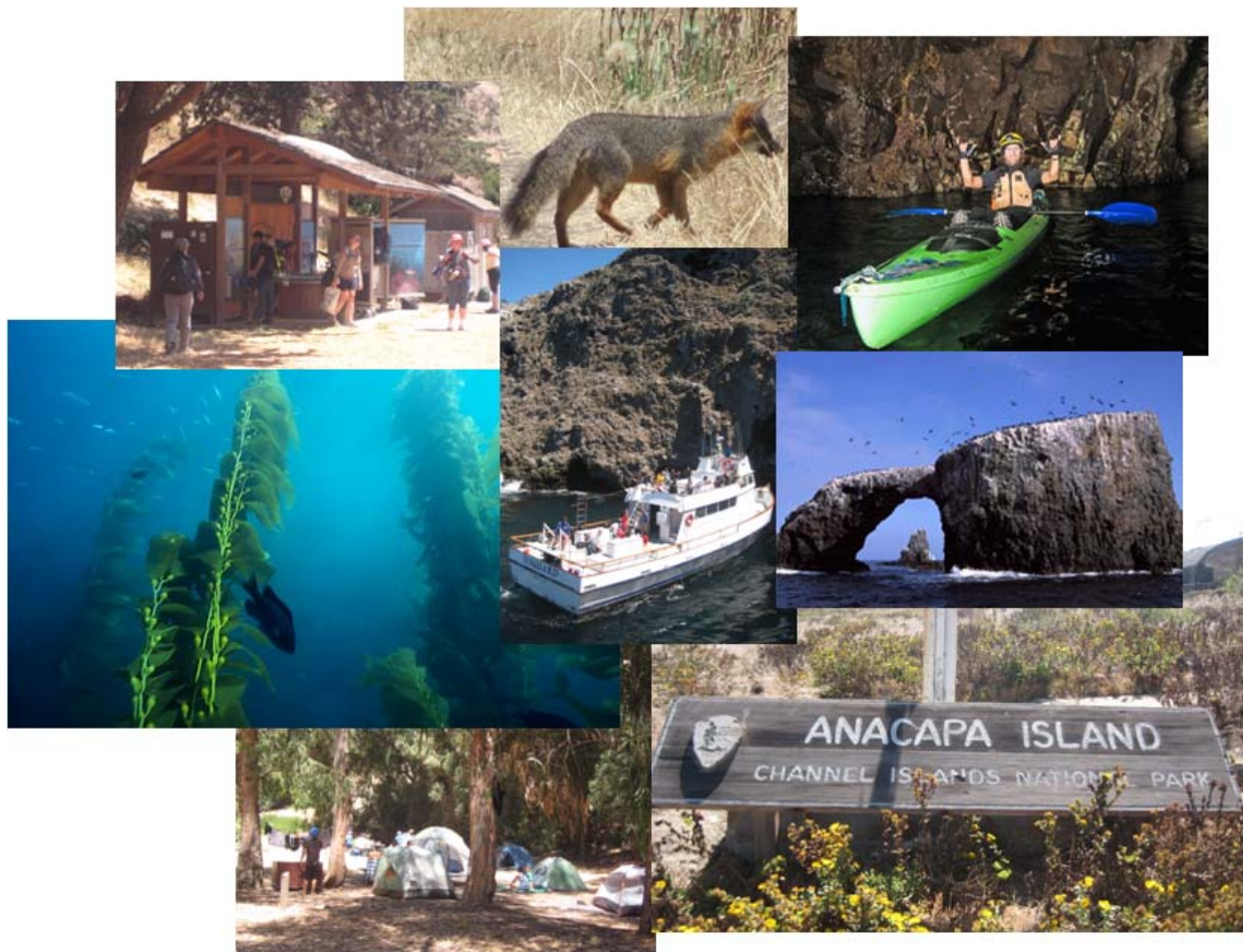




Understanding the spatial dynamics of social values for ecosystem services and environmental behavior among outdoor recreationists



Final Technical Report
March, 2014

Understanding the spatial dynamics of social values for ecosystem services and environmental behavior among outdoor recreationists

Carena J. van Riper¹
Gerard T. Kyle²

¹Department of Recreation, Sport, and Tourism
College of Applied Health Sciences
University of Illinois at Urbana-Champaign
1206 South Fourth St.
Champaign, IL 61820

²Human Dimensions of Natural Resources Laboratory
Department of Recreation, Park & Tourism Sciences
Texas A&M University
600 John Kimbrough Blvd
College Station, Texas, 77845-2261

Please cite this publication as:

van Riper, C.J., & Kyle, G.T. (2014). *Understanding the spatial dynamics of social values for ecosystem services and environmental behavior among outdoor recreationists*. (Prepared for the National Park Service.) College Station, TX: Texas AgriLife Research.

Contents

	Page
Figures.....	v
Tables.....	vi
Appendices.....	viii
Executive Summary.....	ix
Acknowledgments.....	x
Introduction.....	11
Methods.....	11
Data Collection.....	11
Data Analysis.....	12
Results.....	13
SECTION A: Trip Characteristics.....	13
Visitors' Recommendations for Management.....	17
SECTION B: Held Values and Other Factors that Shape Behavior.....	19
Held Value Orientations.....	19
Environmental Worldviews.....	20
Beliefs, Norms, and Behavior.....	21
Behavioral Model.....	24
SECTION C: Assigned Values of Ecosystem Services.....	25
Place Attachment.....	30
SECTION F: Social-Ecological Data Comparison.....	38
SECTION G: Information about Respondents.....	43
Discussion.....	45
Implications and Management Options.....	47

Literature Cited..... 50

Figures

	Page
Figure 1. Study area including Santa Cruz and Anacapa Islands.	11
Figure 2. Survey administration on Sana Cruz Island.	11
Figure 3. Size of personal groups reported by survey respondents.	14
Figure 4. Respondents’ reported experience histories visiting the CHIS.	15
Figure 5. Awareness of consequences for the survey respondent and their family, the park, and other organisms from different types of resource impacts.....	22
Figure 6. Hypothesized model of the relationship among factors that lead to reported behavior.....	24
Figure 7. Digitized points assigned to places on Santa Cruz and Anacapa Islands.....	26
Figure 8. Results from a kernel-density analysis of ecosystem service values assigned to places by the pooled sample of outdoor recreationists on Santa Cruz.....	27
Figure 9. Spatial distribution of (a) Biological Diversity, (b) Recreation, and (c) Scientific assigned values of ecosystem services that were mapped across Santa Cruz Island. Results are presented for two subgroups that reported neutral and high degrees of environmentalism. The intensity of values assigned to places by the two subgroups ranged from 1 (blue) to 10 (red) on a Value Index.	30
Figure 10. Average scores of place attachment dimensions.	32
Figure 11. Zonal statistics for pooled sample showing the relationships between Social Value Index scores displayed on the x-axis and eight environmental variables displayed on the y-axis.....	40
Figure 12. Distribution of perceived biodiversity value for the pooled sample and two survey subgroups defined by self-reported knowledge of Channel Islands National Park.	43

Tables

	Page
Table 1. Description of groups that participated in outdoor recreation activities.....	13
Table 2. Likelihood survey respondents will return to the park within the next year.....	14
Table 3. Respondents’ history of participation in recreation activities.....	15
Table 4. Activity engagement reported by outdoor recreationists.	16
Table 5. Primary activities reported by outdoor recreationists.	16
Table 6. Summary of management recommendations provided by park visitors.....	17
Table 7. Open-ended responses from visitors about areas of improvement in outdoor recreation opportunities.	17
Table 8. Average held values scores reported by survey respondents.	20
Table 9. Agreement or disagreement with survey items measuring environmental worldviews.....	20
Table 10. Reported awareness of consequences incurred from human use.....	21
Table 11. Responsibility ascribed at the individual level to minimize impacts on park resources.	23
Table 12. Respondents levels of agreement with statements about moral, normative concerns.	23
Table 13. Environmental behavior performed in the previous year by outdoor recreationists.	24
Table 14. Estimates of the structural model that examined factors shaping behavior reported by outdoor recreationists.	25
Table 15. Definitions of 12 assigned values of ecosystem services.....	25
Table 16. Preference point allocation and nearest neighbor statistics for 12 values that outdoor recreationists assigned to places on Santa Cruz Island.	28
Table 17. Factor loadings, mean values, standard deviations, and internal consistency among survey items in an abbreviated version of the New Ecological Paradigm scale.....	28
Table 18. Independent samples t-test results and descriptive statistics for 12 assigned values of ecosystem services reported by respondents in the Neutral and Strong-NEP subgroups.	29

Table 19. Agreement or disagreement with survey items measuring place attachment.	31
Table 20. Summary of average levels of place attachment dimensions.....	31
Table 21. Open-ended responses about the reasons why Channel Islands National Park is important.	32
Table 22. Description and sources of environmental variables.	38
Table 23. Animal species incorporated into species richness metric (source: NOAA Environmental Sensitivity Index maps for Southern California, 2010).	39
Table 24. Mean and standard deviation of self-reported knowledge and nearest neighbor statistics for two subgroups and the pooled sample of outdoor recreationists.	40
Table 25. Descriptive statistics, Pearson correlation coefficients, and percent contributions from each predictor variable estimated using zonal statistics for two survey subgroups defined by self-reported knowledge.	42
Table 26. Socio-demographic profile of outdoor recreationists.....	43
Table 27. Descriptive comparison among survey respondents, residents of Santa Barbara County and residents of the state of California.	44

Appendices

	Page
Appendix A: Survey Questionnaire about Held Values and other Factors that Predict Behavior	51
Appendix B: On-site Contact Log	59
Appendix C: Survey Questionnaire about Assigned Values of Ecosystem Services.....	60

Executive Summary

- This study examined “held” values and other psychological processes driving low-impact behavior among outdoor recreationists within the Channel Islands National Park (CHIS) ecoregion. The self-reported, context-specific behaviors performed by park visitors and the configuration of variables that predicted engagement provide insight on how best to foster environmental stewardship among stakeholders such as outdoor recreationists.
- Reported behaviors were more strongly related to biospheric-altruistic held values than egoistic concerns. Multiple other variables shaped respondents’ decisions, especially personal norms that directly anteceded actions minimizing the spread of invasive species, degradation of cultural resources, and overfishing in marine protected areas.
- Results explored the relative importance of 12 “assigned” values for ecosystem services. There were myriad reasons why the CHIS was (or was not) considered important to outdoor recreationists. Aesthetics, recreation, and biodiversity were the most important assigned values whereas economics was the least important. Given that management is a value laden process that involves tradeoffs in decision-making, these findings shed light on the potential compromises visitors are willing to make among competing conditions.
- The CHIS was valued for reasons that reflected the fundamental properties of nature (e.g., sublime landscapes, cultural resource preservation) that inspired the protected area movement in the United States. The diversity and power of these values illustrate a need for the provision of multiple services to sustain special places such as the CHIS that protect biodiversity, contribute to local economies, and support human well-being.
- Assigned value categories mapped by respondents revealed high and low priority settings across marine and terrestrial environments. Areas of value abundance were identified to prioritize decision-making toward particular locales and anticipate points of social conflict.
- Moderate levels of place attachment were reported by outdoor recreationists and no significant differences were found among the four dimensions that comprised this concept. Visitors’ narrative descriptions of place meanings were presented to help elucidate why values were ascribed to the CHIS.
- Results indicated that visitors endorsed an environmental worldview, which shaped the spatial dynamics of assigned values for ecosystem services on Santa Cruz Island. Respondents with strong feelings of environmentalism assigned values to broad geographic areas including places on the island that were not accessible and/or experienced firsthand.
- Perceived biodiversity values were compared to spatially-explicit measures of ecosystem structure and function using GIS tools. Results showed that distance to features relevant for park management, carbon storage, species richness, elevation, vegetation density, and several categories of land cover predicted the locations and intensity of social value points.
- Self-reported knowledge accounted for preference heterogeneity. Two subgroups defined by their understanding of park resources associated biodiversity values with different settings. Respondents with more knowledge ascribed values to the eastern *and* western portions of Santa Cruz whereas those with less knowledge valued only the NPS-side of the island.
- Respondents engaged in a variety of activities, though primarily hiking, camping, kayaking, and enjoying nature. Most did not report extensive visitation histories, in that over half of were visiting the park for the first time. Most were White and not of Hispanic origin, well-educated, and in an upper socio-economic bracket. Approximately half of the sample was comprised of males and the average age just over 40 years.

Acknowledgments

We are grateful for the survey respondents that shared their knowledge and perspectives for this research. We would also like to extend thanks to Russell Galipeau, Kate Faulkner and Yvonne Menard with the National Park Service for their technical support throughout field work. Dustin Green, Travis Peters, and Michael Patillo assisted with data collection and a number of the park staff members improved the quality of this research, including Merrill McCauley, Dave Ashe, Lulis Cuevas, Brent Wilson, and Rocky Rudolph. Drs. Stephen Sutton, Christian Brannstrom, and Amanda Stronza offered conceptual guidance throughout the study period. This research was funded by the Human Dimensions of Natural Resources Laboratory at Texas A&M University and is based on the first author's doctoral program as part of the National Science Foundation's IGERT Program focused on Applied Biodiversity Sciences.

Introduction

Impacts on parks and protected areas are modifying ecosystems that provide benefits to sustain human health and well-being. Compelling evidence of ecological and economic values has been gathered to better understand the implications of these changing social-ecological conditions; however, social values have received considerably less attention. There is a strong need to integrate disciplinary perspectives on the value concept and illustrate the *full* value of nature experienced through outdoor recreation activities. The purpose of this investigation was to explore multiple values of the Channel Islands National Park (CHIS) ecoregion including Anacapa and Santa Cruz Islands (see Figure 1). Specifically, we examined “held” value orientations and other principles that drive outdoor recreation behavior and “assigned” values for ecosystem services defined as the (in)tangible perceived qualities of nature that support outdoor recreation activities (Brown, 1984). A social-ecological systems framework was used to link both held and assigned values to ecological data spanning terrestrial and aquatic ecosystems in the park (Ostrom, 2007). We hope that study findings presented in this report will help to inform decisions about the information, services, and products that managers use to protect environmental conditions and provide quality experiences to outdoor recreationists.

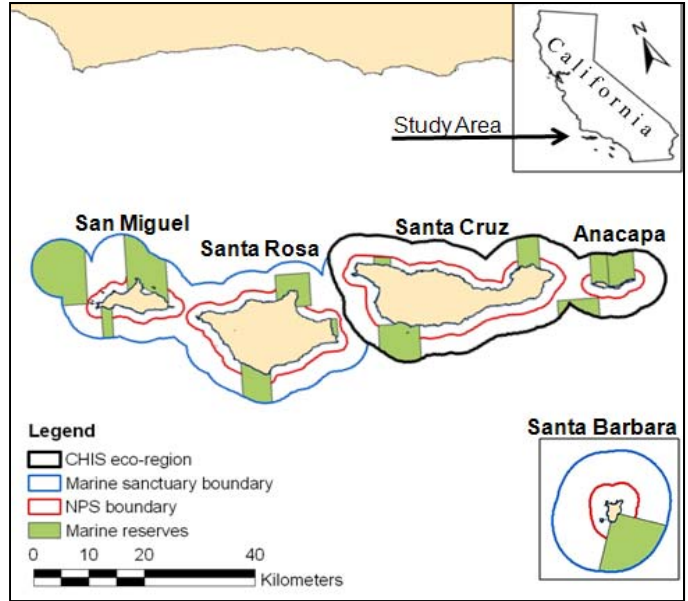


Figure 1. Study area including Santa Cruz and Anacapa Islands.

Methods

Data Collection

Data were collected via an on-site self-administered survey during a time period (June-August, 2012) selected to reflect visitation during the high use season. Potential respondents over the age of 18 were approached at random by trained survey administrators and asked to participate in the study (see Figure 3). For groups, the individual with the most recent birthday completed the survey to minimize potential group leader bias (Battaglia et al., 2008). English versions of the survey were administered at multiple locations, though primarily on Santa Cruz Island to reflect the



Figure 2. Survey administration on Sana Cruz Island.

flow of visitation and owing to difficulties transporting the survey team between the two islands. The survey schedule was stratified by day of the week and time of the day; data were collected in the mornings and afternoons of 28 weekdays and 14 weekend days data using ASUS Transformer TF3000T tablets and Droid Survey (version 1.4.1) and off-line software. Decisions about data collection and the sampling design were informed by preliminary on-site visits to the park in August, 2011 and April, 2012. These survey protocols elicited **682 completed surveys with 51 refusals (93% response rate)**.

There were two on-site surveys administered. First, a survey about “held” values and other factors that shape visitor behavior were examined (N=359) (see Appendix A). Contact logs were used to monitor response rates and calculate potential non-response bias, none of which were detected on the bases on gender ($\chi^2 = 0.07$) and group size ($t = -0.92$, $df = 373$) (See Appendix B). The second survey examined “assigned” values of ecosystem services elicited during a participatory mapping exercise (N=323) (see Appendix C). For this second survey, non-response bias did not exist on the bases of gender ($\chi^2=0.065$) and group size ($t=1.256$, $df=335$). Both surveys took approximately 20 minutes to complete and were administered to different samples in the same survey population. Trip characteristics and socio-demographics from only the “held” values survey are presented herein.

Data Analysis

Completed and usable survey data were coded and entered into databases for analysis using Statistical Package for the Social Sciences Version 21.0. For various response categories, frequency distributions and valid percentages (i.e., percentages excluding missing values) were estimated. Descriptive statistics were also calculated to illustrate mean values (i.e., averages) and standard deviations. To analyze held values and other predictors of behavior, structural equation modeling was used to examine the measurement properties of scaled survey items and test the study hypotheses in Mplus version 7. This study was reviewed by the Texas A&M University Institutional Review Board and approved under exempt status (IRB Protocol Number 2012-0195).

A participatory mapping exercise involving two tasks was performed to elicit assigned values of ecosystem services. First, respondents allocated 100 “preference points” across 12 categories of tangible and intangible assigned values so that their point allocation totaled 100. These categories were drawn from past research (Brown & Reed, 2000) and modified in response to preliminary data collected during visits to the park. The second step in this exercise involved situating these values on a 34’’ by 13’’ map of the study context created by the National Geographic Society and displayed at the survey station. Respondents identified places on the map that they believed embodied assigned values selected in the first step of the exercise. Point data were digitized in a Geographic Information System (GIS) geodatabase and linked to a suite of environmental variables that were selected owing to their potential to shape the perceived qualities of places and based on past research. Social and ecological data were analyzed using a Social Values for Ecosystem Services (SolVES Version 2.0) GIS mapping application developed by the U.S. Geological Survey (Sherrouse et al., 2011) and Maximum Entropy (MaxEnt) modeling (Phillips et al., 2006).

Results

This section of the report presents results from on-site survey data that examined “held” values and other psychological processes driving behavior reported by outdoor recreationists, as well as “assigned” values of ecosystem services that were mapped in relation to a suite of environmental variables across the study area.

SECTION A: Trip Characteristics

As displayed in Table 1, the average group of visitors to the CHIS ecoregion included nearly seven people. However, these data were positively skewed (see Figure 3) so categories of group size were examined. Few (3.6%) respondents counted only one traveler while nearly one third counted two (34.5%) and three-five in their personal groups (36.7). Approximately one out of ten groups had between six and ten people (13.7%), while 11.5% reported between 10-100 outdoor recreationists. When asked to describe their personal group, several (4.2%) were traveling alone, over half (52.8%) were with family, nearly one quarter (20.8%) were with friends, about one in ten (12.4%) were with family and friends, and 9.8% were in organized groups. Nearly half of the sample (52.2%) was considered a day versus overnight user. Day users reported approximately five hours on the islands whereas overnight users reported an average of three hours in the park before completing a survey questionnaire.

Table 1. Description of groups that participated in outdoor recreation activities.

Group Composition	Mean (SD)	N (%)
Group size	6.68 (11.75)	
1		13 (3.6)
2		123 (34.5)
3-5		131 (36.7)
6-10		49 (13.7)
10-100		41 (11.5)
Description of personal group		
<i>Traveling alone</i>		15 (4.2)
<i>Family</i>		188 (52.8)
<i>Friends</i>		74 (20.8)
<i>Family and friends</i>		44 (12.4)
<i>Organized group</i>		35 (9.8)
Day users		176 (52.2)
<i>Total number of hours spent in the park</i>	5.14 (2.87)	
Overnight use		161 (47.8)
<i>Total number of hours spent in the park</i>	2.96 (2.02)	

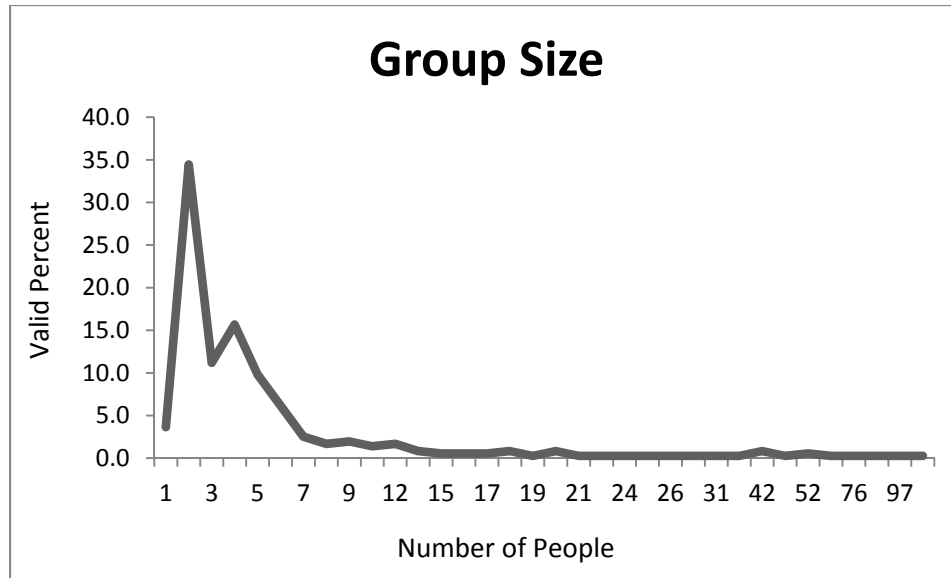


Figure 3. Size of personal groups reported by survey respondents.

A total of 58.5% of respondents reported that they would return to the Channel Islands in the next year (see Table 2). When asked to explain why they would not return, the following reasons were provided:

- Too far (53.3%)
- Will return but not in the next 12 months (15.6%)
- Other priorities (14.1%)
- Not enough time (11.1%)
- Unpleasant experience (3%)
- Too expensive (2.2%)
- Physically unable (0.7%)

Table 2. Likelihood survey respondents will return to the park within the next year.

Likelihood of return	N (%)
Return in the next 12 months	
No	148 (41.5)
Yes	209 (58.5)

As displayed in Table 3, the average number of previous visits reported was five; however, these data were positively skewed (see Figure 4) so categories were examined. Over half (60.9%) had visited on one occasion whereas approximately one quarter (28.9%) had made between two and five previous visits to the park. A total of 5.2% of respondents had been to the Channel Islands between six and ten times and 4% had visited on more than 10 occasions. Among the visitors surveyed, 90.6% had had visited two of the five islands in Channel Islands National Park. The majority (80.8%) reported that the park was their primary destination and less than three quarters (69.3%) were aware that the boundary of the park extended one nautical mile offshore.

Table 3. Respondents' history of participation in recreation activities.

History of Participation	Mean (SD)	N (%)
Number of previous visits to the CHIS	5 (37.84)	
1		198 (60.9)
2-5		94 (28.9)
6-10		17 (5.2)
10-700		16 (4.0)
Number of islands visited	1.34 (0.82)	
1		298 (80.3)
2		37 (10.3)
3		22 (6.1)
4		5 (1.4)
5		7 (1.9)
Channel Islands National Park as primary destination		
Yes		287 (80.8)
No		68 (19.2)
Awareness that park boundary is one nautical mile offshore		
Yes		246 (69.3)
No		109 (30.7)

Previous Visits

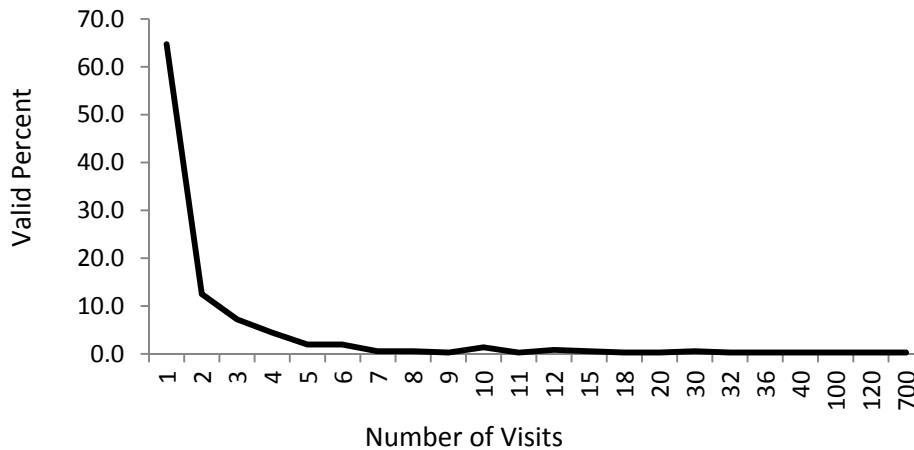


Figure 4. Respondents' reported experience histories visiting the CHIS.

As displayed in Table 4, the most common recreation activities among survey respondents were hiking (94.1%), experiencing nature (78.7%), and taking photographs (75.1%). In contrast, few respondents reported commercial fishing (0.3%), sailing (2.5%), and recreational fishing (4.2%).

Table 4. Activity engagement reported by outdoor recreationists.

Primary Activities	N (%)
Hiking	336 (94.1)
Boating	30 (8.4)
Kayaking	118 (33.1)
Experiencing nature	281 (78.7)
Attending programs	46 (12.9)
Camping	148 (41.6)
Diving / snorkeling	88 (24.6)
Birding	56 (15.7)
Taking photographs	268 (75.1)
Commercial fishing	1 (0.3)
Recreation fishing	15 (4.2)
Sailing	9 (2.5)
Viewing marine life	113 (31.7)
Viewing wildlife	133 (37.3)
Other ¹	21 (5.9)

Note. Respondents could check all that applied so column totals may not equal 100%.

¹Other activities included botanizing, canoeing, spending time with loved ones, drinking, paddle boarding, painting, picnicking, relaxing at the beach, running, surfing, and swimming.

Table 5 shows the **primary** activities of survey respondents. These results indicated that, although respondents engaged in a variety of activities on the islands, hiking (38.9), experiencing nature (16.0%), kayaking (14.6%), and camping (14.6%) were considered primary activities.

Table 5. Primary activities reported by outdoor recreationists.

Primary Activities	N (%)
Hiking	139 (38.9)
Boating	2 (0.6)
Kayaking	52 (14.6)
Experiencing nature	57 (16.0)
Attending programs	1 (0.3)
Camping	52 (14.6)
Diving / snorkeling	25 (7.0)
Birding	3 (0.8)
Taking photographs	6 (1.7)
Commercial fishing	0 (0)
Recreation fishing	1 (0.3)
Sailing	5 (1.4)
Viewing marine life	0 (0)
Viewing wildlife	6 (1.7)
Other ¹	8 (2.2)

¹Other primary activities reported were relaxing at the beach, drinking, seeing what has changed, surfing, and vacation.

Visitors' Recommendations for Management

Respondents were asked, "What, if any, changes would you recommend park managers to make in recreation opportunities at the Channel Islands"? Nearly one third (29.2%) of respondents that offered responses requested more facilities such as trash cans and carts for transporting gear from the boats to the campgrounds (see Table 6). Other common responses were related to more information about the islands offered through on-site interpretation, activities, and/or maps (15.4%), as well as increased access on the islands such as more campsites and transportation to see various other parts of the island not experienced during one's visit (14.9%). A summary of all responses offered are listed in Table 7.

Table 6. Summary of management recommendations provided by park visitors.

Recommendation	N (%)
Keep "natural"	24 (12.3)
Encourage appropriate behavior, especially of children	6 (3.1)
Add facilities (e.g., trash cans, carts, bathrooms, water, benches at overlooks, campfires)	57 (29.2)
Restrict use	6 (3.1)
Maintenance of trails (e.g., add markers) and existing resources (e.g., kill weeds)	15 (7.7)
Increased access on islands (e.g., more time for day trips, more campsites, transportation to other areas)	29 (14.9)
Rental equipment available on islands	22 (11.3)
More information (e.g., on-site interpretation, activities, maps)	30 (15.4)
Non-controllable issues (e.g., increase rain, cure sea sickness)	5 (2.6)
Reduce costs	1 (0.5)

Table 7. Open-ended responses from visitors about areas of improvement in outdoor recreation opportunities.

Comment:
Rentals on the islands (e.g., snorkeling gear, kayaks, umbrellas, cots, mountain bikes, lockers)
Access to more locations (e.g., San Nicholas and San Clemente)
Opportunities for backcountry camping
Add a dressed period maniken to the kitchen.
Add a small store / food facilities, showers, trash cans, hot showers, volleyball court, vending machines
Audio tours
More trails
Informational boards
Campfires at campgrounds
Allow mountain biking
Solar bathrooms
A list of scuba diving club partners of the national park (clubs that are respectful of the marine wildlife)
Documents to describe animals and vegetation of the island
Better bathrooms
Better maps and information regarding trails and backcountry camping
Boating trips or vehicle trips around the island and among islands
Campfire pits on the beach

Campground at Smugglers Cover
Cart rentals to help carry gear
Cleaner restrooms
Trail markers
Solutions for seasickness
Programs on past human habitation
Opportunities for diving
Dock access such as ramps instead of ladders
Evening ranger hikes
Sell beer
Modernize campsites or provide alternatives like yurts
Encourage lighter packing
I would make it cheaper to come on the boat to visit the islands
Flush toilets
Have places set up to sit and enjoy the views in elevated locations
Provide water at beach, Smugglers, and other places
Provide opportunities for at-risk teens
Horses for trail riding
All current efforts are appreciated.
Nice visitor center on Santa Cruz
Information about cliff diving
Identify more trails
Distinguish between trails for younger versus older visitors
Increase rain in the summer
Jet ski activities
Kill more weeds
Kid friendly vocabulary on interpretive hikes
Limit amount of people per day
Later quiet time in campsites
Fewer vehicles
Add more trees and add the wild horses back
Longer day trips
Teach visitors about low impact backcountry camping
Maintain trails better
Make shadey rest stops on trails
More activities at the pier
Mark trails with mileage
More carts for transport to upper campgrounds
More educational programs
More shorter hikes
More longer hikes
More naturalists, park rangers, and guided hikes
More picnic benches

More visible signs
Special walks for campers
Trail markers
More frequent ferries
Provide benches along paths
Continuing to limit amount of visitors per day
The islands are amazing just as they are
Keep natural and prisitine
Nice visitor center
Parasailing and hang gliding off anacapa
Please keep as natural as possible
Poor trail maintenance from del norte to scorpion cove, should not charge for current conditions of Del Norte campground. Camping area is not level and toilets were not installed properly nor maintained.
Enforce appropriate etiquette for campgrounds
Sign language interpreter
Skin diving
Starguide and telescopes
Strict leave no trace enforcement
Transportation of camping gear and food to the campsite
Wildlife identification signs or booklets
Weekend interpretive activities
More private campsites
zip lines
Warn older visitors of difficulty of hikes.
Bags to dispose of litter you find on the trail
We actually feel very well informed. Planning our trip was easy and there was ample information available both online and via NPS. While we enjoy structured activities, we don't feel the need for them here and are enjoying the slower pace.

SECTION B: Held Values and Other Factors that Shape Behavior

Held Value Orientations

To explain why outdoor recreationists engaged in behavior, three dimensions of held value orientations were examined (see Table 8). First, results suggested that biospheric values centered on non-human species and the biosphere carried relative weight in decision-making among outdoor recreationists. The second kind of value examined related to egoistic values and tenets of self interest, which were least important as a guiding principle in respondents' lives. Finally, altruism constituted the third tier of value and suggested respondents were concerned about human welfare. Altruistic values were the second most important held value that guided decision-making about behavioral engagement.

Table 8. Average held values scores reported by survey respondents.

Held values	Mean (SD)
Biospheric values	
<i>Unity with nature: fitting into nature</i>	7.21 (1.80)
<i>Protecting the environment: preserving nature</i>	7.59 (1.51)
<i>Preventing pollution: protecting natural resources</i>	7.62 (1.54)
<i>Respecting the earth: live in harmony with other species</i>	7.61 (1.66)
<i>A world of beauty: beauty of nature and the arts</i>	7.55 (1.53)
Egoistic values	
<i>Authority: the right to lead or command</i>	5.08 (2.13)
<i>Social power: control over others, dominance</i>	3.77 (2.20)
<i>Wealth: material possessions, money</i>	3.98 (1.84)
<i>Influential: having an impact on people and events</i>	6.05 (2.04)
Altruistic values	
<i>Loyal: faithful to my friends, group</i>	7.65 (1.51)
<i>A world at peace: free of war and conflict</i>	7.33 (1.90)
<i>Equality: equal opportunity for all</i>	7.21 (1.83)
<i>Social justice: correcting injustice, care for others</i>	7.14 (1.84)
<i>Helpful: working for the welfare of others</i>	6.82 (1.82)

Note. Mean values were recoded on a Likert scale where 1="Opposed to my Values" and 9="Of Supreme Importance."

Environmental Worldviews

Environmental worldviews and/or general beliefs about the perceived relationships between people and the environment are thought to predict behavior (see Table 9). This study measured environmental worldview using the New Ecological Paradigm scale (Dunlap et al., 2000), which related to principles about living in harmony with or having mastery over natural and social worlds. Results indicated that respondents' worldviews could be situated along a continuum anchored by biocentric beliefs oriented toward environmental protection and anthropocentric beliefs geared toward people taking precedent over nature. Biocentric beliefs were more important driving principles in shaping decision-making among respondents.

Table 9. Agreement or disagreement with survey items measuring environmental worldviews.

Environmental worldviews	Mean (SD)
Biocentrism	
<i>We are approaching the limit of the number of people the earth can support</i>	3.76 (1.09)
<i>When humans interfere with nature it often produces disastrous consequences</i>	4.03 (0.97)
<i>Humans are severely abusing the environment</i>	4.06 (1.03)
<i>Plants and animals have as much right as humans to exist</i>	4.11 (1.06)
<i>Despite our special abilities humans are still subject to the laws of nature</i>	4.26 (0.93)
<i>The earth is like a spaceship with very limited room and resources</i>	3.74 (1.09)
<i>The balance of nature is very delicate and easy to upset</i>	4.02 (0.95)
<i>If we continue on our current course, we will soon experience a major ecological catastrophe</i>	3.97 (1.04)

Table 9. Agreement or disagreement with survey items measuring environmental worldviews (continued).

Environmental worldviews	Mean (SD)
Anthropocentrism ¹	
<i>Humans have the right to modify the natural environment to suit their needs</i>	2.49 (1.10)
<i>Human ingenuity will ensure that we do not make the earth unlivable</i>	2.88 (1.14)
<i>The earth has plenty of natural resources if we just learn how to develop them</i>	3.02 (1.24)
<i>The balance of nature is strong enough to cope with the impacts of modern industrial nations</i>	2.20 (1.09)
<i>The so-called “ecological crisis” facing humankind has been greatly exaggerated</i>	2.11 (1.14)
<i>Humans were meant to rule over the rest of nature</i>	2.10 (1.20)
<i>Humans will eventually learn enough about how nature works to be able to control it</i>	2.45 (1.09)

Note. Measured along a Likert scale where 1=“Strongly Disagree” and 5=“Strongly Agree.”

¹Disagreement with these survey items indicates endorsement of an environmental worldview.

Beliefs, Norms, and Behavior

Scaled items to measure beliefs, personal norms, and behavior reported by outdoor recreationists were created to represent managers’ primary concerns about sustainable use of resources within the CHIS. Four concerns were through preliminary data collection and visits to the park:

1. The spread of non-native plants and animals
2. Restoration activities
3. Impacts on cultural resources such as archaeological sites and historic structures
4. Degradation of natural resources within marine protected areas

The first set of variables measuring respondents’ belief systems examined awareness of consequences, which indicated the extent to which outdoor recreationists recognized the importance of their contributions to avert negative consequences for non-human species and other humans. Results suggested that respondents were equally concerned about the four issues mentioned above and felt these issues were a problem at three scales: 1) individual and family level, 2) Channel Islands National Park, and 3) other species of plants and animals (see Figure 5). Familiarity with the four issues was strong (see Table 10).

Table 10. Reported awareness of consequences incurred from human use.

Awareness of Consequences	Mean	SD
Familiarity ¹	3.51	1.11
<i>Spread of non-native plants and animals</i>	3.49	1.29
<i>Reintroduction of native species</i>	3.50	1.28
<i>Damage to cultural resources</i>	3.28	1.13
<i>Human impact on the marine environment</i>	3.78	1.22
Consequences for respondents and their families ²	3.23	1.09
<i>Spread of non-native plants and animals</i>	3.12	1.32
<i>Reintroduction of native species</i>	2.69	1.41
<i>Damage to cultural resources</i>	3.24	1.23
<i>Human impact on the marine environment</i>	3.82	1.30

Table 10. Reported awareness of consequences incurred from human use (continued).

Awareness of Consequences	Mean	SD
Consequences for Channel Islands National Park ²	3.84	1.03
<i>Spread of non-native plants and animals</i>	4.05	1.17
<i>Reintroduction of native species</i>	3.48	1.42
<i>Damage to cultural resources</i>	3.70	1.25
<i>Human impact on the marine environment</i>	4.11	1.18
Consequences for other species of plants and animals ²	3.72	0.96
<i>Spread of non-native plants and animals</i>	4.16	1.10
<i>Reintroduction of native species</i>	3.43	1.40
<i>Damage to cultural resources</i>	3.03	1.46
<i>Human impact on the marine environment</i>	4.20	1.10

¹Measured along a Likert scale where 1=“Not at all Familiar” and 5=“Very Familiar.”

²Measured along a Likert scale where 1=“Not at all a Problem” and 5=“A Very Serious Problem.”

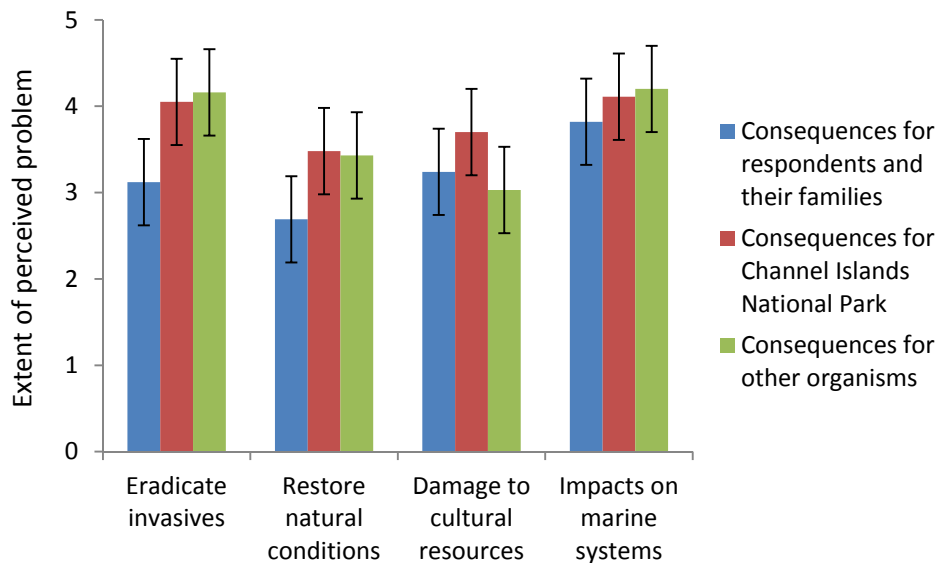


Figure 5. Awareness of consequences for the survey respondent and their family, the park, and other organisms from different types of resource impacts.

Ascribed responsibility was another belief examined among CHIS visitors. Results indicated that respondents did not deny responsibilities to engage in environmentally-friendly actions related to eradicating invasive species, supporting restoration activities, minimizing damage to cultural resources, and minimizing impacts on marine systems (see Table 11). Outdoor recreationists likely assumed that an insufficient number of other people were already engaging in pro-environmental activities or believed that their potential contribution would not be negligible.

Table 11. Responsibility ascribed at the individual level to minimize impacts on park resources.

Ascription of Responsibility	Mean (SD)
Managers of Channel Islands National Park should exert pressure to prevent the spread of non-native plants and animals	4.21 (0.82)
I feel jointly responsible for the spread of non-native species	3.31 (1.28)
Managers of Channel Islands National Park should take strong action to reintroduce native vegetation	4.10 (0.89)
Managers of Channel Islands National Park have a responsibility to prevent damage to archaeological artifacts	4.25 (0.78)
Not only is the National Park Service responsible for minimizing damage to historic structures, but me too	4.33 (0.87)
I feel jointly responsible for damage to cultural resources	3.35 (1.17)
I am jointly responsible for environmental impacts to marine life	4.06 (1.02)

Note. Measured along a Likert scale where 1=“Strongly Disagree” and 5=“Strongly Agree.”

This investigation examined personal norms, which were considered feelings of moral obligation that, when activated, would lead to behavior change among outdoor recreationists. On average, respondents strongly agreed with most statements measuring personal norms suggesting that they felt obliged to engage in behaviors beneficial for the environment partially owing to the pressures imposed by other people.

Table 12. Respondents levels of agreement with statements about moral, normative concerns.

Personal Norms	Mean (SD)
I feel morally obliged to minimize human impact on marine resources within Channel Islands National Park	4.31 (0.86)
People like me should do whatever they can to prevent damage to historic structures on Channel Islands National Park	4.41 (0.83)
I would feel guilty if I were responsible for the spread of non-native plants across Channel Islands National Park	4.39 (0.86)
I feel a sense of personal obligation to not damage historic structures on Channel Islands National Park, regardless of what others do	4.54 (0.78)
I feel a personal obligation to do whatever I can to support the reintroduction of native animals at Channel Islands National Park	3.74 (1.00)

Note. Measured along a Likert scale where 1=“Strongly Disagree” and 5=“Strongly Agree.”

Nine survey items presented on a dichotomous (yes/no) scale were included in the survey questionnaire to measure reported engagement in environmentally-friendly behaviors over the previous 12 months (see Table 13). All behavioral items were developed to reflect context-specific management concerns about ecological and socio-cultural integrity. The summative score for all reported behavior survey items indicated that respondents had undertaken several activities to minimize impacts over the course of the previous year ($M = 4.79$, $SD = 2.23$).

Table 13. Environmental behavior performed in the previous year by outdoor recreationists.

<i>Pro-environmental Behavior</i>	Valid Percent
Volunteer at Channel Islands National Park to remove non-native species	7.7
Support and/or accept policies that protect the marine environment	62.3
Clean equipment (e.g., wash hulls of boats, shake tents, pick seeds from shoe laces) to prevent the spread of exotic species	32.6
Use boot scraping stations to prevent the spread of non-native plants	22.9
Read a newsletter, magazine or other publication about the human history of Channel Islands National Park	52.9
Support the reintroduction of native species (e.g., island foxes) on Channel Islands National Park	63.9
Properly dispose of waste (e.g., apple cores) that may cause the spread of non-native plants	83.9
Support policies that protect historic and cultural resources	75.2
Encourage other visitors to not disturb archeological artifacts on Channel Islands National Park	77.7

Note. Respondents could check all that applied so column total may not equal 100%.

Behavioral Model

This research tested a series of hypotheses about the psychological factors that shaped behaviors reported by outdoor recreationists (van Riper et al., 2014). Specifically, a two-step structural regression model determined whether reported behavior would be performed when an individual felt they ought to take action (i.e., personal norms), believed they could make a difference / others were not performing needed behaviors (i.e., ascription of responsibility), considered environmental conditions to be problematic (i.e., awareness of consequences), and positively or negatively evaluated human-environment interactions (i.e., environmental worldview) in response to the attitude objects of non-human species (biospheric-altruistic values) and individual interests (egoistic value). The effects of environmental worldview and values on personal norms were also estimated in the model. These eight hypotheses (H₁-H₈) are reflected in the model depicted in Figure 6. Each of the variables in this model was represented by a select number of survey items.

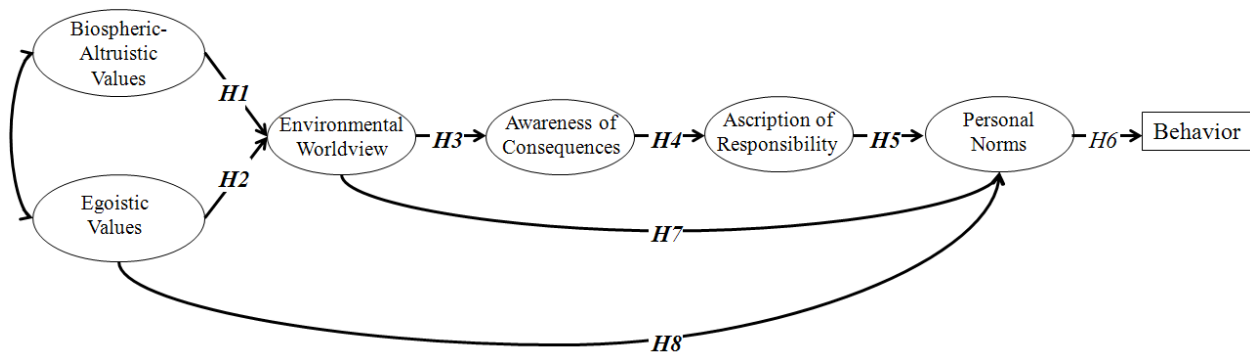


Figure 6. Hypothesized model of the relationship among factors that lead to reported behavior.

Results largely supported the hypothesized relationships (see Table 14). Consistent with H₆, H₅, H₄, and H₃, this study found positive, direct effects of personal norms on behavior ($\beta = 0.46$, $t = 8.28$), ascription of responsibility on personal norms ($\beta = 0.60$, $t = 7.08$), awareness of consequences on ascription of responsibility ($\beta = 0.71$, $t = 8.44$), and worldview on awareness of consequences ($\beta = 0.50$, $t = 9.51$). In other words, as general belief structures representing a worldview were rated more favorably, respondents reported heightened awareness of

environmental problems, ascribed responsibility to take action, and moral inclinations that in turn led to actions undertaken in the previous year. H₇, examining the direct effect of worldview on personal norms, was rejected ($\beta = 0.26, t = 1.93$). As predicted, tests of H₁ confirmed that biospheric-altruistic value orientations increased the likelihood that respondents would positively evaluate human-environment interactions ($\gamma = .82, t = 23.91$). Egoistic values had no influence on worldview (H₇; $\gamma = -.10, t = -1.64$). However, as hypothesized in H₂, egoism had a negative direct effect on personal norms ($\gamma = -.17, t = -2.81$). The expected pattern of relations emerged between biospheric-altruistic values and personal norms (H₈) ($\gamma = .54, t = 8.07$).

Table 14. Estimates of the structural model that examined factors shaping behavior reported by outdoor recreationists.

Dependent variables	Predictors	γ	β	SE	t-value	R ²
Behavior	Personal Norms		.46	.06	8.28	.22
Personal Norms	Ascription of Responsibility		.60	.09	7.08	.82
Ascription of Responsibility	Awareness of Consequences		.57	.07	8.44	.33
Awareness of Consequences	Environmental Worldview		.50	.05	9.51	.25
Personal Norms	Environmental Worldview		.26	.14	1.92 ^a	
Environmental Worldview	Biospheric-altruistic Values	.82		.03	23.91	.67
Environmental Worldview	Egoistic Values	-.10		.06	-1.64 ^a	
Personal Norms	Biospheric-altruistic Values	.54		.07	8.07	
Personal Norms	Egoistic Values	-.17		.06	-2.81	

^a non-significant values at $p \leq 0.05$

SECTION C: Assigned Values of Ecosystem Services

This subsection of the report includes the results from the second survey that examined assigned values of ecosystem services. This survey included a participatory value mapping exercise that asked respondents to allocate 100 “preference points” across 12 categories of tangible and intangible value categories (see Table 15). The second step in this exercise involved situating these values on a 34” by 13” map of the study context that had an approximate scale of 1:50,000. This map served as a visual basis for dialogue about areas in the park that embodied value and the reasons why these places were considered important. The place-based preferences reported by outdoor recreationists were digitized and mapping using Geographic Information System (GIS) tools (n=2,245). Spatial clustering occurred on Santa Cruz Island near Scorpion Anchorage, Cavern Point, Potato Harbor, Smuggler’s Cove, Prisoner’s Harbor, Fry’s Harbor, Painted Cave, Coches Prietos, the Central Valley, Gull Island, and Montañon Ridge. On Anacapa Island, the Brown Pelican Fledgling Area and most of East Anacapa were valued for multiple purposes (see Figure 7).

Table 15. Definitions of 12 assigned values of ecosystem services.

Value Type	Description
Aesthetic	I value Channel Islands National Park for the attractive scenery, sights, sounds, or smells
Biological Diversity	I value Channel Islands National Park because it provides for a variety of plants, wildlife, marine life, and other living organisms
Cultural	I value Channel Islands National Park because it preserves historic places and archaeological sites that reflect human history of the island

Table 15. Definitions of 12 assigned values of ecosystem services (continued).

Value Type	Description
Economic	I value Channel Islands National Park because it provides fisheries, recreation, or tourism opportunities that provide economic benefits
Future Value	I value Channel Islands National Park because it allows future generations to experience this place
Intrinsic	I value Channel Islands National Park in and of itself for its existence
Learning	I value Channel Islands National Park because I can learn about natural and cultural resources
Life Sustaining	I value Channel Islands National Park because it helps produce, preserve, clean, and renew air, soil, and water
Spiritual	I value Channel Islands National Park because it is spiritually significant to me
Recreation	I value Channel Islands National Park because it provides a place for my favorite outdoor recreation activities.
Therapeutic	I value Channel Islands National Park because it makes me feel better, physically and/or mentally
Scientific	I value Channel Islands National Park because it provides an opportunity for scientific observation or experimentation

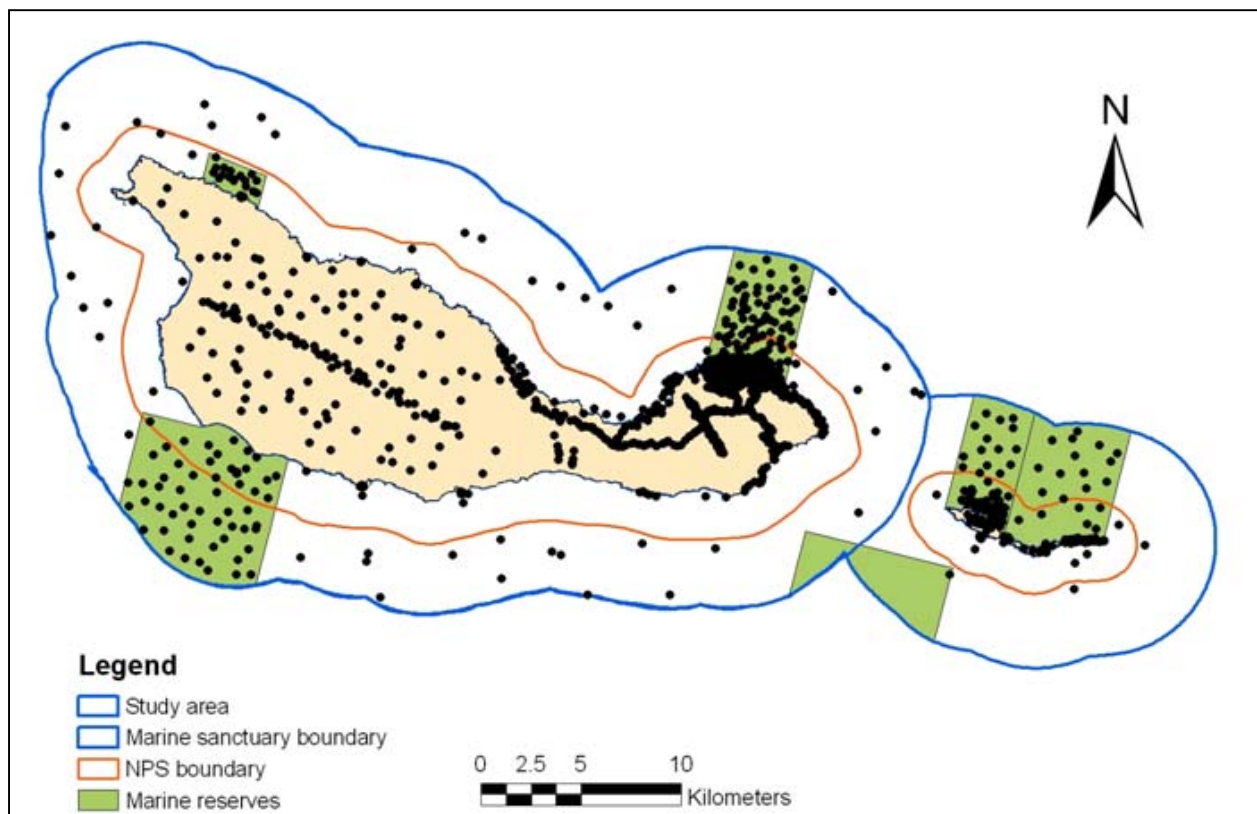


Figure 7. Digitized points assigned to places on Santa Cruz and Anacapa Islands.

Next, analyses were performed using data generated from outdoor recreationists on Santa Cruz Island to determine the perceived values of ecosystem services in this area. Aesthetic, biological diversity, and recreation, were assigned the greatest number of preference points, suggesting the park was most valued for these purposes. These results indicate what was *most* important to

outdoor recreationists based on the relative ordering of assigned value categories in the typology adapted from Brown & Reed (2000). A kernel-density surface map was created to illustrate the distribution and point density of values assigned to places by the pooled sample of survey respondents (see Figure 8). Areas of value abundance on Santa Cruz Island and in adjacent waters were thus identified. Spatial clustering occurred across all categories except “economic” value (see Table 16).

- Aesthetic ($M = 17.06$)
- Biological Diversity ($M = 16.18$)
- Recreation ($M = 12.63$)
- Scientific ($M = 8.52$)
- Learning ($M = 8.36$)
- Future ($M = 8.27$)
- Intrinsic ($M = 6.84$)
- Life Sustaining ($M = 5.72$)
- Therapeutic ($M = 5.63$)
- Cultural ($M = 5.15$)
- Spiritual ($M = 3.41$)
- Economic ($M = 1.90$)

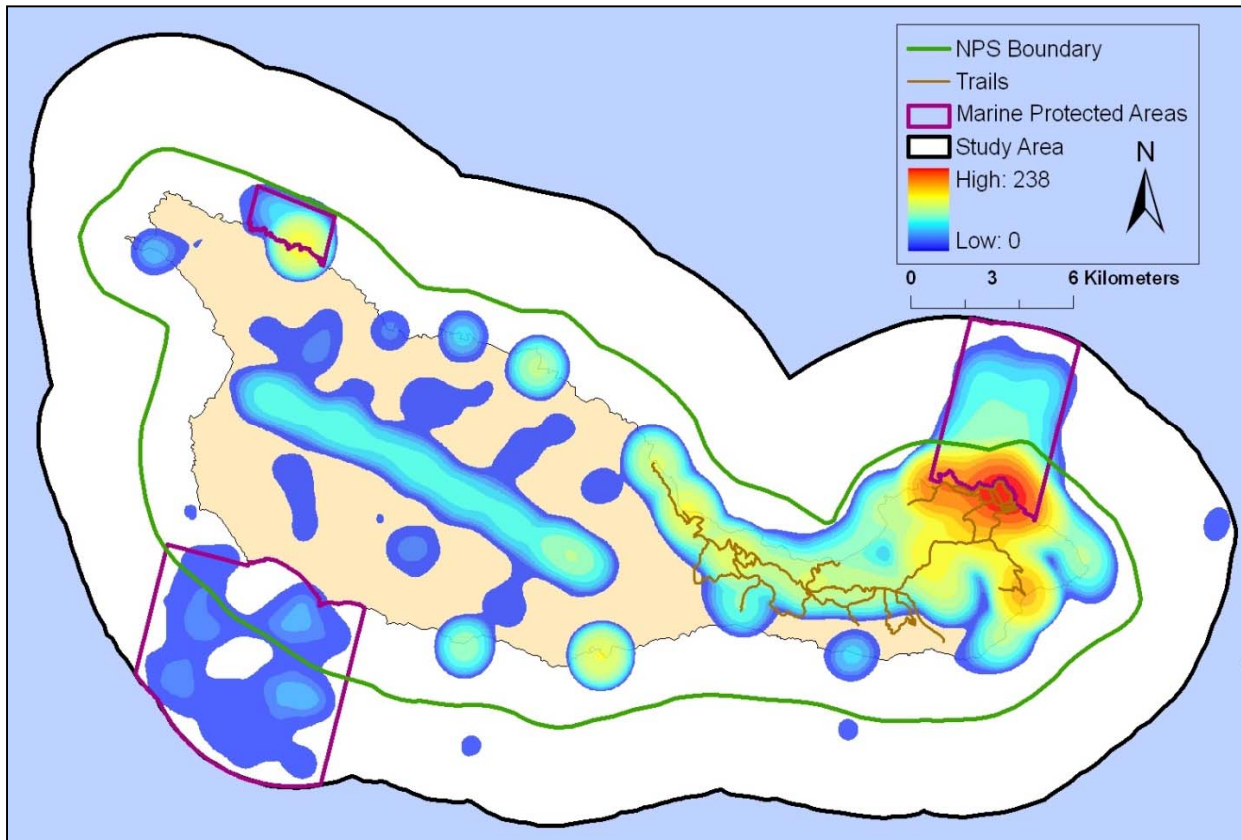


Figure 8. Results from a kernel-density analysis of ecosystem service values assigned to places by the pooled sample of outdoor recreationists on Santa Cruz.

Table 16. Preference point allocation and nearest neighbor statistics for 12 values that outdoor recreationists assigned to places on Santa Cruz Island.

	Pooled Sample			Neutral NEP Subgroup			Strong NEP Subgroup		
	<i>N</i>	<i>R-Ratio</i>	<i>Z-score</i>	<i>N</i>	<i>R-Ratio</i>	<i>Z-score</i>	<i>N</i>	<i>R-Ratio</i>	<i>Z-score</i>
Aesthetic	510	.21	-34.15	157	.21	-18.98	278	.29	-22.57
Biological Diversity	535	.47	-23.67	110	.39	-12.29	306	.57	-14.34
Cultural	97	.24	-14.35	40	.44	-6.79	46	.37	-8.18
Economic	20	.99	-0.08	7	.10	-4.54	9	1.33	1.91
Future	119	.38	-12.85	34	.28	-8.05	76	.49	-8.44
Intrinsic	102	.33	-12.95	40	.45	-6.70	57	.31	-9.92
Learning	246	.11	-26.58	57	.05	-13.68	149	.14	-20.18
Life Sustaining	53	.43	-8.02	21	.46	-4.76	24	.49	-4.83
Spiritual	101	.25	-14.51	38	.24	-9.01	50	.27	-9.90
Recreation	428	.22	-30.98	156	.16	-20.07	213	.31	-19.37
Therapeutic	161	.34	-16.08	54	.13	-12.21	89	.45	-9.97
Scientific	259	.50	-15.24	39	.46	-6.43	161	.53	-11.51

Note. Spatial statistics included the observed versus expected distance between points (R ratio) and the number of standard deviations from the mean (Z score).

Tradeoffs among competing ecosystem service values were examined for two subgroups defined by anthropocentric (i.e., having mastery over nature) and biocentric (i.e., living in harmony with nature) worldviews measured by the NEP scale evaluated in the assigned value survey. Specifically, an abbreviated 10-item version of the revised NEP scale was employed (Dunlap et al., 2000) and verified using confirmatory factor analysis (see Table 17).

Table 17. Factor loadings, mean values, standard deviations, and internal consistency among survey items in an abbreviated version of the New Ecological Paradigm scale

	Factor Loading	Mean	SD
<i>Biocentrism</i> ($\alpha = .706$)			
We are approaching the limit to the number of people the earth can support	.550	3.58	1.16
When humans interfere with nature it often produces disastrous consequences	.663	3.86	0.93
Plants and animals have as much right as humans to exist	.497	4.22	0.90
Despite our special abilities humans are still subject to the laws of nature	.341	4.40	0.68
If we continue on our current course, we will soon experience a major ecological catastrophe	.774	3.81	0.99
<i>Anthropocentrism</i> ($\alpha = .763$)			
Humans have the right to modify the natural environment to suit their needs ¹	.498	3.67	0.98
Human ingenuity will ensure that we do not make the earth unlivable	.506	3.24	1.10
The earth has plenty of natural resources if we just learn how to develop them	.476	2.94	1.16
The balance of nature is strong enough to cope with the impacts of modern industrial nations	.692	3.72	1.06
The so-called "ecological crisis" facing humankind has been greatly exaggerated ¹	.786	3.88	1.08

¹Survey items allowed to covary.

Note. Measured on a Likert scale where 1 = "strongly disagree" and 5 = "strongly agree"

Next, a K-means cluster analysis was performed to segment respondents into subgroups on the basis of their worldviews. The two-cluster solution included a *Neutral NEP* subgroup that represented 36.4% (n=108) of the sample that reported nearly equal agreement with survey items reflecting biocentrism ($M=3.38$, $SD=.52$) and anthropocentrism ($M=3.23$, $SD=.57$). Respondents in the second subgroup, *Strong NEP*, represented 63.6% (n=189) of the sample and took a relatively pronounced stance toward environmental issues indicated by agreement with statements about biocentrism ($M=4.32$, $SD=.41$) and disagreement with statements about anthropocentrism ($M=2.10$, $SD=.53$). Value allocations were compared between the subgroups using independent samples t-tests (see Table 18). Three value categories were preferred to significantly different degrees: (a) biological diversity, (b) recreation, and (c) scientific. Results suggested the *Neutral NEP* subgroup believed the park embodied more recreational qualities than the second subgroup, *Strong NEP*, which was comprised of individuals that reported higher ratings of biological diversity and scientific-based values (van Riper & Kyle, in review).

Table 18. Independent samples t-test results and descriptive statistics for 12 assigned values of ecosystem services reported by respondents in the Neutral and Strong-NEP subgroups.

	Neutral-NEP Subgroup (n = 108)		Strong-NEP Subgroup (n = 189)		95% CI for Mean Difference	t-stat	df
	M	SD	M	SD			
Aesthetic ¹	18.36	18.67	16.32	15.11	-2.12, 6.19	0.97	187
Biological Diversity	13.04	14.05	17.97	15.18	-8.44, -1.42	-2.77*	295
Cultural	5.10	7.27	5.19	7.07	-1.78, 1.61	-0.10	295
Economic ¹	2.52	5.27	1.55	4.11	-0.21, 2.15	1.62	179
Future	6.70	9.26	9.16	10.80	-4.90, 0.02	-1.99*	295
Intrinsic	6.95	11.34	6.81	10.20	1.28, -2.38	0.11	295
Learning	7.78	12.43	8.68	11.09	1.40, -3.65	-0.64	295
Life Sustaining	5.46	11.39	5.87	10.38	-2.97, 2.14	-3.20	295
Spiritual	3.69	7.07	3.24	6.14	-1.10, 1.98	0.56	294
Recreation ¹	15.24	15.75	11.16	10.87	0.70, 7.45	2.38*	166
Therapeutic	5.67	10.26	5.60	8.19	-2.07, 2.20	0.60	294
Scientific	5.72	8.66	10.13	10.35	-6.73, -2.09	-3.74*	294

¹Equal variances not assumed.

* $p \leq .05$.

The three value types perceived differently by the two subgroups were further analyzed. Varied spatial distributions of points emerged indicating that worldviews manifested different assigned value patterns (see Figure 9). Specifically, assigned values were spread across a larger area by respondents in the *Strong NEP* subgroup. These individuals ascribed biological diversity, recreation, and scientific values to the eastern portion of Santa Cruz where visitor activities were facilitated by the NPS, as well as the TNC side of the island where use was prohibited.

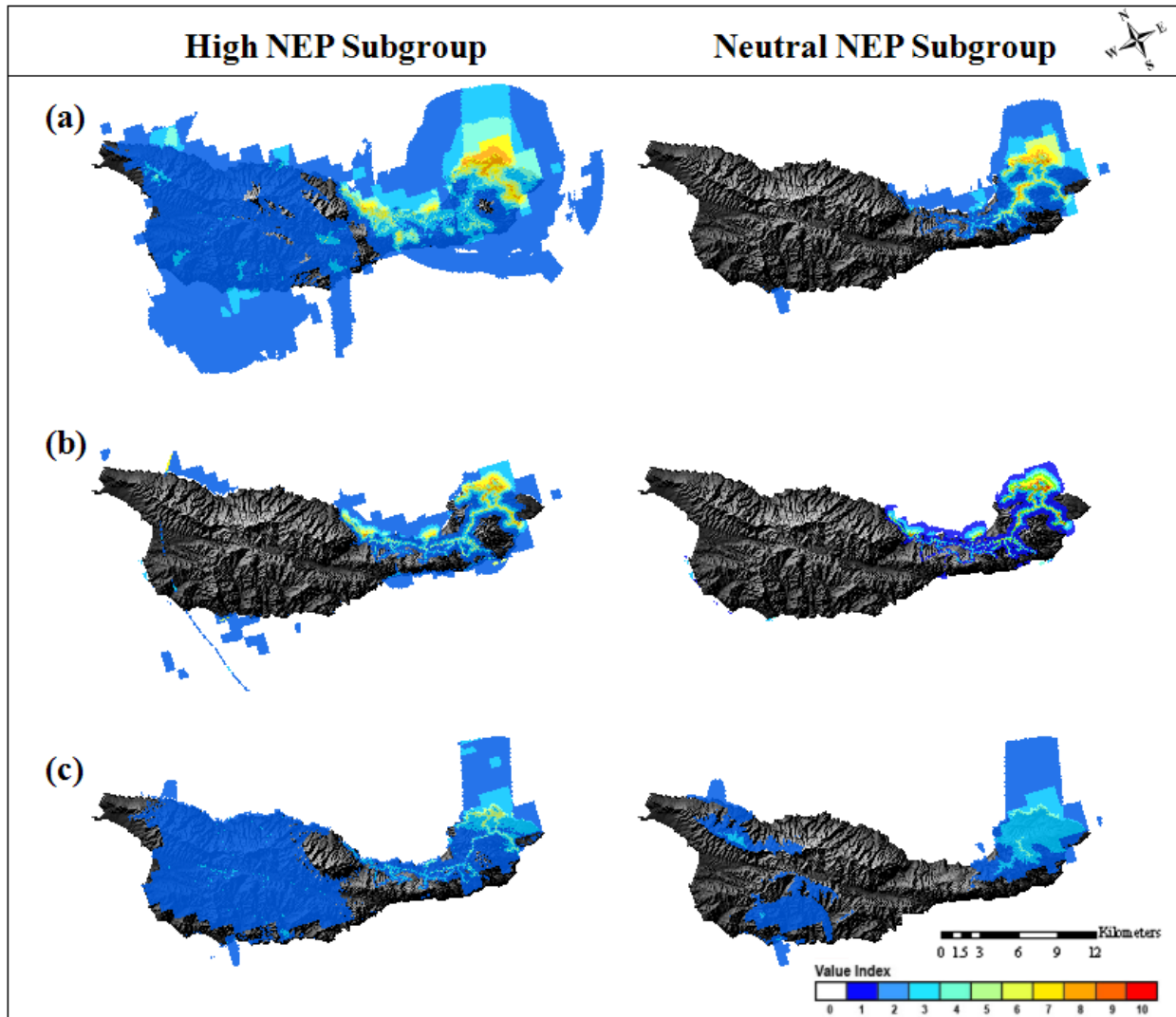


Figure 9. Spatial distribution of (a) Biological Diversity, (b) Recreation, and (c) Scientific assigned values of ecosystem services that were mapped across Santa Cruz Island. Results are presented for two subgroups that reported neutral and high degrees of environmentalism. The intensity of values assigned to places by the two subgroups ranged from 1 (blue) to 10 (red) on a Value Index.

Place Attachment

A subsection was included in the second survey to examine “place attachment,” which is the strength of a connection shared between a persona and a place (see Table 19). Findings helped to elucidate the reasons why values were assigned to places in the park. In general, respondents reported moderate attachment to the park. Multiple-item scales measured four dimensions of place attachment drawn from past research (Williams & Vaske, 2003; Kyle et al., 2005) (see Table 20, Figure 10). Recreationists agreed with statements measuring **place identity** ($M = 3.23$) and **affective attachment** ($M = 3.24$), indicating that their connections were formed on the basis of psychological and emotional bonds that defined the individual. Respondents disagreed with items assessing **place dependence** ($M = 2.97$), suggesting that other locales may serve as substitutions for the CHIS. Respondents were neutral with respect to **social bonding** ($M = 3.08$), which examined the interpersonal relations that created shared meanings.

Table 19. Agreement or disagreement with survey items measuring place attachment.

Place attachment	Mean (SD)
Place identity	
I feel Channel Islands National Park is part of me	3.00 (0.97)
I identify strongly with Channel Islands National Park	3.28 (0.95)
Visiting this place says a lot about who I am	3.48 (1.01)
Affective attachment	
Channel Islands National Park means a lot to me	3.70 (0.92)
I have a strong emotional bond to Channel Islands National Park	3.15 (1.01)
I feel a strong sense of belonging to Channel Islands National Park	3.20 (0.94)
I am happiest when I visit Channel Islands National Park	3.08 (0.90)
Place dependence	
I get more satisfaction out of visiting this place than any other	2.81 (0.88)
I wouldn't substitute any other area for doing the types of things I do here	2.83 (1.00)
The things I do at Channel Islands National Park I would enjoy doing just as much at a similar site	3.33 (1.01)
Channel Islands National Park is the best place for what I like to do	3.03 (0.88)
Social bonding	
I will (do) bring my children to this place	4.03 (0.87)
My friends/family would be disappointed if I were to start visiting other settings and facilities	2.03 (0.90)
I have a special connection to Channel Islands National Park and the people who use it	3.12 (0.96)
I associate special people with Channel Islands National Park	3.24 (1.15)

Note. Measured along a Likert scale where 1="Strongly Disagree" and 5="Strongly Agree."

Table 20. Summary of average levels of place attachment dimensions.

Dimensions of place attachment	Mean (SD)
Place identity	3.23 (0.81)
Affective attachment	3.24 (0.72)
Place dependence	2.97 (0.56)
Place bonding	3.08 (0.66)

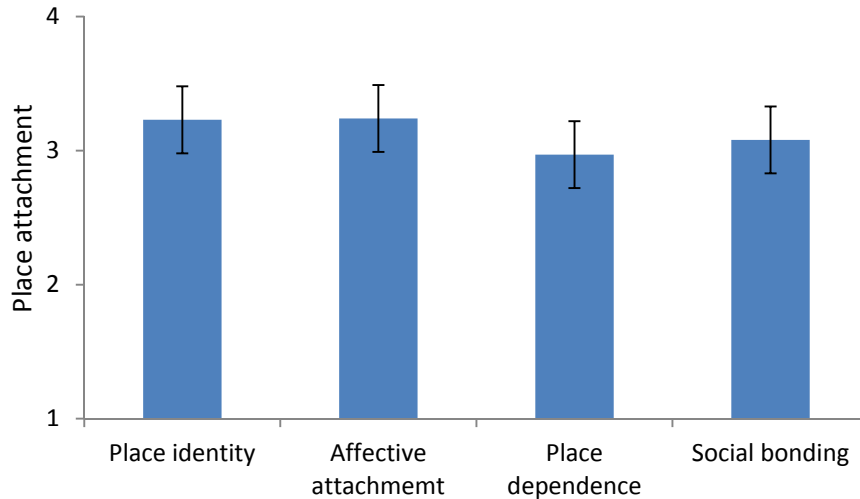


Figure 10. Average scores of place attachment dimensions.

Survey respondents were asked to describe why Channel Islands National Park was important to them. A range of responses were provided, which elucidate the meanings that underpin the strength of attachments formed between outdoor recreationists and places (see Table 21).

Table 21. Open-ended responses about the reasons why Channel Islands National Park is important.

First time here. Would like to explore more to have more knowledge about the islands.
Helping the environment.
It excites primal energy in me.
Natural beauty at its best.
A goal in life to visit all national parks.
A local treasure, I love the park for the solitude it provides in busy southern California.
A natural pristine environment 1 hour from the congestion of southern California. A place for natural systems to flourish.
A new experience.
A refuge where civilization is not allowed is important.
Accessible and relatively untouched.
All national parks are important to preserve.
Americas Galapagos.
An escape from work.
Annual camping trip.
Another example of the natural wonders of our country. Channel isles have a unique history and ecology that is very fascinating. Also we visit many national parks.
Excellent national park but it does not particularly illicit a strong emotional response.
As a nature preserve.
As close to untouched as possible.
Beautiful and pristine. Rugged and wild. Rare types of animals.
Beautiful and remote place.
Beautiful land, close to where I live.
Beautiful natural setting....I like the fact that it is a little difficult to get here thus limiting thus limiting the amount of people on any island at any given time.
Beautiful place.
Beautiful place, wonderful scenery, more remote, quiet, park tries to make sure people is responsible of their impact on animals and land.

Beautiful protected near major cities.
Beautiful, I awesome, I love this place.
Beautiful, spiritual place, pristine setting.
Beautiful, serene, delightful weather, love the wildlife.
Beauty and nature.
Beauty, ocean, endemic species, away from crowds, marine preserve.
Because it is a very different experience.
Because of the ocean activities and the ability to combine hiking and the ocean.
Because of the untouched nature.
Because we came here on our wedding anniversary
Being so close to nature.
Being so one with nature.
Bonding with friends, experiencing nature, getting away from daily life and modern society.
Came here with my friend.
Cave kayaking.
Channel Islands are a unique experience that should be s preserved and shared.
Channel Islands is important to me because it's easily accessible and is seclusion is an attractive feature.
Channel Islands National Park is important to me because I really love all of the wildlife and beautiful scenery. This is my first time in the park, and I think that this park is a true testament of natural beauty.
Conservation efforts, wildlife, solitude.
Do not have time to discuss. It is a good way to get back to nature.
Endemic population.
Endemic species and unique ecological system.
Endemic species, important nesting site for seabirds and rookery for pinnipeds, like mainland California before development.
Family sailing trips.
Feels homey because I grew up on the coast, Carpentaria. Best of both worlds - "mountains" and ocean! I was here for camping 35 years ago and I don't see any changes. Thank you for conserving the beauty, etc. Anacapa was a field trip when I was very young and I love that memory too!
Few people, attractive scenery.
First time here.
For fun.
Former employee.
God's creation.
Good hiking, good alone time.
Great history.
Great place to explore.
Great place to get away from society.
Great place to go hiking and see the pacific ocean.
Great resource environment to enjoy.
Great to have this resource so readily available to us especially for my family as we live 30 minutes away on mainland. Have gazed at it from shore many times and am privileged to be able to visit it in person. Was very good experience. Enjoyed it thoroughly.
Hike and be away from city.
Hiking and preserving its natural state.
Historical and cultural importance.
History and restoring and maintaining ecology and animals.
I am delighted to have visited, and that we had a great guide who identified various plants for us and who gave us lots of historical information.
I am getting married here in 8/16/12.
I believe in the mission of preservation.
I come from France and I love hiking. This trip was very beautiful and I am very happy that natural parks are so protected in this US. I feel it is very important. But as I will be back to France in one year, I know I won't be able to come back. Thus I respect Channel Island but I am not emotionally attached to it.
I enjoy CHIS because it is a unique and special place. Seeing nature, being in nature, learning about animals and their habitats, and getting away from LA and technology are big pluses. And for kids...it's fun...And there are so many islands to explore.CA are fortunate to have CHIS.

I enjoy that it is close to home and I feel time slow down. I am always very relaxed after my visits here.
I enjoy the experience of being on a island.
I enjoy the nature and the various activities and beauty that the islands offer us.
I enjoy the outdoors and volunteer a great deal to keep it available to people.
I enjoyed the quiet, beauty, history of channel island. I did not know it was a national park.
I grew up in Ventura and came here as child. it is a joy to return here now with my own children and parents. proximity to such geologically unique and natural beauty is hard to resist. it is important to preserve it for future generations of both humans and animals.
I have always had an interest in nature and biology. Visiting the park enables me to view numerous species and to escape the heat also.
I have been camping here since I was very young and have always made it an annual trip with friends and family.
I have been visiting Santa Cruz island for 10years and each time if learn and see something different.
I like knowing it's out there to visit, and love to hear that the foxes have made a comeback.
I like the fact that is not easy to get to, the pack it in pack it out philosophy. the as near to natural environment.
I like to experience nature.
I live in Ventura and see the island every day. It is a great natural area.
I look at it every day from where if live (SANTA BARBARA) so if like it a lot. also it is a special place for wildlife and human history, plus it is special geologically, so if think it is important. but mainly it is beautiful, never seen anything like it before.
I love nature & exploring it.
I love the boat ride and love the scenery and how it has been kept in its natural state.
I love the pacific coastal ecosystem.
I really like the nature and animals over here.
I went to school in Santa Barbara and always saw the islands on the horizon and wanted to explore them. It is a unique place to visit and appreciate that it has been preserved.
I would like to see it in its natural state; the mainland coastline has been so severely developed.
Important to experience God's creation, learn about wildlife.
Important wildlife habitat.
Interest in the Chumash and kayaking.
Interesting lesson in native species vs. the introduction of nonnative species.
Interesting place to visit.
Isolation.
It feels like you are on the ends of the earth and being let in on a secret. It's so wonderfully peaceful.
It is a beautiful part of our inheritance.
It is a beautiful place.
It is a beautiful place and remote from other locations. It's a great place to feel like you've gotten away. Good change of pace. Love islands. Love no roads.
It is a beautiful place to enjoy an active vacation in nature.
It is a beautiful place to hike.
It is a beautiful unique wild place.
It is a change from usual routine.
It is a great place to relax and enjoy nature.
It is a national park, and I want to visit all national parks.
It is a national park. we need more parks.
It is a nice place to become removed from city life.
It is a nice place to get in touch with the nature.
it is a place that provides solitude that cannot be found on the main land.
It is a place to get away.
It is a special natural wilderness amongst millions of people.
It is a great place to visit.
It is an interesting place to visit and I am glad to experience it.
It is an untouched view of what California is supposed to be like and offers an amazing getaway from civilization.
It is beautiful and an oasis within view of the overcrowded southland.
It is beautiful and harbors varied and unique wildlife, also close to home.
It is beautiful, quiet, well preserved and close to where I live.
It is beautiful, fun, and exciting to see. Its life changing experience.
It is close to my home in Moorpark, CA and it has an amazing history.

It is exceptionally peaceful
It is good that there are places where nature can be itself without human interference. too many people are ignorant.
It is great to see that on the channel islands efforts are being made to restore it to how it was before non-indigenous human contact. It is a great and isolated example as to how steps can and should be made to undo our wrong doings.
It is great way to spend with family and fun camping.
It is home to animals and plants that should have their habitat.
It is important because species live here that don't exist elsewhere.
It is important to have places like this.
It is important to me in that it gives me a broader picture of the US.
It is important to preserve this as a place of solitude and its natural animal and plant resources.
It is nature the way the earth grew it. channel islands should be important to every human.
It is not.
it is peaceful and simple and helps me feel closer to nature.
It is unique, protected, local to me, historical, beautiful.
it is very peaceful and is so different from city life.
it is very pretty and helps protect endangered animals.
It offers camping near the ocean.
it offers unique natural experiences.
it provides a sample of what can happen when humans disrupt nature.
It provides a way of enjoying nature away from the cityscape.
It provides an important space of peace in my life.
it provides an opportunity to enjoy California without all of the development
It represents an untouched area that should be preserved.
It symbolizes the relationship I have with my girlfriend.
It's a special environmental place that should be preserved for the future.
It's close to home and not overrun by people and tourists. It is also in its natural state and hasn't been ruined or destroyed by people.
It's worth preserving this unique ecosystem.
It's a great place to spend some time away from demands of daily life.
It's a part of past and must be preserved.
It's a remote place where you have to use your own power not a machine's to enjoy it. This allows you a more intimate experience with nature than you would have in parks where you just drive by.
It's a retreat from the city.
It's an island. I grew up in southern California there are unique species here.
It's beautiful.
It's beautiful and close to my family. it's also a wonderful place for my children to learn and grow.
It's beauty and because of the many endemic species.
It's far away from...stuff. But not really.
It's important that we preserve a natural space so that the next generation can see what things were/are/should/can is so that their sense of ecological conservancy will be inspired.
It's on my bucket list of places to see and I love California.
It's open space with unique plants and animals.
It's relaxing.
It's relaxing and peaceful and beautiful.
It's wonderful and peaceful. I really like how undeveloped it is.
Just a place to go.
Just a unique and special place on land and sea.
Kayaking.
Kayaking and marine life.
Like getting out nature.
Limited and endangered resources.
Limited visitors, great local escape from the city, peaceful.
Local wildness.
Location where friends and I go.
Love outdoors and hiking.

Love to get away from it all and just enjoy my time away from distracting life. Get back to basics.
Lovely nature and different limited resources that we usually do not think about.
Makes nature accessible to us.
Many good memories with friends. Learned many things from visiting. Lots of fun. Great photos.
My family has visited. Daughter has done restoration. Son and husband camped. Close proximity to home.
My daughter was certified for scuba diving here. It has a wonderful variety of wildlife and nature. We live in Half Moon Bay and love the coastal and marine ecosystem.
My family and I enjoy nature and enjoy very much visiting and camping on the Channel Islands. We love the native animals and relics and appreciate the investment that's been made to restore the island to its natural state. Thank you.
My first kayaking experience! :-)
My wife and I choose to spend a part of our honeymoon here.
Native American cultural history. Protected area.
Natural beauty of the USA.
Natural beauty, sea caves, nice camping.
Natural break from storm surges.
Natural phenomenon.
Natural resources are important.
Natural setting.
Natural state needs to be maintained.
Natural, wild, free, ours, peaceful.
Natural. habit for local plants and animals.
Natural preserve.
Nature in its true form.
Nature is beautiful.
Nature is pure and safe and no pollution.
Nature is very important to me. I love the ecological diversity of the islands. I have been here a few times and have participated in ecological restoration projects.
Nature left to its own.
Nature, kayak.
Natural beauty.
Near to where we live.
Nice hiking.
Nice place.
Offers a beautiful escape from the city life.
One of very few untouched places left.
Open space open for use and native preservation.
Open spaces.
Part of California's immense and unique diversity.
People have ruined its ecosystem and we need to correct it.
Place that I dreamed of as a kid.
Preservation and greater understanding.
Preserved.
Preserves nature.
Preserving and experiencing nature is important.
Pristine environment.
Protected resource.
Pure natural environment with minimal human infrastructure.
Quiet place of reflection and view a natural environment very minimally impacted by humans.
Quiet, wild.
Recreation.
Reestablishment of natural condition of unique islands.
Relaxing and lots to do.
Remote island experience.
Santa Barbara native. Local interest.
Santa Cruz.
Saving the natural beauty of California.

Scuba diving and experiencing nature.
Sea access nothing like this in Indiana.
See places I have never experienced and visit nature
Seeing the nature. The peaceful environment. Being able to snorkel in this pristine water with all the wildlife. My son thinks this is the best place on earth. The kids just love to be out in the wild. So important these days with all the scheduled activities.
Solitude beauty southern California with minimal development.
Solitude, species preservation, beauty.
Special environment that needs to be preserved.
Special place to visit especially with the boat trip attached. Don't do this every day.
Spiritually uplifting, professionally rewarding, it's been a big part of my career over the last two years as an environmental educator.
Strong supporter of the NPS and the environment. Wonderful to see relatively undisturbed environment.
Sweet views.
The Channel Islands are so beautiful, natural, quiet, and a wonderful opportunity for me to appreciate nature.
The Channel Islands offer an opportunity to escape the electronics and mechanized world.
The conservation of the natural environment.
The history and geography. The animals. The view from the mainland.
The natural beauty of CHIS yields a plethora of opportunities for recreation and utility.
The park reminds me of the islands the way they were 50 years ago.
The pristine environment.
The rural beauty.
There are few places left to teach children about nature and the way people use to live.
There are recreational activities and the opportunity to connect with wildlife.
This a natural sanctuary.
This is one of the last places in the world that humans haven't been able to destroy.
This was my first visit and I am quite pleased.
To get close to nature.
Totally preserved and good connection to nature.
Undeveloped, clean clear water. Great sailing.
Unique and beautiful place that needs to be protected.
Unique ecology.
Unique environment.
Unique environment and park experience.
Unique experience of nature and animals and a feeling of isolation.
Unique flora, fauna, ecosystems. relatively pristine condition. Culturally significant.
Unique location, facilities, and isolation.
Unique marine and land habitat.
Unique marine environment.
Unique place, balance nature, wonderful landscape.
Uniqueness.
Unspoiled.
Unspoiled beauty.
Unspoiled nature is rare in southern California. Never seen more stars in a night sky.
Untouched.
Way to experience untouched nature.
We enjoy nature.
We like the sea caves.
Wild and diverse and what Los Angeles would look like without civilization.
Wilderness, solitude, natural habitat, camping, history, exercise. Hiking, marine life, kayaking, wildlife viewing, flora.
Wildlife conversation.
Wonderful ecosystem.
Wonderful scenery and recreation.

SECTION F: Social-Ecological Data Comparison

A total of 12 categories of assigned value were examined during the mapping exercise; however, perceived biodiversity was further analyzed for this section of the report because there were more locations associated with biodiversity value than any other category and the relative degree of preference points associated with this value type was high. Also, biodiversity is a priority for management agencies that oversee the Channel Islands and this category has been the sole focus of past value mapping research (e.g., Alessa et al., 2008). For the social ecological data comparison, eight environmental variables were identified based on their ability to reflect ecologically meaningful information and their potential to contribute to the perceived importance of places reported by survey respondents (see Table 22). The relationships between these environmental variables and one social value (i.e., perceived biodiversity) were examined for the pooled sample and two segments of the survey population defined by self-reported knowledge of the CHIS. All of these predictor variables and social value data were generated at an output cell size of 50m.

Table 22. Description and sources of environmental variables.

Environmental Variable	Description	Source
Distance to Infrastructure	Distance between perceived biodiversity value points and infrastructure that facilitated recreational activities, including trails, educational centers, boat ramps, and harbors.	Derived from the U.S. National Park Service spatial data and created using tools available in the Spatial Analyst extension of ArcGIS
Distance to Viewshed	Distance between perceived biodiversity value points and areas on SCI within view of the coastline.	Derived from the U.S. National Park Service spatial data
Distance to MPAs	Distance between perceived biodiversity value points and Marine Protected Areas surrounding SCI, including two Marine Reserves and one Marine Conservation Area.	Derived from the U.S. National Park Service spatial data
Carbon Storage	Extent to which soil and vegetation on SCI capture and store atmospheric carbon dioxide. Data are in 30 x 30 meter spatial resolution and were generated in 2000 to indicate tons of carbon storage per square meter.	USDA Soil Survey Geographic (SSURGO) Database and National Biomass and Carbon Dataset
Species Richness	Total species richness comprised of range data for 25 species across five taxonomic groups: 1) birds, 2) fish, 3) invertebrates, 4) mammals (terrestrial and marine); and 5) reptiles (see Table 23).	National Oceanic and Atmospheric Administration's Office of Response and Restoration
Elevation	Raster elevation data of Santa Cruz Island generated in 2007.	U.S. Geological Survey's National Elevation Dataset
Terrestrial Vegetation	Vegetation density of predominant plant life (conifers, hardwoods and shrubs) on Santa Cruz Island in 2007. Average values within six vegetation categories (1=>60%; 2=40-60%; 3=25-40%; 4=10-25%; 5=2-10%; and 6=N/A) were reclassified into an index.	Derived from The Nature Conservancy spatial data (Cohen et al., 2009)
Marine and Terrestrial Land Cover	A 16-class NLCD-2006 classification scheme, including one additional category of marine vegetation cover that was added to the original layer to indicate giant kelp forest extents and eelgrass beds detected in surveys conducted from 1982-2009. All data were processed at a spatial resolution of 50 meters.	National Land Cover Database (NLCD-2006) and National Oceanic and Atmospheric Administration's Office of Response and Restoration (Fry et al., 2011).

Table 23. Animal species incorporated into species richness metric (source: NOAA Environmental Sensitivity Index maps for Southern California, 2010).

Taxon	Common name	Scientific name
Birds (1989-2009)	Ashy storm petrel	<i>Oceanodroma homochroa</i>
	Bald eagle	<i>Haliaeetus leucocephalus</i>
	Black oystercatcher	<i>Haematopus bachmani</i>
	Brandt's cormorant	<i>Phalacrocorax penicillatus</i>
	Brown pelican	<i>Pelecanus occidentalis</i>
	Western gull	<i>Larus occidentalis</i>
	Western snowy plover	<i>Charadrius alexandrinus nivosus</i>
	Xantu's murrelet	<i>Synthliboramphus hypoleucus</i>
Fish (2000-2009)	California grunion	<i>Leuresthes tenuis</i>
	Rocky intertidal fish	
Invertebrates (1977-2009)	Black abalone	<i>Haliotis cracherodii</i>
	Pink abalone	<i>Haliotis corrugate</i>
	Pismo clam	<i>Tivela stultorum</i>
	Red abalone	<i>Haliotis rufescens</i>
Terrestrial mammals (1990-2009)	Santa Cruz Island fox	<i>Urocyon littoralis santacruzae</i>
Marine mammals (1998-2010)	Baird's beaked whale	<i>Berardius bairdii</i>
	Blue whale	<i>Balaenoptera musculus</i>
	California sea lion	<i>Zalophus californianus</i>
	Fin whale	<i>Balaenoptera physalus</i>
	Humpback whale	<i>Megaptera novaeangliae</i>
	North Pacific right whale	<i>Eubalaena japonica</i>
	Pacific harbor seal	<i>Phoca vitulina richardii</i>
Sperm whale	<i>Physeter macrocephalus</i>	
Reptiles (2001-2009)	Leatherback sea turtle	<i>Dermochelys coriacea</i>
	Loggerhead sea turtle	<i>Caretta caretta</i>

The relationships between social and ecological data were examined using GIS, specifically, a mapping application developed by the U.S. Geological Survey called “Social Values for Ecosystem Services” (SolVES, Version 2.0) (Sherrouse et al., 2011, 2014). This application created a standardized 10-point Social Value Index (SVI) score for each respondent subgroup based on the relative ratings of each of the 12 value categories. That is, the SVI score reflected the magnitude of difference among preference points allocated to each category, ranging from 1-10. All digitized points were evaluated using Completely Spatially Random hypothesis testing, which estimated average nearest neighbor statistics. These tests showed spatial clustering along the coastline and within marine protected area boundaries according to R-values (observed versus expected distance between points) and Z-scores (number of standard deviations from the mean) (see Table 24). The pooled sample reported average knowledge ($M=2.77$, $SD=1.11$), whereas the two survey subgroups had low ($M=1.65$, $SD=.48$) and high knowledge ($M=3.53$, $SD=.69$), as well as SVI scores reaching maximum values of 6 and 10, respectively. These results indicated that respondents in the high knowledge subgroup felt the park was more important for the purposes of biological diversity than respondents in the other subgroup.

Table 24. Mean and standard deviation of self-reported knowledge and nearest neighbor statistics for two subgroups and the pooled sample of outdoor recreationists.

	<i>Knowledge</i> ¹ <i>M (SD)</i>	<i>R-value</i>	<i>Z-score</i>
Pooled Sample	2.77 (1.11)	.506	-19.26
Low Knowledge	1.65 (.48)	.483	-11.50
High Knowledge	3.53 (.69)	.569	-13.84

¹Measured on a five-point Likert scale ranging from “Low Knowledge” to “High Knowledge”

The SolVES program interfaced with Maximum Entropy (MaxEnt) modeling (Phillips et al., 2006) to generate spatial predictions of the locations most likely to support perceived biodiversity value based on the configuration of underlying environmental variables. For example, respondents may have ascribed biodiversity to particular landscape features such as rocky outcrops or open bodies of water. Drawing on this relationship, value surface layers were created to show that perceived biodiversity values were associated with areas where these two landscape features occurred. Varied directional relations emerged between this comparison between social and ecological data (see Figure 11). Specifically, perceived biodiversity decreased as (a) distance to infrastructure, viewshed, and marine protected areas increased, (b) greater numbers of species and vegetation density were encountered, and (c) at areas of higher elevation. Conversely, as carbon sequestration increased, so too did the Value Index score. Analyses of categorical data showed that perceived value points were associated with locations where the majority of land cover was classified as marine vegetation, open water, evergreen forest, shrub/scrub, and grassland/herbaceous.

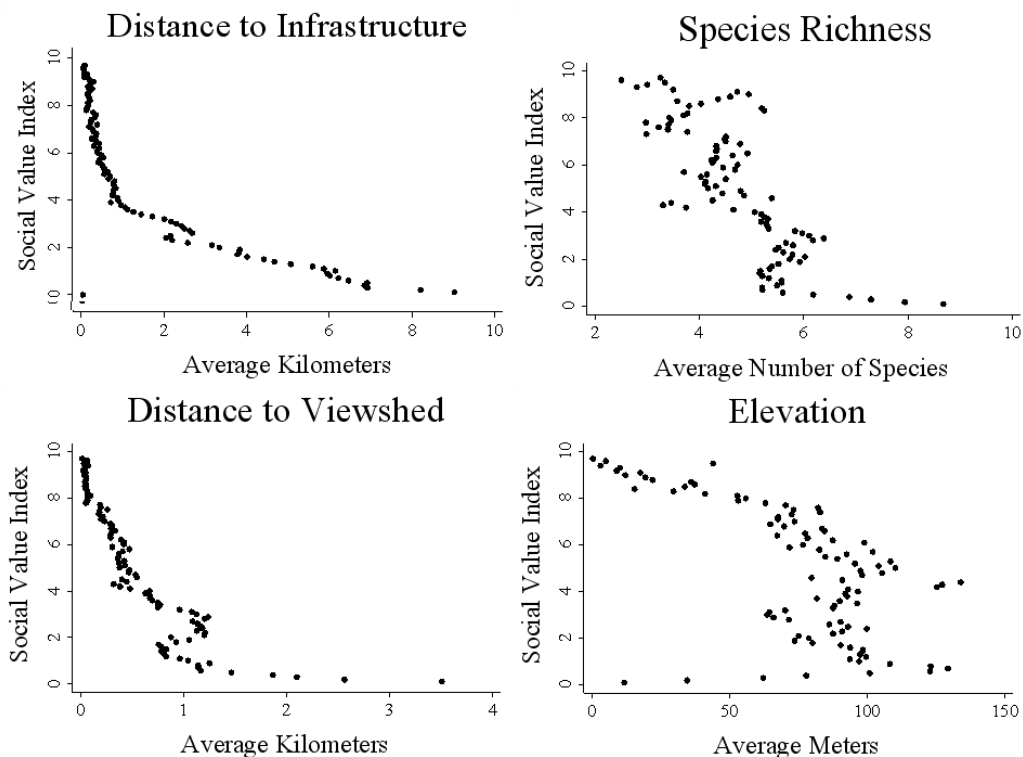


Figure 11. Zonal statistics for pooled sample showing the relationships between Social Value Index scores displayed on the x-axis and eight environmental variables displayed on the y-axis.

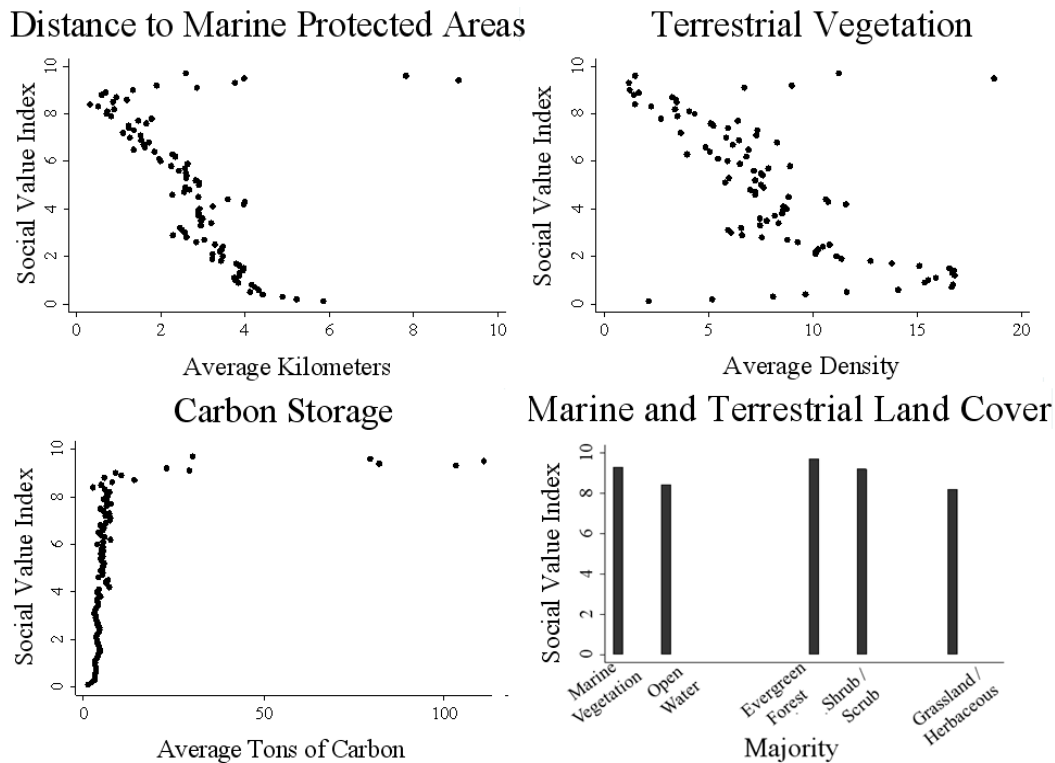


Figure 11. Zonal statistics for pooled sample showing the relationships between Social Value Index scores displayed on the x-axis and eight environmental variables displayed on the y-axis (continued).

Social-ecological data comparisons showed that environmental variables contributed in different ways to perceived biodiversity value on Santa Cruz for two survey subgroups (see Table 25). Specifically, the percent contributions of each environmental variable – indicating its relative influence on the spatial projections of value point distributions – suggested distance to management infrastructure, distance to viewshed, and distance to MPAs were the most effective predictor variables.

To provide a further description of the two models generated for the low and high knowledge subgroups, descriptive statistics and Pearson correlation coefficients were estimated using zonal statistics and then compared using independent samples t-tests. Analyses suggested that heterogeneity existed on the basis of self-reported knowledge. That is, significant differences were found for six of seven continuous variables listed below and as indicated by similar superscripts in Table 25:

- Distance to infrastructure ($t = -2.979$, $df = 156$)
- Distance to viewshed ($t = -2.412$, $df = 153$)
- Carbon storage ($t = 3.948$, $df = 156$)
- Species richness ($t = -5.092$, $df = 150$)
- Elevation ($t = 2.056$, $df = 82.53$)
- Terrestrial vegetation ($t = 3.263$, $df = 76$)

Table 25. Descriptive statistics, Pearson correlation coefficients, and percent contributions from each predictor variable estimated using zonal statistics for two survey subgroups defined by self-reported knowledge.

	Low Knowledge Subgroup			High Knowledge Subgroup		
	<i>M(SD)</i>	<i>r</i>	Percent Contribution	<i>M(SD)</i>	<i>r</i>	Percent Contribution
Distance to Infrastructure	1.76 (1.93) ^a	-.78*	49.701	2.94 (3.05) ^a	-.89*	47.060
Distance to Viewshed	0.43 (0.40) ^b	-.75*	15.861	0.62 (0.59) ^b	-.81*	14.812
Distance to MPAs	2.15 (1.60)	-.78*	20.840	2.46 (1.25)	-.78*	24.006
Carbon Storage	8.84 (11.18) ^c	.45*	0.740	4.13 (3.08) ^c	.45*	0.286
Species Richness	4.14 (0.97) ^d	.03	3.891	5.08 (1.34) ^d	-.62*	3.468
Elevation	87.51 (52.57) ^e	-.81*	4.913	72.05 (31.06) ^e	-.23*	3.559
Terrestrial Vegetation	9.47 (7.07) ^f	-.77*	0.637	6.25 (3.59) ^f	-.56*	0.898
Marine and Terrestrial Land Cover	-	-	3.417	-	-	5.913

* p-value \leq 0.05

Note. Like superscripts indicate significant differences at $p \leq 0.05$.

Analyses were performed to examine the relationship between social and ecological values for segments of outdoor recreationists with low versus high knowledge of the park. Both subgroups assigned multiple values to the northeast corner of the island indicating an area of value abundance. This point on the island is where public transport vessels take most visitors to the island and where most surveys were administered. Value points were also concentrated along trail systems on the east side of the island, likely aligning with the provision of opportunities for recreation.

Visual differences in the subgroup's value assignments emerged, in that configurations of environmental variables supported perceived biodiversity values in different ways for respondent with low and high self-reported knowledge of the CHIS (see Figure 12). Distinct spatial distributions of value points indicated that respondents with less knowledge (graph b) assigned values across a smaller geographic gradient that covered the eastern side of the island, which was accessible to the public via boat and trail. Conversely, individuals with greater knowledge (graph c) assigned biodiversity values to a larger space that encompassed both areas that could be experienced first-hand and the region of the island (i.e., the western portion) where public use was prohibited. Respondents likely obtained knowledge from multiple sources, though individuals with greater knowledge of the park reported a higher number of previous visits ($M = 7.51$, $SD = 20.09$) than did respondents with less knowledge ($M = 1.01$, $SD = 0.69$) to a statistically significant degree (t -stat = -4.316, $df = 178$).

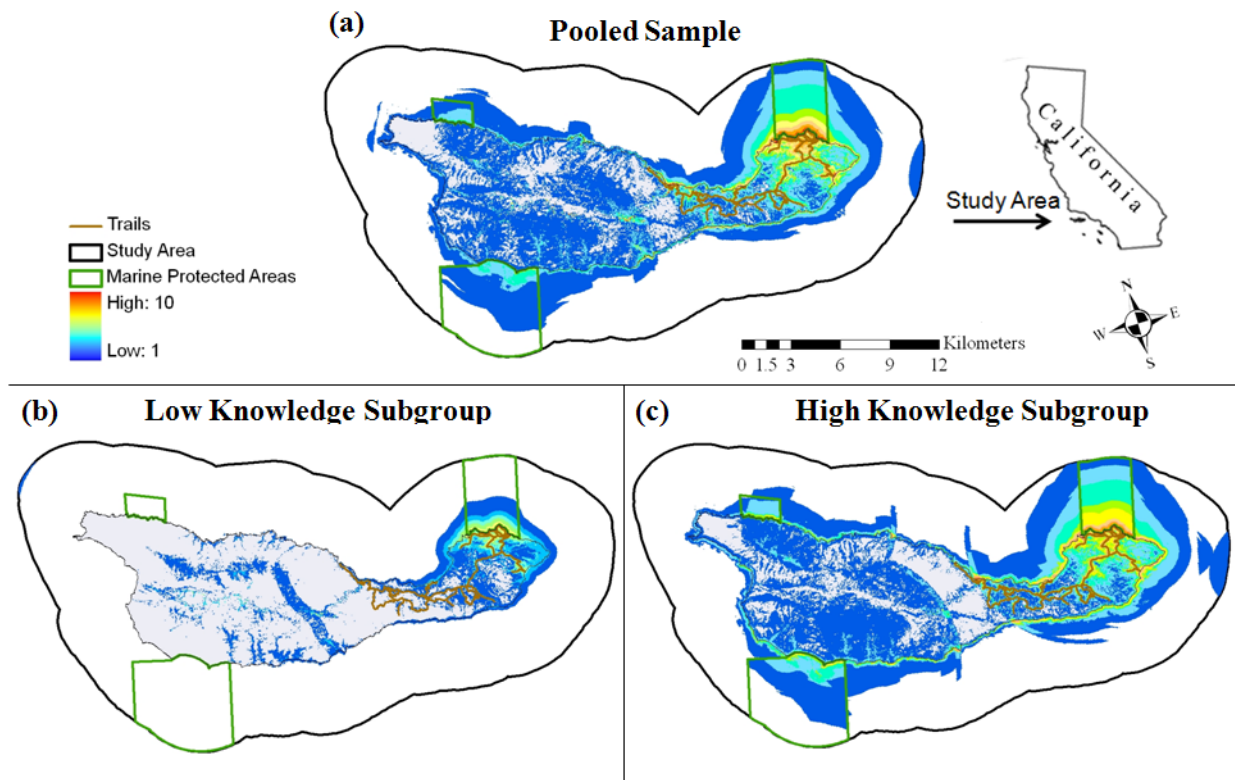


Figure 12. Distribution of perceived biodiversity value for the pooled sample and two survey subgroups defined by self-reported knowledge of Channel Islands National Park.

SECTION G: Information about Respondents

The gender distribution of survey respondents was nearly equal with 48% male and 52% female (see Table 26). The majority (84%) was White and well-educated with 76% reporting having obtained at least a four-year college degree. Half of the survey sample earned over \$100,000 before taxes on an annual basis. The average age was 43.3 ($SD=14.3$) and number of people per household was 2.9 ($SD=1.3$). The sample contacted for this research was wealthier and more educated than residents in Santa Barbara County according to the U.S. Census Bureau (2012) (see Table 27).

Table 26. Socio-demographic profile of outdoor recreationists.

Socio-demographics	N (%)
Gender	
Male	168 (47.6)
Female	185 (52.4)
Age	$M=43.32$ $SD=14.27$
Household size	$M=2.86$ $SD=1.33$

Table 26. Socio-demographic profile of outdoor recreationists (continued).

Socio-demographics	N (%)
Education	
<i>Less than high school</i>	3 (0.9)
<i>High school graduate</i>	23 (6.5)
<i>Vocational/trade school certificate</i>	12 (3.4)
<i>Two-year college degree</i>	47 (13.4)
<i>Four-year college degree</i>	133 (37.8)
<i>Graduate degree</i>	134 (38.1)
Income	
<i>Less than \$20,000</i>	19 (5.6)
<i>\$20,000 to \$49,999</i>	51 (15.1)
<i>\$50,000 to \$99,999</i>	97 (28.8)
<i>\$100,000 to \$149,999</i>	84 (24.9)
<i>\$150,000 to \$199,999</i>	49 (14.5)
<i>Greater than \$200,000</i>	37 (11.0)
Occupation	
<i>Employed outside the home</i>	73 (58.4%)
<i>Unemployed</i>	7 (5.6%)
<i>Retired</i>	23 (18.4%)
<i>Full-time homemaker</i>	12 (9.6%)
<i>Student</i>	10 (8.0%)
Ethnicity	
<i>Hispanic or Latino</i>	40 (11.3)
<i>Not Hispanic or Latino</i>	313 (88.7)
Race¹	
<i>American Indian or Alaska Native</i>	6 (1.7)
<i>Asian</i>	31 (8.8)
<i>Black or African American</i>	5 (1.4)
<i>Native Hawaiian or other Pacific Islander</i>	2 (0.6)
<i>White</i>	293 (83.5)

¹Respondents could check all that applied so column totals may not equal 100%.

Table 27. Descriptive comparison among survey respondents, residents of Santa Barbara County and residents of the state of California.

Socio-demographic	Visitors to the CHIS	Santa Barbara County residents	California residents
Race	84% White	86% White	74% White
Education	76% holds at least a bachelor's degree	32% holds at least a bachelor's degree	31% holds at least a bachelor's degree
Income	Between \$100,000 and \$150,000 (median)	\$63,000 (median)	\$61,000 (median)
Household size	2.9 people	2.9 people	2.9 people

Discussion

The purpose of this investigation was to better understand “held” and “assigned” values reported by outdoor recreationists that visited the Channel Islands National Park (CHIS) ecoregion. Drawing on a social-ecological systems framework for conceptual guidance, this study examined: (a) trip characteristics and visitors’ recommendations for management; (b) held value orientations and other factors that predicted behavior, (c) assigned values of ecosystem services mapped by survey respondents with neutral and strong environmental worldviews, as well as reported levels of place attachment; (d) a social-ecological data comparison between perceived biodiversity and eight indicators of ecological value that spanned terrestrial and aquatic ecosystems on Santa Cruz Island; and (e) socio-demographic characteristics reported by the outdoor recreationists.

Results from analyses of trip characteristics indicated that most visitors were in groups of less than five people and were traveling with either family or friends. Approximately half of the sample engaged in day versus overnight use and spent between three and five hours at the park before participating in this study. Over half were visiting for the first time and said they would return within the next year. Among those that were not planning to return, just over half said the distance required to travel to the park would prevent them from visiting in the future. Nearly nine out of ten had visited two of five Channel Islands, eight out of ten considered the park their primary destination, and seven out of ten visitors were aware that the park boundary extended one nautical mile offshore. The most common primary activities were hiking, experiencing nature, kayaking, and camping whereas few respondents reported engaging in commercial and recreational fishing and sailing. When presented with an opportunity to offer open-ended comments for management, most visitors said that adding facilities (e.g., carts to transport gear, trashcans, water spickets), providing more information (e.g., interpretive activities, maps), increasing access (e.g., creating more trails and campsites, providing island transportation), and keeping the park “natural” would improve their recreational experiences.

Analyses of held values and other factors that shaped reported behaviors revealed a pattern of effects that can be referenced by resource and recreation managers to increase environmental stewardship and minimize human impacts on park resources. Respondents were environmentally oriented, in that biospheric and altruistic values were high and egoistic values were low. Along similar lines, there was strong agreement with statements about nature-based, biocentric worldviews and strong disagreement with statements about human-based, anthropocentric worldviews. Beliefs, personal norms, and behaviors pertaining to four issues of managerial concern were also examined: 1) the spread of non-native plants and animals; 2) restoration activities, 3) impacts on cultural resources such as archaeological sites and historic structures, and 4) degradation of natural resources within marine protected areas. Results indicated that awareness of consequences incurred from human use was high, respondents felt responsible and morally obliged to prevent impacts, and actions were undertaken in the previous year to minimize changing environmental conditions related to the four managerial issues noted above. According to the results from a two-step structural regression model of these psychological processes, behaviors that minimized impact on the park were predicted by values, beliefs, and norms (Stern et al., 1999). These findings offer a promising explanation for why outdoor recreationists choose to undertake environmentally-friendly actions relevant to the CHIS.

A total of 12 tangible and intangible assigned values of ecosystem services were rated and mapped by outdoor recreationists across the land and seascapes of the CHIS ecoregion. The relative ratings of value categories indicated the park was most important for aesthetic, recreation, and biological diversity purposes. Given that perceived biological diversity was one of the most important value types and economics was the least important, it could be that respondents are willing to tolerate limitations on access and/or economic development to ensure protection of the various plants, wildlife, marine life, and other living organisms in the park. Although U.S. protected areas make important contributions to local and national economies, respondents in this sample appeared to view the park as a relatively invaluable place that was not primarily important for monetary benefits and/or resource extraction. The 12 assigned were associated with particular locations in the park by respondents and these results revealed uneven point distributions and densities of values for ecosystem services. Kernel-densities indicated that Scorpion Anchorage, Cavern Point, Potato Harbor, Smuggler's Cove, Prisoner's Harbor, Fry's Harbor, Painted Cave, and Coches Prietos on Santa Cruz, as well as the Brown Pelican Fledgling Area and most of East Anacapa Island were highly valued by outdoor recreationists. These data provide insight on what is (or is not) considered important to outdoor recreationists.

Assigned values of ecosystem services were mapped by respondents on Santa Cruz Island that reported differing biocentric and anthropocentric worldviews. Respondents either viewed people and nature on equal terms or thought that nature had rights to exist irrespective of human use. Given the pronounced stances that emerged, results showed that visitors endorsed an environmental worldview. However, spatial heterogeneity was revealed, in that reported preferences for ecosystem services and the spatial dynamics of those preferences varied between the *Neutral NEP* and *Strong NEP* subgroups. Assigned values were spread across a larger geographic area by respondents in the *Strong NEP* subgroup. These individuals ascribed biological diversity, recreation, and scientific values of ecosystem services to the eastern portion of the island where visitor activities were facilitated by the NPS, as well as the TNC side of the island where public use was prohibited. Degrees of place attachment and the descriptions of why places carried importance shed light on the processes underpinning social value assignments.

This investigation included a social-ecological data comparison of the spatial relationships between a single social value type (i.e., perceived biodiversity) and eight indicators of ecological value on Santa Cruz Island. Outdoor recreationists ascribed biodiversity to multiple locations within the park and spatial clustering of these value points occurred primarily along the coastline and within marine protected area boundaries. The eight predictor variables contributed in different ways to the intensity of preferences for why areas were considered biologically important and cumulatively accounted for high degrees of variance in the Value Index scores created for the perceived biodiversity assigned value category. These findings support ongoing efforts to understand and manage for spatially-anchored values placed on terrestrial and aquatic environments in protected areas.

Consistent with past research (e.g., Sherrouse et al., 2011), distance to management infrastructure, distance to areas in view of the coastline, and distance to MPAs were the strongest predictors of perceived biodiversity value. This information is helpful for formulating place-based conservation strategies, because management can use this information to anticipate

locations that might be deemed important by outdoor recreationists and gauge the efficacy of current interpretation focused on expressing the values of places. For example, distance to management infrastructure (e.g., trail systems, educational centers) was negatively correlated with the Value Index score, in that as distance to these features increased, the score decreased. Most interpretation on Santa Cruz occurs near infrastructure, which may explain why respondents detected the importance of proximate biological resource conditions. Perceived biodiversity value was also more likely to be supported near MPAs, which were situated in regions of high on-ground biodiversity established through public consultation (Davis, 2005). Given the importance of teaching visitors about biodiversity through outreach activities, public understanding appears to align with these priorities. Also, areas proximate to views of the coastline were more likely to support social values, thus illustrating the importance of aesthetics in respondents' evaluations of biodiversity.

Survey respondents were attuned to on-the-ground biological diversity of Santa Cruz Island given the positive correlation between the pooled sample's value index score and the species richness environmental layer. These associations may have been due to high levels of education and affluence among survey respondents. Also, knowledge shaped the relationship between the perceived biodiversity value and a number of explanatory environmental variables. Specifically, respondents with different degrees of self-reported knowledge assigned biodiversity values to different places. Survey respondents with less knowledge valued a smaller geographic area whereas individuals more familiar with the park associated biodiversity with the privately owned, western portion of the island where visitor use was prohibited. These findings suggest value assignments occurred at different geographic scales depending on individual knowledge. It could be that knowledge supersedes firsthand experience, in that individuals with high knowledge value places that are *both* experienced by the individual and areas that are inaccessible to the public. Socio-demographic characteristics of the sample indicated that most respondents were White and not of Hispanic origin, well-educated, and in an upper socio-economic bracket. Approximately half of the sample was comprised of males and the average age just over 40 years.

Implications and Management Options

- Implications emanating from this research illustrate how managers and policymakers can activate behaviors that are beneficial for the CHIS ecoregion. This information can guide intervention strategies that promote biological diversity and carries potential to be well-received by stakeholders in the context of U.S. national park management.
- Agencies will see more immediate results from outreach efforts that target less stable psychological variables. On-site education should be maintained and/or implemented to stimulate responses to environmental consequences and prevent responsibility denial. Activating feelings of moral obligation (and preventing the deactivation of norms) among the environmentally conscious and affluent people that visit the CHIS ecoregion will also create behavioral regularities that drive individual expectations about visitor experiences in protected areas.
- Three approaches (technological, structural, cognitive) can be adopted to encourage environmentally-friendly behavior (Heberlein, 2012). However, these tactics will fail if

implemented alone. The three “fixes” detailed below are complementary approaches to shaping behavior and should be carefully executed and combined with other techniques for designing outreach strategies informed by visitor behavioral patterns.

- **Technological changes** involve altering the biophysical world and effectively circumventing behavior change among visitors. Creating more durable structures that are less susceptible to deterioration is one example of a technological change that prevents visitors from damaging historic artifacts on the CHIS.
- **Structural changes** alter the social environment that affects what visitors do. Management tactics that structurally minimize human impacts may include zoning, policies, or regulations. Expanding marine reserve networks to limit resource extraction would constitute a structural change.
- **Cognitive changes** are educational in nature. This management approach requires decision-makers to have knowledge of attitudes toward the resources affected by human use. On the CHIS, cognitive changes may involve interpretive signage or ranger-delivered messages about how to properly dispose of waste that exacerbates biological invasions. Cognitive solutions are most common and will be most effective when supported by understandings of the internal processes highlighted in this study.
- High priority areas of value abundance (i.e., “hotspots”) can be targeted by management to accommodate the range of value positions held by stakeholders and to anticipate conflicts over competing forms of human use. It may behoove management to also raise awareness of important resources *not* recognized by the public (i.e., “coldspots”) (van Riper et al., 2012). There may be biologically diverse settings farther away from infrastructure that are not sought out by visitors but that can generate an appreciation of landscape aesthetics and provide psychological restoration. Given that off-trail use is permitted on Santa Cruz, managers might consider directing attention to canyons on the NPS / eastern side of the island where bird species can be encountered or forested areas on the TNC / western side that visitors may come to appreciate for intrinsic reasons irrespective of public access.
- To engage different stakeholder groups, managers can target different segments of the survey population identified in this investigation. Both environmental worldview and self-reported knowledge accounted for preference heterogeneity and manifested different spatial patterns of assigned values for ecosystem services. The segments with stronger environmental orientations and greater knowledge of the CHIS would be more likely to undertake environmentally-friendly behaviors such as volunteering at the park, learning about management challenges, and/or supporting environmental policies.
 - Respondents in the *Neutral NEP* subgroup can be targeted on the basis of their inclination to support human use within the park. This subgroup placed relative importance on the recreation assigned value category suggesting these individuals relied on interaction with park resources to recognize values of ecosystem services.
 - To garner widespread support for environmental protection, individuals in the *Neutral NEP* subgroup should be made aware of important places, especially areas where visitor use may be prohibited due to human impacts, restoration, or scientific activities.

- Respondents in the *High NEP* subgroup situated values across a broader region including the western portion of Santa Cruz Island managed by TNC and inaccessible to the public. This subgroup valued areas that did not provide direct, tangible benefits in terms of outdoor recreation, indicating that ethical arguments about the intrinsic values of nature beyond utilitarian interests would likely resonate with these individuals. Considering the range of value positions expressed by survey respondents, these findings shed light on different and potentially shifting public viewpoints about protection and use of natural resources (Tarrant et al., 2003).
- Respondents were predisposed to support environmental protection, because they sought out nature-based experiences by engaging in outdoor recreation in the park. That is, considering the financeable obligation and time commitment to visit the park by crossing at least ten miles of open ocean, the sample was comprised of a specifically-defined stakeholder group. Outreach efforts that call attention to conservation and preservation of resources will likely be well received by these individuals. Although these results are informative for management, educational strategies should be carefully formulated owing to the extent to which the sample is generalizable to broader publics. The interests of residents that engage in private boating or water-based, consumptive activities should be consulted in the case of policy change, because these individuals may express varied spatially-anchored values of ecosystem services (LaFranchi & Pendleton, 2008).
- The diversity of experiences, attitudes, and behaviors reported by survey respondents suggest that a “one size fits all” management approach may exclude important segments of the survey population. Research results pertaining to the varied elements that comprise visitor experiences can be used as a guide to most effectively respond to the preferences reported by park visitors and underlying biological resource conditions.

Literature Cited

- Alessa, L. N., Kliskey, A. A., & Brown, G. (2008). Social-ecological hotspots mapping: A spatial approach for identifying coupled social-ecological space. *Landscape and Urban Planning, 85*, 27-39.
- Battaglia, M. P., Link, M. W., Frankel, M. R., Osborn, L., & Mokdad, A. H. (2008). An evaluation of respondent selection methods for household mail surveys. *Public Opinion Quarterly, 72*, 459-469.
- Brown, T. C. (1984). The concept of value in resource allocation. *Land Economics, 60*, 231-246.
- Brown, G., & Reed, P. (2000). Validation of a forest values typology for use in national forest planning. *Forest Science, 46*, 240-247.
- Davis, G. (2005). Science and society: Marine reserve design for the California Channel Islands. *Conservation Biology, 19*, 1745-1751.
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*, 425-442.
- Heberlein, T. A. (2012). *Navigating environmental attitudes*. New York, NY: Oxford University Press.
- Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behavior, 37*(2), 153-177.
- LaFranchi, C., & Pendleton, L. (2008). *Private boating and boater activities in the Channel Islands: A spatial analysis and assessment*. Report prepared for The Resources Legacy Fund Foundation and The National Marine Sanctuary Program.
- Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science, 325*, 419-422.
- Phillips, S. J., Anderson, R. P., & Schapire, R. E. (2006). Maximum entropy modeling of species geographic distributions. *Ecological Modelling, 190*, 231-259.
- Sherrouse, B. C., Clement, J. M., & Semmens, D. J. (2011). A GIS application for assessing, mapping, and quantifying the social values of ecosystem services. *Applied Geography, 31*(2), 748-760.
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*, 81-97.
- Tarrant, M. A., Cordell, H. K., & Green, G. T. (2003). PVF: A scale to measure public values of forests. *Journal of Forestry, 101*, 24-30.
- van Riper, C. J., Kyle, G. T., Sutton, S. G., Barnes, M., & Sherrouse, B. C. (2012). Mapping outdoor recreationists' perceived social values for ecosystem services at Hinchinbrook Island National Park, Australia. *Applied Geography, 35*, 164-173.
- van Riper, C. J., & Kyle, G. T. (2014). Understanding the internal processes of behavioral engagement in a national park: A latent variable path analysis of the value-belief-norm theory. *Journal of Environmental Psychology, 38*, 288-297.
- van Riper, C. J., & Kyle, G. T. (in review). Capturing multiple values of ecosystem services shaped by environmental worldview: A spatial analysis. *Journal of Environmental Management*.
- Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science, 49*, 830-840.

Appendix A: Survey Questionnaire about Held Values and other Factors that Predict Behavior



Channel Islands National Park Visitor Survey, 2012



ID _____

Date _____

Location _____

Texas A&M University is conducting a survey to learn more about recreationists at Channel Islands National Park. This information will be used to better serve the public. You are one of a small number of people chosen for this study, so your opinions are important to us. All information will be kept strictly confidential and your response is voluntary. No action may be taken against you for refusing to supply the information requested. Please read each question carefully and save any additional comments for the final page. This survey will take 10-15 minutes to complete.

SECTION 1 of 5: TRIP CHARACTERISTICS

1. How many people (including you) are in your personal group today?

Total number of people: _____ Adults: _____ Children: _____

2. How would you describe your personal group? (please ✓ one)

- Traveling alone Friends Organized group
 Family Family and friends

3. How long are you staying in the park during your visit? (please ✓ one box & fill in blank)

- Day use only:
 └───────────▶ How many hours **today?** _____ hours
 Overnight use:
 └───────────▶ How many **nights** are you staying? _____ nights

4a. Do you expect to return to Channel Islands National Park on other trips in the next 12 months? (please ✓ one)

- Yes *please skip to question 5* No

b. If you do not expect to return, please explain why not: _____

5a. How many times have you visited Channel Islands National Park? _____

b. How many of the Channel Islands have you visited or do you plan to visit? _____

c. Was Channel Islands National Park your primary destination? _____

6. Are you aware that the boundary of Channel Islands National Park extends to one nautical mile offshore? (please ✓ one)

- Yes No

7a. Which of the following activities have you participated in during your visit? (please ✓ all that apply)

- | | | |
|--|---|--|
| <input type="checkbox"/> Hiking | <input type="checkbox"/> Camping | <input type="checkbox"/> Recreational fishing |
| <input type="checkbox"/> Boating | <input type="checkbox"/> Diving/Snorkeling | <input type="checkbox"/> Sailing |
| <input type="checkbox"/> Kayaking | <input type="checkbox"/> Birding | <input type="checkbox"/> Viewing marine wildlife |
| <input type="checkbox"/> Experiencing nature | <input type="checkbox"/> Taking photographs | <input type="checkbox"/> Viewing island wildlife |
| <input type="checkbox"/> Attending programs | <input type="checkbox"/> Commercial fishing | <input type="checkbox"/> Other (please specify) |

b. From the above list, which would you identify as your primary activity? _____

8. What, if any, changes would you recommend park managers to make in recreational opportunities at the Channel Islands?

SECTION 2 of 5: ENVIRONMENTAL AWARENESS

9a. We'd like to better understand your awareness of the consequences associated with changing environmental conditions at Channel Islands National Park. How familiar are you with these issues? If you learned about these issues during your visit, please specify where.

	Not at all a familiar	Some what familiar	Very familiar	Where did you learn about these issues during your visit (if applicable)	
The spread of non-native plants and animals	1	2	3	4	5
Reintroduction of native species	1	2	3	4	5
Damage to cultural resources including historic structures and archaeological artifacts	1	2	3	4	5
Human impact on the marine environment	1	2	3	4	5

b. How much of a problem to do you think these issues are for you and your family?

	Not at all a Problem	Some what of a Problem	A Very Serious Problem		
The spread of non-native plants and animals	1	2	3	4	5
Reintroduction of native species	1	2	3	4	5
Damage to cultural resources including historic structures and archaeological artifacts	1	2	3	4	5
Human impact on the marine environment	1	2	3	4	5

c. How much of a problem to do you think these issues are for Channel Islands National Park?

	Not at all a Problem	Some what of a Problem	A Very Serious Problem		
The spread of non-native plants and animals	1	2	3	4	5
Reintroduction of native species	1	2	3	4	5
Damage to cultural resources including historic structures and archaeological artifacts	1	2	3	4	5
Human impact on the marine environment	1	2	3	4	5

d. How much of a problem to do you think these issues are for other species of plants and animals?

	Not at all a Problem	Some what of a Problem	A Very Serious Problem		
The spread of non-native plants and animals	1	2	3	4	5
Reintroduction of native species	1	2	3	4	5
Damage to cultural resources including historic structures and archaeological artifacts	1	2	3	4	5
Human impact on the marine environment	1	2	3	4	5

SECTION 3 of 5: ENVIRONMENTAL BEHAVIOR

10. Please rate the extent to which you agree or disagree with the following statements about how you evaluate activities, environments, and management proposals. (Circle one number.)

	Strongly Disagree		Neutral		Strongly Agree
I would feel guilty if I were responsible for the spread of non-native plants across the Channel Islands National Park	1	2	3	4	5
I feel a personal obligation to do whatever I can to support the reintroduction of native animals at Channel Islands National Park	1	2	3	4	5
Managers of Channel Islands National Park should exert pressure to prevent the spread of non-native plants and animals	1	2	3	4	5
I feel morally obliged to minimize human impact on marine resources within Channel Islands National Park	1	2	3	4	5
People like me should do whatever they can to prevent damage to historic structures on Channel Islands National Park	1	2	3	4	5
Managers of Channel Islands National Park should take strong action to reintroduce native vegetation	1	2	3	4	5
Managers of have a responsibility to prevent damage to archaeological artifacts	1	2	3	4	5
I feel a sense of personal obligation to not damage historic structures on the Channel Islands National Park, regardless of what others do	1	2	3	4	5
Not only is the National Park Service responsible for minimizing damage to historic structures, but me too	1	2	3	4	5
I feel jointly responsible for damage to cultural resources	1	2	3	4	5
The impact I have on cultural resources is negligible	1	2	3	4	5
I am jointly responsible for environmental impacts to marine life	1	2	3	4	5
I feel jointly responsible for the spread of non-native species	1	2	3	4	5
The impact I have on the reintroduction of native species is negligible	1	2	3	4	5

11. There are many ways you can help to minimize impacts on natural and cultural resources. Which of the following actions have you undertaken in the previous 12 months to reduce your impact on Channel Islands National Park? (Please circle one response.)

	Action taken in previous 12 months	
	Yes	No
Volunteer at Channel Islands National Park to remove non-native species	Yes	No
Read a newsletter, magazine or other publication about the human history of the Channel Islands National Park	Yes	No
Clean equipment (e.g., wash hulls of boats, shake tents, pick seeds from shoe laces) to prevent the spread of exotic species	Yes	No
Use boot scraping stations to prevent the spread of non-native plants	Yes	No
Support and/or accept policies that protect the marine environment	Yes	No
Support the reintroduction of native species (e.g., island foxes) on Channel Islands National Park	Yes	No
Properly dispose of waste (e.g., apple cores) that may cause the spread of non-native plants	Yes	No
Support policies that protect historic and cultural resources	Yes	No
Encourage other visitors to not disturb archeological artifacts on the Channel Islands National Park	Yes	No

12. There are many ways you can help to minimize impacts on natural and cultural resources. Which of the following actions do you intend to undertake the next 12 months to reduce your impact on Channel Islands National Park? (Please circle one response.)

	Action taken in next 12 months	
	Yes	No
Volunteer at Channel Islands National Park to remove non-native species	Yes	No
Read a newsletter, magazine or other publication about the human history of the Channel Islands National Park	Yes	No
Clean equipment (e.g., wash hulls of boats, shake tents, pick seeds from shoe laces) to prevent the spread of exotic species	Yes	No
Use boot scraping stations to prevent the spread of non-native plants	Yes	No
Support and/or accept policies that protect the marine environment	Yes	No
Support the reintroduction of native species (e.g., island foxes) on Channel Islands National Park	Yes	No
Properly dispose of waste (e.g., apple cores) that may cause the spread of non-native plants	Yes	No
Support policies that protect historic and cultural resources	Yes	No
Encourage other visitors to not disturb archeological artifacts on the Channel Islands National Park	Yes	No

SECTION 4 of 5: VALUE SYSTEMS

13. These questions examine your value systems. Please rate the extent to which these values are considered important as guiding principles in your life. (Circle one number.)

	Opposed to my values	Not at all Important	Important	Very Important	Of supreme Importance
Unity with nature: fitting into nature	-1	0 1 2 3 4 5 6 7			
Authority: the right to lead or command	-1	0 1 2 3 4 5 6 7			
Protecting the environment: preserving nature	-1	0 1 2 3 4 5 6 7			
Social power: control over others, dominance	-1	0 1 2 3 4 5 6 7			
A world at peace: free of war and conflict	-1	0 1 2 3 4 5 6 7			
Preventing pollution: protecting natural resources	-1	0 1 2 3 4 5 6 7			
Wealth: material possessions, money	-1	0 1 2 3 4 5 6 7			
Equality: equal opportunity for all	-1	0 1 2 3 4 5 6 7			
Respecting the earth: live in harmony with other species	-1	0 1 2 3 4 5 6 7			
Social justice: correcting injustice, care for others	-1	0 1 2 3 4 5 6 7			
Influential: having an impact on people and events	-1	0 1 2 3 4 5 6 7			
Helpful: working for the welfare of others	-1	0 1 2 3 4 5 6 7			
Loyal: faithful to my friends, group	-1	0 1 2 3 4 5 6 7			
A world of beauty: beauty of nature and the arts	-1	0 1 2 3 4 5 6 7			

14. These questions measure environmentalism and your view of the relationship between people and nature. Please rate the extent to which the following statements describe your view of the world. (Circle one number.)

	Strongly Disagree	Neutral	Strongly Agree
We are approaching the limit of the number of people the earth can support	1 2 3 4 5		
Humans have the right to modify the natural environment to suit their needs	1 2 3 4 5		
When humans interfere with nature it often produces disastrous consequences	1 2 3 4 5		
Human ingenuity will ensure that we do not make the earth unlivable	1 2 3 4 5		
Humans are severely abusing the environment	1 2 3 4 5		
The earth has plenty of natural resources if we just learn how to develop them	1 2 3 4 5		
Plants and animals have as much right as humans to exist	1 2 3 4 5		

The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5
Despite our special abilities humans are still subject to the laws of nature	1	2	3	4	5
The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5
The earth is like a spaceship with very limited room and resources	1	2	3	4	5
Humans were meant to rule over the rest of nature	1	2	3	4	5
The balance of nature is very delicate and easy to upset	1	2	3	4	5
Humans will eventually learn enough about how nature works to be able to control it	1	2	3	4	5
If we continue on our current course, we will soon experience a major ecological catastrophe	1	2	3	4	5

SECTION 5 of 5: SOCIO-DEMOGRAPHICS

15. Are you ...?

- Male Female

16. In what year were you born? _____

17. What is your home zip code? _____

18a. Do you consider yourself to be Hispanic, Latino or Latina?

- Yes No

b. With which racial group(s) do you identify? *(please ✓one or more)*

- | | |
|---|--|
| <input type="checkbox"/> American Indian or Alaska Native | <input type="checkbox"/> Black or African American |
| <input type="checkbox"/> Asian | <input type="checkbox"/> Native Hawaiian or other Pacific Islander |
| <input type="checkbox"/> White | <input type="checkbox"/> Other _____ |

19. What is the highest level of formal education you have completed? *(please ✓one)*

- | | |
|--|---|
| <input type="checkbox"/> Less than high school | <input type="checkbox"/> Two-year college degree |
| <input type="checkbox"/> High school graduate | <input type="checkbox"/> Four-year college degree |
| <input type="checkbox"/> Vocational/trade school certificate | <input type="checkbox"/> Graduate degree |

20. How many people live in your household (including you)? Number of people: _____

21. Would you mind telling me your household's TOTAL approximate annual income from all sources before tax? *(please ✓one)*

- | | |
|--|---|
| <input type="checkbox"/> Less than \$20,000 | <input type="checkbox"/> \$100,000 - \$149,999 |
| <input type="checkbox"/> \$20,000 - \$49,999 | <input type="checkbox"/> \$150,000 - \$199,999 |
| <input type="checkbox"/> \$50,000 - \$99,999 | <input type="checkbox"/> Greater than \$200,000 |

Thank you for helping us with this important survey. If there is anything else you would like to tell us, please do so in the space below.



Institutional Review Board Approval: 2012-1095
Expiration Date: May 2013

Person Collecting and Analyzing Data: Carena J. van Riper
Human Dimensions of Natural Resources Laboratory
Department of Recreation, Park & Tourism Sciences
Texas A&M University
2261 TAMU
College Station, TX, USA 77843-2261
Phone: 979-862-3068
Email: cvanripe@tamu.edu

Appendix C: Survey Questionnaire about Assigned Values of Ecosystem Services



Channel Islands National Park Visitor Survey, 2012



ID _____

Date _____

Location _____

Texas A&M University is conducting a survey to learn more about recreationists at Channel Islands National Park. This information will be used to better serve the public. You are one of a small number of people chosen for this study, so your opinions are important to us. All information will be kept strictly confidential and your response is voluntary. No action may be taken against you for refusing to supply the information requested. Please read each question carefully and save any additional comments for the final page. This survey will take 10-15 minutes to complete.

SECTION 1 of 5: TRIP CHARACTERISTICS

1. How many people (including you) are in your personal group today?

Total number of people: _____ Adults: _____ Children: _____

2. How would you describe your personal group? (please ✓ one)

- Traveling alone Friends Organized group
 Family Family and friends

3. How long are you staying in the park during your visit? (please ✓ one box & fill in blank)

- Day use only:
 ↳ How many hours **today?** _____ hours
 Overnight use:
 ↳ How many **nights** are you staying? _____ nights

4a. Do you expect to return to Channel Islands National Park on other trips in the next 12 months? (please ✓ one)

- Yes → please skip to question 5 No

b. If you do not expect to return, please explain why not: _____

5a. How many times have you visited Channel Islands National Park? _____

b. How many of the Channel Islands have you visited or do you plan to visit? _____

c. Was Channel Islands National Park your primary destination? _____

6. Are you aware that the boundary of Channel Islands National Park extends to one nautical mile offshore? (please ✓ one)

- Yes No

7. How would you rate your knowledge of Channel Islands National Park? (please ✓ one)

- Very low
 Somewhat low
 Average
 High
 Very high

8a. Which of the following activities have you participated in during your visit? (please ✓ all that apply)

- | | | |
|--|---|--|
| <input type="checkbox"/> Hiking | <input type="checkbox"/> Camping | <input type="checkbox"/> Recreational fishing |
| <input type="checkbox"/> Boating | <input type="checkbox"/> Diving/Snorkeling | <input type="checkbox"/> Sailing |
| <input type="checkbox"/> Kayaking | <input type="checkbox"/> Birding | <input type="checkbox"/> Viewing marine wildlife |
| <input type="checkbox"/> Experiencing nature | <input type="checkbox"/> Taking photographs | <input type="checkbox"/> Viewing island wildlife |
| <input type="checkbox"/> Attending programs | <input type="checkbox"/> Commercial fishing | <input type="checkbox"/> Other (please specify) |

b. From the above list, which would you identify as your primary activity? _____

9. What, if any, changes would you recommend park managers to make in recreational opportunities at the Channel Islands?

SECTION 2 of 5: ENVIRONMENTAL VALUES

10. The following statements describe a range of potential feelings you could associate with Channel Islands National Park. Please indicate your level of agreement with the statements below. (Circle one number.)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel Channel Islands National Park is part of me	1	2	3	4	5
I identify strongly with Channel Islands National Park	1	2	3	4	5
Visiting this place says a lot about who I am	1	2	3	4	5
Channel Islands National Park means a lot to me	1	2	3	4	5
I have a strong emotional bond to Channel Islands National Park	1	2	3	4	5
I feel a strong sense of belonging to Channel Islands National Park	1	2	3	4	5
I am happiest when I visit Channel Islands National Park	1	2	3	4	5
I get more satisfaction out of visiting this place than any other	1	2	3	4	5
I wouldn't substitute any other area for doing the types of things I do here	1	2	3	4	5
The things I do at Channel Islands National Park I would enjoy doing just as much at a similar site	1	2	3	4	5
Channel Islands National Park is the best place for what I like to do	1	2	3	4	5
I will (do) bring my children to this place	1	2	3	4	5
My friends/family would be disappointed if I were to start visiting other settings and facilities	1	2	3	4	5
I have a special connection to Channel Islands National Park and the people who use it	1	2	3	4	5
I associate special people with Channel Islands National Park	1	2	3	4	5

11. Please use the space below to describe why Channel Islands National Park is important to you.

12. These questions measure environmentalism and your view of the relationship between people and nature. Please rate the extent to which the following statements describe your view of the world. (Circle one number.)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
We are approaching the limit of the number of people the earth can support	1	2	3	4	5
Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5
When humans interfere with nature it often produces disastrous consequences	1	2	3	4	5
Human ingenuity will ensure that we do not make the earth unlivable	1	2	3	4	5
Humans are severely abusing the environment	1	2	3	4	5
The earth has plenty of natural resources if we just learn how to develop them	1	2	3	4	5
Plants and animals have as much right as humans to exist	1	2	3	4	5
The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5
Despite our special abilities humans are still subject to the laws of nature	1	2	3	4	5
The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5
The earth is like a spaceship with very limited room and resources	1	2	3	4	5
Humans were meant to rule over the rest of nature	1	2	3	4	5
The balance of nature is very delicate and easy to upset	1	2	3	4	5
Humans will eventually learn enough about how nature works to be able to control it	1	2	3	4	5
If we continue on our current course, we will soon experience a major ecological catastrophe	1	2	3	4	5

SECTION 3 of 5: SOCIO-DEMOGRAPHICS

14. Are you ...?

Male

Female

15. In what year were you born? _____

16. What is your home zip code? _____

17a. Do you consider yourself to be Hispanic, Latino or Latina?

Yes

No

b. With which racial group(s) do you identify? (please ✓ one or more)

American Indian or Alaska Native

Black or African American

Asian

Native Hawaiian or other Pacific Islander

White

Other _____

18. What is the highest level of formal education you have completed? (please ✓ one)

Less than high school

Two-year college degree

High school graduate

Four-year college degree

Vocational/trade school certificate

Graduate degree

19. How many people live in your household (including you)?

Number of people: _____

20. Would you mind telling us your household's TOTAL approximate annual income from all sources before tax? (please ✓ one)

Less than \$20,000

\$100,000 - \$149,999

\$20,000 - \$49,999

\$150,000 - \$199,999

\$50,000 - \$99,999

greater than \$200,000

SECTION 4 of 5: WHAT YOU VALUE

Now for something different! This final section examines the values you associate with Channel Islands National Park. Imagine you could distribute 100 preference points to ensure Channel Islands National Park keeps its existing value. Please allocate 100 points among the 12 values listed on the next page in a way that expresses why you think this place is important.

Please divvy up your 100 preference points and refer to the map on display for definitions of each value.

- _____ **Aesthetic value (A).** I value Channel Islands National Park for the attractive scenery, sights, sounds, or smells.

- _____ **Biological Diversity Value (B).** I value Channel Islands National Park because it provides for a variety of plants, wildlife, marine life, and other living organisms.

- _____ **Cultural Value (C).** I value Channel Islands National Park because it preserves historic places and archaeological sites that reflect human history of the islands.

- _____ **Economic Value (E).** I value Channel Islands National Park because it provides fisheries, recreation, or tourism opportunities that provide economic benefits.

- _____ **Future Value (F).** I value Channel Islands National Park because it allows future generations to experience this \ place.

- _____ **Intrinsic Value (I).** I value Channel Islands National Park in and of itself for its existence.

- _____ **Learning Value (L).** I value Channel Islands National Park because I can learn about natural and cultural resources.

- _____ **Life Sustaining Value (LS).** I value Channel Islands National Park because it helps produce, preserve, clean, and renew air, soil, and water.

- _____ **Recreation Value (R).** I value Channel Islands National Park because it provides a place for my favorite outdoor recreation activities.

- _____ **Spiritual Value (S).** I value Channel Islands National Park because it is spiritually significant to me.

- _____ **Therapeutic Value (T).** I value Channel Islands National Park because it makes me feel better, physically and/or mentally.

- _____ **Scientific Value (Sci).** I value Channel Islands National Park because it provides an opportunity for scientific observation or experimentation.

100 Preference Point Allocation

SECTION 5 of 5: VALUE ALLOCATION

The final step in this exercise involves you showing us specific places that reflect the values you selected in the previous exercise. First, approach the displayed map of Channel Islands National Park and return your tablet to the survey administrator. Next, indicate which places on the map you feel embody values. Please refer to the value abbreviations listed in the lower right hand corner of the map to identify which values you associate with each area. You can point to as many or as few places as you would like.

Image of map on display at the survey station (source: National Geographic Society, 2012):



Thank you for helping us with this important survey! If there is anything else you would like to tell us, please do so in the space below.

Institutional Review Board Approval: 2012-0195
Expiration Date: May 2013

Person Collecting and Analyzing Data: Carena J. van Riper
Human Dimensions of Natural Resources Laboratory
Department of Recreation, Park & Tourism Sciences
Texas A&M University
2261 TAMU
College Station, TX, USA 77843-2261
Phone: 979-862-3068
Email: cvanripe@tamu.edu