering "not applicable" or "don't know." The second section asked the respondent to consider the same list of items and rate them for how satisfied they were with each of the items on their visit to the Channel Islands region. Again, a five-point scale was used with one (1) meaning "not satisfied" and five (5) meaning "extremely satisfied." Respondents were also given the choices of answering either "not applicable" or "don't know."

Data from the questionnaire are presented in multiple ways. First, the means, or average scores, are reported along with the estimated standard errors of the mean, the sample sizes (number of responses), and the percent of respondents that gave a rating. This latter measure is important because many respondents provide importance ratings for selected items but may not have had a chance to use a resource, facility, or service and therefore do not provide a satisfaction rating. This might lead to biases in comparing importance and satisfaction.

Bar charts are also presented to show the mean scores of each item's importance and satisfaction rating. It is important to note that, while both importance and satisfaction are measured on a one to five scale, the scales measure different metrics and are not directly comparable. They do, however, communicate relative importance/satisfaction relationships across the items considered.

The most useful analytical framework provided in importance-satisfaction analysis is the four-quadrant presentation. The four quadrants are formed by first placing the importance measurement on the vertical axis and the satisfaction measurement on the horizontal axis (see Figure 4.1). A vertical line is placed at the mean score for all 26 items on the satisfaction scale and an additional horizontal line is placed at the mean score for all 26 items on the importance scale. These two lines form a cross hair. The cross hair then separates the importance-satisfaction measurement area into four separate areas or quadrants. This allows for

interpretation of the *"relative importance"* and *"relative satisfaction"* of each item. That is, if every respondent gave high scores to all items, we would still be able to judge the relative importance and satisfaction to establish priorities.

The use of the four quadrants provides a simple but easy-to-interpret summary of results. Scores falling in the upper left quadrant are relatively high on the importance scale and relatively low on the satisfaction scale. This quadrant is labeled "Concentrate Here." Scores falling in the upper right quadrant are relatively high on the importance scale and relatively high on the satisfaction scale and are labeled "Keep up the Good Work." Scores falling in the lower left quadrant are relatively low on both the importance and satisfaction scale and are labeled "Low Priority." And, finally, scores in the lower right quadrant are relatively low on the importance scale but relatively high on the satisfaction scale and are labeled "Possible Overkill."

In general, the 17 items that resident and visitors were asked to rate were organized into four categories. In the survey, the order of the items was mixed. Each of the items was given a letter rather than a number and thus are labeled A through Z.

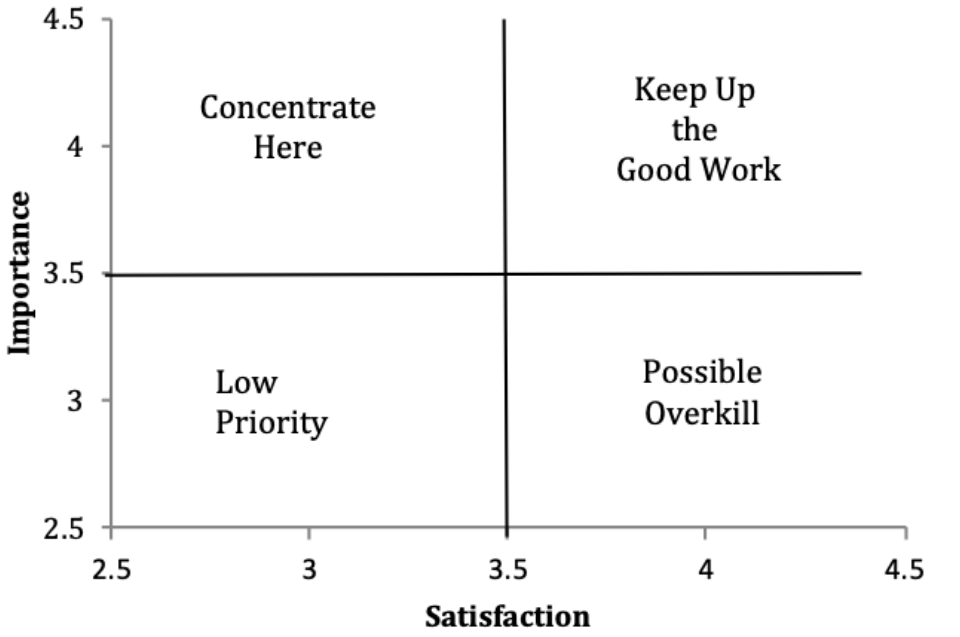

Figure 4.1 Importance/satisfaction matrix.

Importance-Satisfaction Mean Ratings

This section presents the mean level of importance and satisfaction for the sample as a whole, then the winter and summer seasons separately. For the sample, the items with the highest level of satisfaction were the opportunity to see whales and the availability of tour guides. The items with the highest level of importance were clean water and clean air. Table 4.1 to Table 4.6 show the importance and satisfaction scores for both seasons combined and each season individually.

When looking at only the *winter season*, the items with the highest level of importance were:

- clean water,
- clean air, and
- the current level of protection for whales.

The items with the highest levels of satisfaction for the *winter season* were:

- the opportunity to see whales,
- the availability of tour guides, and
- the availability of public restrooms.

The items that the passengers for the *summer season* ranked as most important were:

- clean air,
- clean water, and
- the current level of protection for whales.

The items with the highest level of satisfaction for the *summer season* were:

- the availability of public restrooms,
- the availability of tour guides, and
- the opportunity to see whales.

Table 4.1 Importance scores for both seasons combined.

Item	Mean	Standard Deviation	Count
Clean water	4.16	0.88	558
Clean air	4.13	0.86	556
Current level of protection for whales	4.03	0.98	516
Opportunity to see whales	3.96	1.00	559
Number of other marine mammals	3.51	1.11	554
Different types of other marine mammals	3.49	1.14	551
Number of whales	3.48	1.15	555
Opportunity to see other marine mammals	3.47	1.09	553
Availability of public restrooms	3.42	1.05	546
Clear water	3.35	1.15	548
Availability of tour guides	3.17	1.04	552
Availability of parking	3.15	1.12	536
Different types of whales	3.02	1.32	552
Different types of birds	2.75	1.30	541
Number of birds	2.69	1.27	544
Marine facilities	2.62	1.12	539
Educational posters and signs	2.57	1.13	540

Table 4.2 Satisfaction scores for both seasons combined.

Item	Mean	Standard Deviation	Count
Opportunity to see whales	3.66	1.16	548
Availability of tour guides	3.65	0.91	534
Availability of public restrooms	3.57	0.92	529
Clean air	3.53	1.01	535
Clear water	3.47	0.94	527
Opportunity to see other marine mammals	3.45	0.99	539
Marine facilities	3.45	0.90	497
Number of whales	3.41	1.21	544
Availability of parking	3.40	1.04	508
Number of other marine mammals	3.38	1.01	536
Clean water	3.36	1.02	523
Different types of other marine mammals	3.27	1.03	529
Number of birds	3.05	1.01	481
Educational posters and signs	2.96	0.95	470
Different types of birds	2.91	1.04	468
Different types of whales	2.75	1.26	497
Current level of protection for whales	2.44	1.17	434

Table 4.3 Importance scores for the winter season.

Item	Mean	Standard Deviation	Count
Clean water	4.19	0.86	377
Clean air	4.14	0.87	375
Current level of protection for whales	4.06	0.98	348
Opportunity to see whales	3.97	0.99	378
Number of other marine mammals	3.56	1.12	373
Number of whales	3.55	1.16	375
Different types of other marine mammals	3.55	1.15	371
Availability of public restrooms	3.48	1.05	369
Opportunity to see other marine mammals	3.47	1.09	373
Clear water	3.41	1.16	369
Availability of tour guides	3.27	1.03	374
Availability of parking	3.2	1.10	362
Different types of whales	3.09	1.35	374
Different types of birds	2.72	1.31	364
Number of birds	2.67	1.29	366
Marine facilities	2.66	1.15	366
Educational posters and signs	2.63	1.12	364

Table 4.4 Satisfaction scores for the winter season.

Item	Mean	Standard Deviation	Count
Opportunity to see whales	3.74	1.14	371
Availability of tour guides	3.71	0.91	367
Availability of public restrooms	3.60	0.93	359
Clean air	3.56	1.03	357
Clear water	3.53	0.95	353
Marine facilities	3.5	0.91	339
Number of whales	3.48	1.19	368
Opportunity to see other marine mammals	3.48	1.00	365
Availability of parking	3.47	1.02	343
Clean water	3.43	1.04	347
Number of other marine mammals	3.42	1.04	361
Different types of other marine mammals	3.29	1.08	357
Number of birds	3.1	1.02	320
Educational posters and signs	3.02	0.92	323
Different types of birds	2.96	1.06	312
Different types of whales	2.83	1.29	335
Current level of protection for whales	2.47	1.23	285

Table 4.5 Importance scores for the summer season.

Item	Mean	Standard Deviation	Count
Clean air	4.12	0.86	181
Clean water	4.10	0.93	181
Current level of protection for whales	3.98	0.99	168
Opportunity to see whales	3.92	1.02	181
Opportunity to see other marine mammals	3.47	1.11	180
Number of other marine mammals	3.39	1.08	181
Different types of other marine mammals	3.36	1.11	180
Number of whales	3.34	1.11	180
Availability of public restrooms	3.28	1.03	177
Clear water	3.22	1.12	179
Availability of parking	3.06	1.16	174
Availability of tour guides	2.95	1.02	178
Different types of whales	2.89	1.24	178
Different types of birds	2.8	1.29	177
Number of birds	2.75	1.23	178
Marine facilities	2.55	1.05	173
Educational posters and signs	2.45	1.16	176

Table 4.6 Satisfaction scores for the summer season.

Item	Mean	Standard Deviation	Count
Availability of public restrooms	3.52	0.90	170
Availability of tour guides	3.51	0.90	167
Opportunity to see whales	3.50	1.18	177
Clean air	3.46	0.95	178
Opportunity to see other marine mammals	3.38	0.96	174
Clear water	3.36	0.91	174
Marine facilities	3.34	0.87	158
Number of other marine mammals	3.28	0.93	175
Number of whales	3.25	1.24	176
Availability of parking	3.25	1.05	165
Clean water	3.23	0.96	176
Different types of other marine mammals	3.22	0.93	172
Number of birds	2.96	0.98	161
Educational posters and signs	2.82	1.00	147
Different types of birds	2.80	0.99	156
Different types of whales	2.57	1.17	162
Current level of protection for whales	2.40	1.05	149

The tables below show the statistical tests for differences between the summer and winter seasons. For the continuous variables of importance and satisfaction, t-tests were used to see if there were statistical differences between passengers in the summer and winter seasons. The t-test statistics are presented in Table 4.7 and Table 4.8. There were three importance scores that significantly differed between the winter and summer seasons: the number of whales, the availability of tour guides, and the availability of public restrooms. The winter season passengers had a statistically higher mean for all of the statistically significant items, meaning the number of whales, the availability of tour guides, and the availability of public restrooms were more important to users in the winter season relative to the summer season. There were significant differences between the satisfaction ratings of the summer and winter season passengers for eight of the 17 satisfaction items. Winter passengers had a statistically higher mean for all of these items. The items with the largest statistical difference in satisfaction scores were the availability of parking, opportunity to see whales, and availability of tour guides.

Table 4.7 Statistical tests for differences in importance scores between the summer and winter seasons.

Item	Mean Difference (s1-s2)	t-value	p-value
Clear water	0.194	1.85	0.064
Clean water	0.089	1.11	0.268
Clean air	0.028	0.36	0.720
Number of whales	0.210	2.02	0.044
Different types of whales	0.192	1.60	0.109
Opportunity to see whales	0.056	0.63	0.532

Item	Mean Difference (s1-s2)	t-value	p-value
Current level of protection for whales	0.075	0.81	0.416
Number of other marine mammals	0.171	1.70	0.090
Different types of other marine mammals	0.189	1.82	0.069
Opportunity to see other marine mammals	0.000	0.00	0.999
Number of birds	-0.078	-0.67	0.504
Different types of birds	-0.074	-0.62	0.535
Educational posters and signs	0.183	1.76	0.079
Marine facilities	0.107	1.03	0.303
Availability of tour guides	0.323	3.46	0.001
Availability of public restrooms	0.200	2.09	0.037
Availability of parking	0.141	1.37	0.171

Table 4.8 Statistical tests for differences in satisfaction scores between the summer and winter seasons.

Item	Mean Difference (s1-s2)	t-value	p-value
Clear water	0.176	2.03	0.043
Clean water	0.202	2.15	0.032
Clean air	0.097	1.05	0.295
Number of whales	0.234	2.12	0.035
Different types of whales	0.256	2.13	0.033
Opportunity to see whales	0.239	2.27	0.024
Current level of protection for whales	0.071	0.60	0.550
Number of other marine mammals	0.141	1.52	0.130
Different types of other marine mammals	0.073	0.77	0.445
Opportunity to see other marine mammals	0.100	1.10	0.271
Number of birds	0.140	1.44	0.150
Different types of birds	0.160	1.58	0.115
Educational posters and signs	0.202	2.15	0.032
Marine facilities	0.154	1.78	0.076
Availability of tour guides	0.191	2.24	0.025
Availability of public restrooms	0.084	0.98	0.327
Availability of parking	0.224	2.29	0.022

Winter Season Four Quadrant Analysis

A scatter plot for the four quadrant analysis is presented below. The mean importance score was 3.39 and the mean satisfaction score was 3.33. Using this information, the 17 items were separated into the quadrants. Some of the "lowest priority" items (low satisfaction and low importance) were different types of birds and educational posters and signs. Clean water and opportunity to see whales fell into the "keep up the good work" category (relatively high importance and satisfaction).

Table 4.9 Item key (for both winter and summer season analyses).

Item	Letter
Clear water	A
Clean water	B
Clean air	C
Number of whales	D
Different types of whales	E
Opportunity to see whales	F
Current level of protection for whales	G
Number of other marine mammals	H
Different types of other marine mammals	I
Opportunity to see other marine mammals	J
Number of birds	K
Different types of birds	L
Educational posters and signs	M
Marine facilities	N
Availability of tour guides	O
Availability of public restrooms	P
Availability of Parking	Q

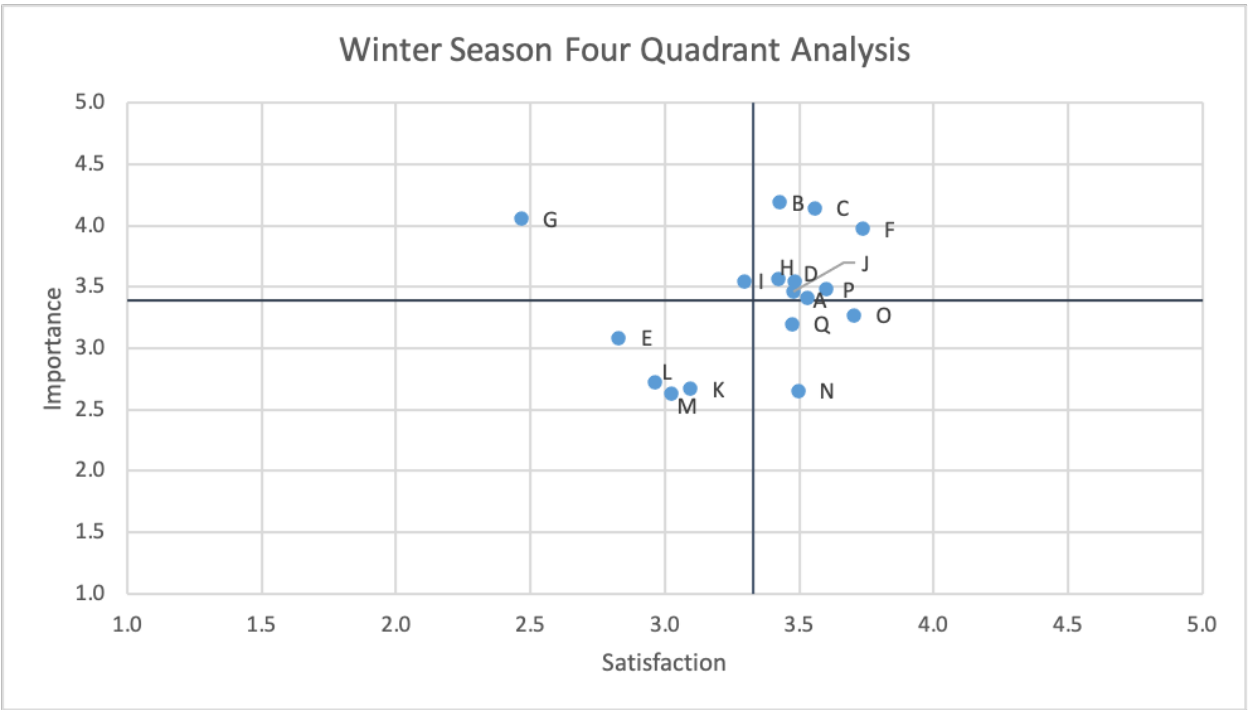

Figure 4.2 Winter season four quadrant analysis.

Based on the four quadrant analysis, the items assessed were categorized as follows for the winter season:

Concentrate Here

- G. Current level of protection for whales
- I. Different types of other marine mammals

Low Priority

- E. Different types of whales
- K. Number of birds
- L. Different types of birds
- M. Educational posters and signs

Possible Overkill

- N. Marine facilities
- O. Availability of tour guides
- Q. Availability of Parking

Keep Up the Good Work

- A. Clear water

- B. Clean Water
- C. Clean air
- D. Number of whales
- F. Opportunity to see whales
- H. Number of other marine mammals
- J. Opportunity to see other marine mammals
- P. Availability of public restrooms

Summer Season Four Quadrant Analysis

The average importance rating was 3.27 and the average satisfaction rating was 3.17 for summer season passengers. Using this information, the 17 items were separated into quadrants (Figure 4.3). Based on visitor responses, improvements for the current level of protection for whales fell into the "concentrate here" category. Areas of "possible overkill" included marine facilities and availability of tour guides.

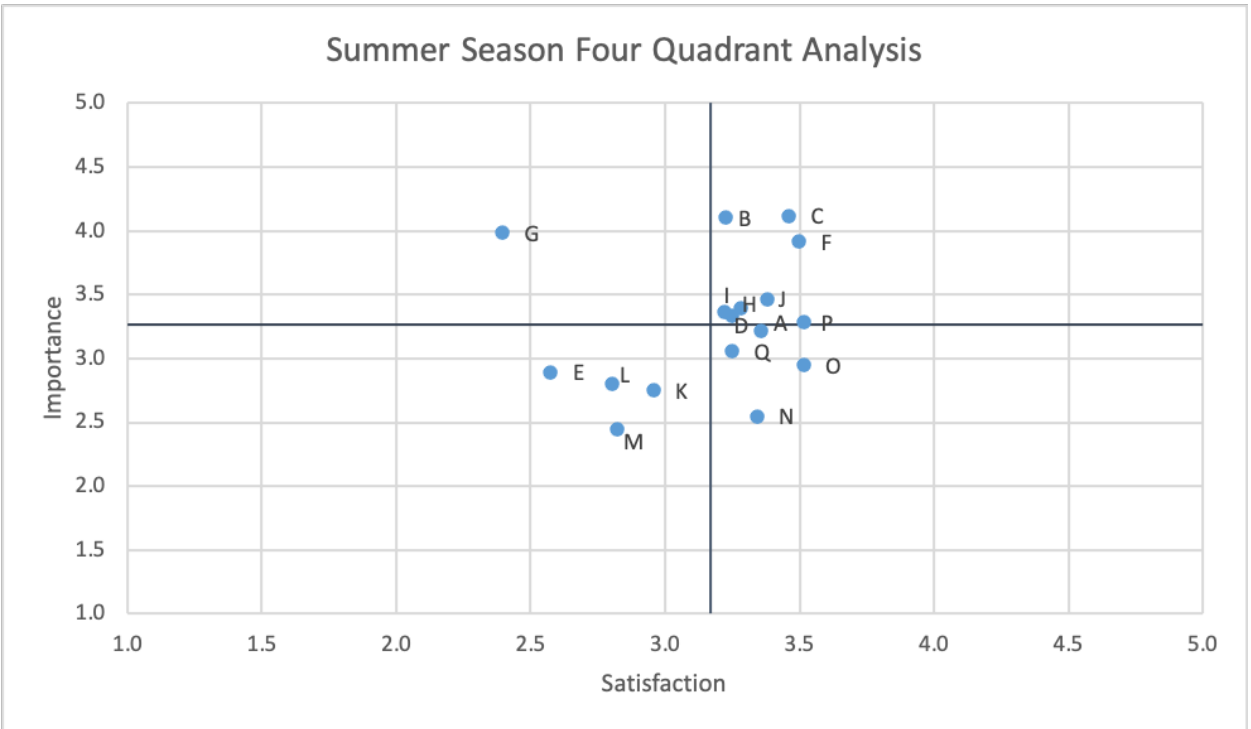

Figure 4.3 Summer season four quadrant analysis.

Based on the four quadrant analysis, the items assessed were categorized as follows for the summer season:

Concentrate Here

- G. Current level of protection for whales

Low Priority

- E. Different types of whales
- K. Number of birds
- L. Different types of birds
- M. Educational posters and signs

Possible Overkill

- A. Clear water
- N. Marine facilities
- O. Availability of tour guides
- Q. Availability of Parking

Keep Up the Good Work

- B. Clean Water
- C. Clean air
- D. Number of whales
- F. Opportunity to see whales
- H. Number of other marine mammals
- I. Different types of other marine mammals
- J. Opportunity to see other marine mammals
- P. Availability of public restrooms

Chapter 5: EXPENDITURES

Analysis of expenditure responses revealed abnormally high spending levels among respondents compared to existing spending profiles from external sources in the region and other sanctuary spending profiles. While the exact cause of this is unclear, one potential reason is the phrasing of the spending question. Respondents were asked to only report their spending on the day they were surveyed, however it is possible that many respondents instead reported their spending for the entire trip. Based on suggestions from experts, a generic spending profile for tourists in Santa Barbara was used instead of expenditure responses from the survey. The generic profile was developed by Destination Analysts, Inc. (2017) and was supplemented by survey data on whale watching ticket expenditures, which were deemed valid as they fell within the range of ticket prices posted by whale watching operators. Destination Analysts, Inc. (2017) separate spending profiles for visitors who are considered "day trippers" versus those considered "hotel guests." Survey respondents were binned into these two spending profiles based on the zip code of residence they provided on the questionnaire. Respondents who listed a zip code within Santa Barbara County were given the "day trip" spending profile and respondents who listed any other zip code were given the "hotel guest" profile. However, not every respondent listed their zip code. Respondents who did not list a zip code were categorized into spending profile based on their expenditures from the survey. Respondents who reported spending money on lodging or airline fares were considered "hotel guests," and those who did not spend money in those categories were considered "day trippers."

There are some limitations with using a generic visitor spending profile as opposed to one tailored specifically to whale watchers. Spending patterns of whale watchers may differ from the average visitor to Santa Barbara County. Based on input from experts at CINMS, whale watchers tend to spend more money on their visits than the average visitor, therefore the economic contribution estimates from this spending profile can be considered as a lower bound estimate for contributions. It is also possible that the inclusion of whale watching ticket spending from the survey may result in some double counting, because the generic profile includes an "entertainment" category. However, given that annual whale watching passengers make up a small percentage of annual visitors to Santa Barbara County, it is unlikely that any significant proportion of spending in the entertainment category comes from spending on whale watching tickets.

The highest spending category for day trippers was "whale watching tours," followed by "restaurants and dining" and "entertainment (concerts, etc.)." The highest spending categories for hotel guests were "hotel/lodging," "whale watching tours," and "restaurants and dining." Based on the operators' websites, at the time of the survey, the cost of whale watching tickets ranged from$68 to $99 in the winter season and $38 to $50 in the summer season.

Data provided by the three operators who are known to frequent CINMS (and whose passengers were surveyed) show that there are about 24,769 person days spent whale watching in the Channel Islands region and about 5,705 of these person days were spent in the sanctuary in 2018. Operators stated that this amount varies from year to year. Since CINMS is offshore, if whales are encountered closer to shore, operators will stay in these areas versus continuing

further offshore (and increasing their costs). See Figure 1.1 for a map of the Channel Islands region. The survey responses showed that 72.4% of respondents who had a spending profile were hotel guests and 27.6% were day trippers. It is reasonable to assume that the number of person days follows the same breakdown. Thus, the number of person days was calculated for hotel guests and day trippers, allowing for an assessment of total spending by category for each group. This can be used to estimate each group's economic contributions.

Table 5.1 Day tripper spending per person per day (n=126).

Category	**Average Daily Spending Per Person**
Restaurants and dining	$38.34
Hotel/lodging	$0.00
Shopping (gifts/souvenirs)	$22.64
Entertainment (concerts, etc.)	$24.32
Local transportation	$9.16
Groceries/personal items	$3.73
Wine (bottles purchased)	$4.61
Wine tasting fees/wine tours	$5.51
Spa/beauty/health club services or products	$1.22
Whale watching	$75.92
Total	$185.45

Table 5.2 Hotel guest spending per person per day (n= 330).

Category	**Average Daily Spending Per Person**
Restaurants and dining	$68.90
Hotel/lodging	$104.81
Shopping (gifts/souvenirs)	$32.87
Entertainment (concerts, etc.)	$18.99
Local transportation	$9.31
Groceries/personal items	$6.46
Wine (bottles purchased)	$8.14
Wine tasting fees/wine tours	$12.22
Spa/beauty/health club services or products	$4.46
Whale watching	$87.35
Total	$353.51

Chapter 6:
ECONOMIC CONTRIBUTIONS

Study Area

When people recreate in an area and spend money, their expenditures contribute to the local economy. This chapter quantifies the economic contributions by those who visited the watching operations in the study area to employment, income, value added, and output. Using the expenditures profiles presented in Chapter 5 of this report, the economic contributions of users of whale watching operations were estimated. Economic contributions estimate the economic effect of a given activity and determine how this activity helps to support jobs, income, and sales in the economic study area. This should not be confused with economic impacts, which look at changes in expenditures and metrics such as employment, income, value added, and output as a result of some change in the region (such as a policy or regulatory change).

Estimating Economic Contributions

The primary tool used by national marine sanctuaries (and other federal agencies) to estimate these relationships is an input-output model developed by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency. The model, IMPLAN, is now maintained and updated annually by MIG, Inc. (Day, 2011). The software provides the mathematical algorithms to estimate the input-output model and the resulting multipliers. The model uses the Bureau of Economic Analysis I/O Benchmark Tables, Bureau of Labor Statistics Quarterly Census of Employment and Wages, Census Bureau's County Business Patterns, and the Bureau of Economic Analysis Regional Economic Accounts. IMPLAN is used by multiple federal agencies in addition to state and other non-governmental organizations. Economic analyses that use IMPLAN have been cited in myriad peer-reviewed studies (Bonn & Harrington, 2008; Watson et al., 2007; Lindall et al., 2006), and IMPLAN also serves as the basis for National Environmental Policy Act and other regulatory analyses.

Table 6.1 provides a more detailed explanation of the terminology used in this report, as defined by IMPLAN. Impacts/contributions are defined as direct, indirect, or induced. In short, direct effects are those that occur within the sector of the expenditure. Indirect effects occur as a result of spending within the primary sector on goods and services from other sectors. Induced effects result from the wage earners within the study area spending money on goods and services within the region. The indirect plus induced effects make up what are generally referred to as "multiplier" effects. Multipliers show how every dollar spent in the industry helps to support the local economy. For example, if an output multiplier is 3, that means that for every dollar spent on for-hire passenger whale watching, $3.00 of activity is supported in the local economy; the original dollar provides an additional $2.00 to the economy. Table 6.2 explains these types of impacts/contributions in more detail.

Table 6.1 Definitions of IMPLAN economic indicators. Source: Day, 2011

Indicator	Definitions and Relationships
Employment	Total annual average jobs. This includes self-employed individuals, wage and salary employees, and all full-time, part-time, and seasonal jobs, based on a count of full-time/part-time averages over 12 months.
Labor income	Defines the total value paid to local workers within a region. Labor income is the income source for induced household spending estimations. *labor income = employee compensation + proprietor income*
Value added	Comprised of labor income, indirect business taxes, and other property type income, value added demonstrates an industry's value of production over the cost of purchasing the goods and services required to make its products. Value added is often referred to as gross regional product. *value added = labor income + indirect business taxes + other property type income*
Output	The total value of an industry's production, comprised of the value of intermediate inputs[1] and value added. In IMPLAN, this is typically viewed as the value of a change in sales or the value of increased production. However, annual production is not always equal to annual sales. If production levels are higher than sales, surpluses become inventory. Because inventory does not drive additional impacts in the year it was produced, in IMPLAN, direct industry sales = direct output. *output = intermediate inputs + value added*

1. The Bureau of Economic Analysis and IMPLAN define intermediate inputs as "goods and services that are used in the production process of other goods and services and are not sold in final-demand markets."

Table 6.2 Definitions of impact/contribution types.

Type	Definition
Direct effect	The effect of spending by recreators at each business they purchased goods or services from within the study area.
Indirect effect	The result of a sector purchasing goods and services to produce their product from other industries located within the study area.
Induced effect	Results from spending of employee wages that stem from both the direct and indirect effects within the study area.

Contributions

The next several tables present the economic contributions resulting from the expenditures explained in Chapter 5. The contributions were estimated using IMPLAN (2017 multipliers). Table 6.3 shows the codes that were used with the corresponding total expenditures presented in Chapter 5. In cases where there are multiple codes assigned to an activity, the total expenditures were distributed evenly across the sectors. One expenditure category, "groceries," was entered as a commodity. Commodities in IMPLAN are used when a good or service that is purchased might be produced by multiple industries. For example, a person buys groceries, but the groceries might be produced by farms, factories, or other facilities. The commodity applies the expenditure to a variety of industries that would be used to produce that commodity.

Table 6.3 IMPLAN codes used to analyze economic contributions.

Expenditure Category	IMPLAN Code
Restaurants and dining	503
Hotel/lodging	499
Shopping (gifts/souvenirs)	405
Entertainment (concerts, etc.)	423
Local transportation	412
Groceries/personal items	Grocery commodity
Wine (bottles purchased)	400
Wine tasting fees/wine tours	414
Spa/beauty/health club services or products	405
Whale watching	414

Tables 6.4 and 6.5 show the economic contributions to the study area from spending induced by whale watching operations near CINMS. The IMPLAN model was restricted to only include the nine-county study area defined in Figure 1.1. Overall, day trippers who use whale watching operations that visit CINMS contribute about $3.3 million in output, $2.1 million in value added, $1.4 million in income, and 33 full- and part-time jobs to the local economy annually. Hotel guests who use whale watching operations that visit CINMS contribute $11.2 million in output, $6.9 million in value added, $4.7 million in income, and 94 full- and part-time jobs to the local economy. In the 2018–2019 seasons, about 19% of whale watching activity within the study area occurred within CINMS, which means that these contributions have the potential to be impacted by changes within the sanctuary. Further, this percent varies from year to year based upon whale presence and location.

Overall, spending induced by whale watching from residents and non-residents contributes about $14.6 million in output, $9.0 million in value added, $6.1 million in income, and 126 full- and part-time jobs to the local economy. This total comes from simply adding the contributions by residents and non-residents. Visitors are an important group because their spending infuses new money into the local economy. Table 6.6 shows the full breakdown of impact types.

A study by Van Deren et al. (2019) looked at the contributions of whale watching in San Juan County to the Puget Sound region. The contribution levels they found were higher than the local contributions outlined in this report. Overall, spending due to whale watching in San Juan County contributes about $216.9 million in output, $66.7 million in income, and 1,870 full- and part-time jobs to the Puget Sound region (Van Deren et al., 2019). Spending due to whale watching in Stellwagen Bank National Marine Sanctuary contributed $182 million in output, $107 million in value added, $76 million in income, and 1,400 full- and part-time jobs to the New England region (Schwarzmann & Shea, 2020).

Table 6.4 Economic contributions to the study area by day tripper spending.

Impact Type	Employment	Labor Income	Value Added	Output
Direct effect	23.1	$887,142	$1,127,369	$1,704,832
Indirect effect	3.3	$221,022	$360,302	$598,345
Induced effect	6.2	$335,929	$614,199	$1,002,823
Total effect	32.5	$1,444,092	$2,101,870	$3,306,000

Table 6.5 Economic contributions to the study area by hotel guest spending.

Impact Type	Employment	Labor Income	Value Added	Output
Direct effect	60.3	$2,696,604	$3,557,319	$5,702,073
Indirect effect	13.4	$896,846	$1,371,607	$2,305,572
Induced effect	20	$1,090,991	$1,994,641	$3,256,883
Total effect	93.8	$4,684,441	$6,923,567	$11,264,527

Table 6.6 Total economic contributions to the study area from whale watching spending.

Impact Type	Employment	Labor Income	Value Added	Output
Direct effect	83.4	$3,583,746	$4,684,688	$7,406,905
Indirect effect	16.7	$1,117,868	$1,731,909	$2,903,917
Induced effect	26.2	$1,426,920	$2,608,840	$4,259,706
Total effect	126.3	$6,128,533	$9,025,437	$14,570,527

Chapter 7: CONCLUSIONS

Summary of Findings

Overall, the items ranked high for importance and satisfaction were fairly similar across seasons. The items with the highest importance scores for both seasons were clean water, clean air, and the current level of protection for whales. The items with the highest levels of satisfaction for both seasons were the opportunity to see whales, the availability of tour guides, and the availability of public restrooms. Winter season passengers had higher importance and satisfaction scores than summer season passengers for almost every item. In the four quadrant analysis, some of the items that were categorized as "Keep up the Good Work" in the winter season were: clear water, clean water, and clean air. Items categorized as "Concentrate Here" for the winter season were: current level of protection for whales and different types of other marine mammals. Some of the items that were categorized as "Keep up the Good Work" in the summer season were: clean water, clean air, and number of whales. The only item categorized as "Concentrate Here" for the summer season was current level of protection for whales.

Overall, spending induced by whale watching from residents and non-residents contributed about $14.6 million in output, $9.0 million in value added, $6.1 million in income, and 126 full- and part-time jobs to the local economy. Table 6.6 shows the full breakdown of impact types. Hotel guests had higher levels of contributions than residents due to higher levels of spending on lodging, whale watching tickets, and dining. The contributions to the local economy from whale watching found in this report were lower than those found in previous studies. This mostly has to do with the fact that there are fewer person days spent on whale watching operations in the CINMS region compared to other areas where studies on whale watching have been conducted. One operation noted that during the study period, whales were feeding closer to shore. This means operations did not always need to travel to CINMS to view whales, but the operation stated the sanctuary is still important to their business.

Lessons Learned

The spending profile for respondents was extremely high compared to the spending profiles found in other studies and it was thus removed from this analysis (except for spending on whale watching tickets). Respondents were asked to report only their spending on the day they were surveyed; however, it is possible that many respondents instead reported their spending for their entire trip. It is likely that the phrasing of the question was responsible for why reported visitor expenditures were so high. However, the reason for this anomaly remains uncertain since this survey was not pretested or discussed with a focus group. Overall, a more carefully drafted survey and additional research are required to develop more specific expenditure estimates in the future.

Acknowledgements

The authors thank the whale watching charter operations who frequent Channel Islands National Sanctuary and the subject matter experts who peer reviewed this document.

Literature Cited

Aldrich, G. A., Grimsrud, K. M., Thacher, J. A., & Kotchen, M. J. (2007). Relating environmental attitutdes and contingent values: How robust are methods for identifying preference heterogeneity? *Environmental and Resource Economics*, 37, 757–775. https://doi.org/10.1007/s10640-006-9054-7

Bonn, A., & Harrington, J. (2008). A comparison of three economic impact models for applied hospitality and tourism research. *Tourism Economics*, *14*(4), 769–789. https://doi.org/10.5367/000000008786440148

Chami, R., Cosimano, T., Fullenkamp, C., & Oztosun, S. (2019). Nature's solution to climate change: A strategy to protect whales can limit greenhouse gases and global warming. *Finance & Development*, *56*(4). https://doi.org/10.5089/9781498316880.022

Day, F. (2011). *Principles of impact analysis and IMPLAN applications*. MIG, Inc.

Destination Analysts, Inc. (2017). Santa Barbara south coast visitor profile and tourism economic impact study. https://santabarbaraca.com/wp-content/uploads/2017/10/Santa-Barbara-Visitor-Profile-and-Economic-Impact-Study-2016-17-DECK.pdf

Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. (2000). New trends in measuring environmental attitudes: Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, *56*(3), 425–442. https://doi.org/10.1111/0022-4537.00176

Dunlap, R. (2008). The New Environmental Paradigm Scale: From marginality to worldwide use. *The Journal of Environmental Education*, *40*(1), 3–18. https://doi.org/10.3200/JOEE.40.1.3-18

Guadagnolo, F. (1985). The importance-performance analysis: An evaluation and marketing tool. *Journal of Park and Recreation Administration*, *3*(2), 13–22.

Hollenhorst, S., Olson, D., & Fortney, R. (1992). Use of importance-performance analysis to evaluate state park cabins: The case of the West Virginia park system. *Journal of Park and Recreation Administration*, *10*(1), 1–11.

Leeworthy, V. R., & Wiley, P. C. (1996). *Importance and satisfaction ratings by recreating visitors to the Florida Keys/Key West*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Ocean Resources Conservation and Assessment, Strategic Environmental Assessments Division.

Leeworthy, V. R., & Ehler, R. (2010). *Importance and satisfaction ratings by recreating visitors to the Florida Keys/Key West 2007–08*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of National Marine Sanctuaries.

Leeworthy,V., Schwarzmann, D., Reyes Saade, D., Goedeke, T. L., Gonyo, S., & Bauer, L. (2015). *Importance-satisfaction ratings for natural resource attributes facilities and services in the outer coast of Washington and the Olympic Coast National Marine Sanctuary: Volume 3, 2014*. Marine Sanctuaries Conservation Series ONMS-16-04. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

Lindall, S. A., Olson, D. C., & Alward, G. S. (2006). Deriving multi-regional models using the IMPLAN National Trade Flows Model. *The Journal of Regional Analysis and Policy*, *36*(1), 76–83. https://doi.org/10.22004/ag.econ.132316

Martilla, J. A., & James, J. C. (1977). Importance-performance analysis. *Journal of Marketing*, *41*(1), 77–79. https://doi.org/10.1177/002224297704100112

Office of National Marine Sanctuaries. (2019). *Channel Islands National Marine Sanctuary 2016 condition report*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/docs/2016-condition-report-channel-islands-nms.pdf

Richardson, S. L. (1987). An importance-performance approach to evaluating communication effectiveness. *Journal of Park and Recreation Administration*, *5*(4), 71–83.

Schwarzmann, D., & Shea, R. (2020). *Whale watching in Stellwagen Bank National Marine Sanctuary: Understanding passengers and their economic contributions*. National Marine Sanctuaries Conservation Series ONMS-20-12. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

Schwarzmann, D., Shea, R., Leeworthy, V., Hastings, S., Knapp, L., & Tracy, S. (2021). *Whale watching in Channel Islands National Marine Sanctuary: A stated preference study of passengers' willingness to pay for marine life improvements*. National Marine Sanctuaries Conservation Series ONMS-21-05. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

U.S. Census Bureau. (2021). *Explore census data* [Data set]. U.S. Department of Commerce. https://data.census.gov/cedsci/

Van Deren, M., Mojica, J., Martin, J., Koefod, C. (2019). *The whales in our waters: The economic contribution of whale watching in San Juan County*. Earth Economics.

Watson, P., Wilson, J., Thilmany, D., & Winter, S. (2007). Determining economic contributions and impacts: What is the difference and why do we care? *The Journal of Regional Analysis and Policy*, *37*(2), 15–19. https://doi.org/10.22004/ag.econ.132414

AMERICA'S UNDERWATER TREASURES