

The Economic Value of Sea Otters and Recreational Tourism in a California Estuary

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The Economic Value of Sea Otters and Recreational Tourism in a California Estuary

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1. INTRODUCTION

Conservation programs can arise from a variety of independent and often intersecting motives. These may include legislative mandates, single-species recovery, ecosystem restoration, economic incentives, and other actions attributed to wildlife and ecosystems. Legal protections and government management have been used globally for marine and terrestrial species or habitat with varying degrees of success (Margulies et al. 2019; Roman et al. 2013; Webb, Stojanovic, and Heinsohn 2018). Particularly for marine mammals, many species are experiencing ongoing population growth and range expansion under legal protection and related policies (Magera et al. 2013; Valdivia, Wolf, and Suckling 2019). This ongoing recovery not only leads to restoration of species populations, but also potentially re-establishes or expands ecosystem benefits (Hammerschlag et al. 2019; Mayer et al. 2019; Roman et al. 2014). However, population recovery also has the potential to cause concerns about conflicts with established industries (Boustany et al. 2020; Cammen, Rasher, and Steneck 2019; Nie 2003; Reidy 2019). Thus, identifying and quantifying benefits and costs is essential to help build understanding and consensus among stakeholders when developing conservation management goals (Reidy 2019; Sanjurjo-Rivera et al. 2021; Shogren et al. 1999).

The benefits of species recovery are frequently quantified through the lens of ecosystem services (Daily 1997; Sagoff 2011), but when developing conservation management strategies, documenting economic benefits is also key for connecting with a diverse group of stakeholders (Hunt et al. 2015; Reidy 2019; Sanjurjo-Rivera et al. 2021; Shogren et al. 1999). The impact of a species' presence on ecotourism is still a growing area of study (Auster, Barr, and Brazier 2020; Giraud et al. 2002; Hunt et al. 2015; Mieras et al. 2017; Scheyvens 1999). Previous studies have shown that ecotourism can yield significant economic gains in connection with wildlife conservation (Chapagain and Poudyal 2020; Hunt et al. 2015), and that these may outweigh the costs experienced by some specific industries (Gregg et al. 2020). These economic benefits include both the values that people place on their tourism experience and the direct values accrued to businesses which serve the tourists. The recovery of megafauna is also highly suited to have positive ecosystem restoration impacts as well as economic impacts related to tourism, as the general public may place higher value in seeing rare wildlife (Yang et al. 2022).

Southern sea otters (*Enhydra lutris nereis*) were over-exploited for the fur trade in the 19th century and by the early 1900s were nearly extinct (Bryant 1915; Kittinger et al. 2015). Although the population in California has since grown to nearly 3,000 individuals, the inhabited range has not expanded since 2000 and the subspecies remains listed as “threatened” under the U.S. Endangered Species Act (Hatfield et al. 2019). While many historical threats to the species have been successfully managed, emerging threats arising from novel ecosystem dynamics (such as white shark interactions and disease pathways) and climate change present new challenges (Miller et al. 2020; Moxley et al. 2019; Nicholson et al. 2018; Tanaka et al. 2021; Tinker et al. 2016). As a result, the continued recovery of southern sea otters will likely require additional conservation efforts that will involve diverse stakeholders with varied interests.

Expanding the current southern sea otter range back into their historical areas will likely be essential to population recovery (Tinker et al. 2016; Tinker et al. 2021). The recovery of sea otters is expected to have positive ecosystem impacts as they maintain their role as a keystone species in

kelp forest and estuary habitats (Estes and Palmisano 1974; Hughes et al. 2013). Coastal commercial industries in areas currently uninhabited by sea otters are unaccustomed to their presence and may be uncertain about the impacts of efforts to recover sea otter populations in historical habitats. Therefore, demonstrating ecosystem effects (Estes and Palmisano 1974; Foster et al. 2021; Hughes et al. 2013; Smith et al. 2021; Wilmers et al. 2012), commercial fisheries impacts (Boustany et al. 2020; Grimes et al. 2020; Raimondi, Jurgens, and Tinker 2015), and socioeconomic incentives (Gregar et al. 2020; Loomis 2006; Martone et al. 2020) of sea otter recovery are key tasks for continued conservation planning.

In this study, we focus on the economic value associated with recreational tourism and the presence of sea otters in a small coastal estuary. Previous research has used multiple direct and indirect methods to estimate the hypothetical and realized economic impacts of sea otter recovery at various geographic scales (Gregar et al. 2020; Hageman 1985; Loomis 2006; Martone et al. 2020). Each study has shown sea otters to provide potential or actual economic benefits via ecosystem benefits, eco-tourism, and existence values. While each method provides different insights, they also have limitations based on sampling methods and scale. This study also differs from previous southern sea otter economic assessments by focusing on visitors while at the location of interest and assessing the impact of observing sea otters while on their visit.

This study builds on prior research to quantify the direct and indirect economic impacts of ecotourism in Elkhorn Slough, California (Figure 1), with special focus on how visitors valued the presence of sea otters. Since the Kildow and Pendleton (2010) study, the population of sea otters in this area increased dramatically (Hatfield et al. 2019; Mayer et al. 2019) and the number of local businesses supporting recreational users has also grown (Figure S1; JobsEQ 2020). We focused surveyed activities on those occurring within Elkhorn Slough. The slough is recognized as a National Estuarine Research Reserve (NERR), a state area of significance, as well as on the RAMSAR list of internationally significant wetlands. This area provides a diversity of ecosystem services, including critical habitat for fisheries, significant educational opportunities which many area schools take advantage of, and the recreational activities studied here (Kildow and Pendleton 2010).

We assessed the value of recreational tourism and sea otters in Elkhorn Slough in three distinct ways. First, we modeled the economic impacts of recreational tourism through direct and indirect spending to local economies. Second, we surveyed the importance sea otters play in the reported visitor experience. Third, we calculated the perceived value of protecting Elkhorn Slough or sea otters through a visitor's willingness to pay a hypothetical fee. The results of this study can help inform the role of sea otters, not only as a keystone species in coastal ecosystems, but also as an important economic factor through recreation-based activities to a local region. This case study also provides support for the value of the recovery of rare mega-fauna to tourism, even on local scales.

2. METHODS

2.1 Study location

Elkhorn Slough is a 12 km² tidal estuary and is the largest wetland on the California coast south of San Francisco Bay (Figure 1A, Van Dyke and Wasson 2005). This area supports a resident

population of sea otters as well as many other marine mammals, invertebrates, and birds (Wasson et al. 2015). Direct surveys of visitors were possible due to the relatively limited points of entry to the estuary (Figure 1C). Interviews took place at three main geographical access points to Elkhorn Slough: North Harbor, South Harbor, and the visitor center of the Elkhorn Slough National Estuarine Research Reserve (ESNERR; Figure 1C). Recreational businesses that focused outside of Elkhorn Slough (such as fishing charters and whale watching boats that launched from the adjacent harbor) were not focal areas for surveys.

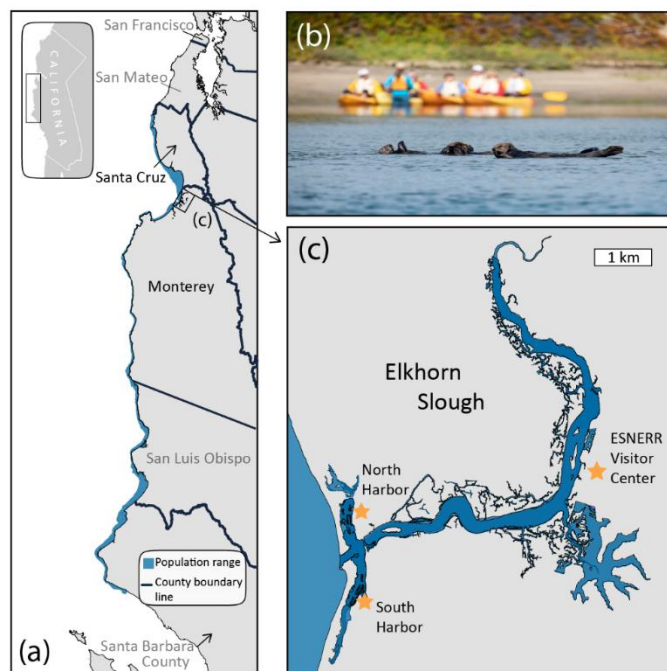


Figure 1. Southern sea otter range extent is currently limited along central California, with a small subpopulation concentrated in Elkhorn Slough, a popular recreation location for wildlife viewing. a) The current mainland range extent of sea otters in California (translocated population surrounding San Nicolas Island not shown) includes the small estuary Elkhorn Slough. b) Elkhorn Slough supports a year-round population of sea otters and is a popular kayaking destination as well as other recreational activities. c) Survey sites (yellow stars) were selected based on key visitor access points for water and shore-based activities.

2.2 Survey Methods

To characterize visitation to Elkhorn Slough, we conducted opportunistic intercept surveys (Churchill, Brown, and Suter 1996) without snowballing or chain referral (Biernacki and Waldorf 1981; Van Houtan and Kittinger 2014). We restricted interviews to individuals over 18 years of age. We conducted surveys in English and no requests for surveys in other languages were made. Surveyors interviewed individuals from larger groups assembled for guided water tours (kayak or motorboat), who were using their own paddled watercraft (kayaks, stand-up paddleboards, etc.), or visiting hiking trails. Particularly at the ESNERR location, many visitors were associated with school groups, but we excluded these groups in the interviews as they were minors (under 18 years of age) and did not make an economic decision to visit the area.

Intercept interviews of area visitors were conducted using Qualtrics Offline Surveys application (Qualtrics, Provo, UT). Interviewers used tablet computers to record answers and

uploaded completed interviews daily to a central database. Surveys included demographic questions, such as age, sex, home area (grouped by region), and annual income, as well as grouping questions to characterize their visit to Elkhorn Slough (question summary and full survey found in Supplemental Material 1, Table S1; Supplemental Material 2). Surveys took place from May to October 2019 with most surveys in June and July and took place during typical business hours (approximately 9:00 and 16:00 local time).

To evaluate how wildlife experiences influenced ranking and valuation responses, interviewers asked respondents if they had previously visited Monterey Bay Aquarium (a local non-profit aquarium with conservation messaging) and whether they observed sea otters during their trip to Elkhorn Slough. Previous visits to the Aquarium may influence their decision to visit Elkhorn Slough as well as their perception of conservation value of wildlife and their habitats. These responses were used to evaluate the impacts to the perceived value of protecting Elkhorn Slough or sea otters (described in Section 2.4). Respondents were able to skip any questions, so sample size may vary per question. Additional survey questions are described below.

2.3 Economic impacts of recreational visitors

We estimated the annual number of visitors to Elkhorn Slough to calculate annual economic output. The exact number of visitors is not available due to lack of monitoring and the relatively open access nature of the area. Detailed customer numbers from rental companies and motorboat tours were not provided as this was considered business sensitive information. Instead, we estimated annual visitation from previous assessments of visitors to ESNERR and from interviews with local business owners. Between 2006 and 2007, Kildow & Pendleton (2010) reported an estimate of 35,000 annual visitors to the Elkhorn Slough National Estuarine Research Reserve (ESNERR) which they defined as inclusive of the land and water areas covered in this study. Interviews with ESNERR staff suggested that, of these, approximately 10,000 were part of school groups and so were excluded. Business interviews estimated 20,0000 visitors access the Slough via watercraft or boat. We used the resulting annual estimate of 45,0000 visitors to calculate annual economic impacts.

We extrapolated direct spending from survey respondents providing the following information for their party: lodging, meals, incidentals during the trip, and transportation expenditures. Based on their reported activities, the average advertised price was used for tour or rental services. For those who traveled by automobile, the standard 2019 GSA mileage rate of \$0.55 per mile was used for distance traveled to Elkhorn Slough using the most efficient road route calculated by ArcGIS Network Analyst by ESRI (ArcGIS Version 10.7, Redmond, CA). Daily spending was expected to differ between single-day visitors and multi-day visitors, so average and estimated annual spending was calculated by trip type.

To determine the impacts of Elkhorn Slough tourism to the regional economy (Monterey and Santa Cruz counties), we estimated the effects of visitor spending using economic input-output modeling using IMPLAN software systems (IMPLAN Group LLC, 2019; Leontief 1986). IMPLAN simulations use direct and indirect economic effects with industry-specific multipliers to measure economic activity and have previously been applied in environmental contexts (Jin, Hoagland, and Dalton 2003; Wang et al. 2020). Respondent reported spending was used to estimate direct effects (as described above). From the direct effects, IMPLAN simulated indirect

effects, which are the purchases of goods and services needed to provide the direct purchases, such as spending on supplies of goods and services by impacted businesses (e.g., tour companies, hotels, restaurants), and the incomes of those businesses and employees. Additionally, IMPLAN estimates induced effects, which are the additional changes in income and output in the region resulting from the spending of the employees supported by direct and indirect impacts (Leontief 1986). The combination of direct spending from visitors together with the indirect effects of businesses spending and induced effects of employee spending are together called the multiplier effect (Isard 1960). We used direct, indirect, and induced effects in combination to assess the economic activity that was due to recreational tourism in Elkhorn Slough.

We analyzed simulations for both the Monterey and Santa Cruz County economies as Elkhorn Slough is geographically situated within Monterey County, but on the border with Santa Cruz County and, particularly for multi-day users, there was also a high likelihood that visitors went to locations other than Elkhorn Slough during their trip. Indirect economic impacts on employment (number of full- and part-time jobs), labor income (employee compensation), value added (the difference between sales and the costs of inputs), and output (sum of financial impacts) were estimated. Value added was used to measure the contribution to the regional economy as it is unique to each industry (Poudyal, Watkins, and Joshi 2020). The IMPLAN model uses established multiplier effect values based on industry type (Table S3; IMPLAN Group LLC 2019). The estimation of multiplier effects using the IMPLAN model was consistent for hotels, restaurants, retail, and transportation related spending. However, the impacts of the companies that offer tours of Elkhorn Slough and rent kayaks did not fit within a single sector and so could not be analyzed directly with North American Industry Classification System (NAICS) 487210 (Scenic and Sightseeing Transportation, Water).

To correct for this broad classification of industries, we estimated the economic impacts of the expenditures on tours and rentals by using the multiplier effects computed by IMPLAN for this sector and then applying those to the actual figures derived from the survey (Table S4). We calculated the estimate of labor income and value added as the IMPLAN-estimated ratio of these two measures to the output estimate. Indirect and induced multipliers were based on the ratio of indirect to direct and induced to direct for labor income, value added, and output.

2.4 Perception and Values to Recreational Users

To evaluate visitors' perception of Elkhorn Slough, respondents ranked six provided attributes with a score between 1 to 10 for their experience during the days' trip. In this scheme, a score of 1 represented no importance while 10 was described as "the best thing about the trip." Attributes included the uniqueness of the area, the convenience of the visit, sea otters, birds, fish, and other wildlife. Chi-square tests evaluated the significance of rank order. The rank order was compared across survey location and whether the respondent reported seeing sea otters (whether a few or many) or no sea otters.

To determine the perceived value of Elkhorn Slough and sea otters, we used a referendum question format with a double bid and modeled the factors that influenced value trends (Aizaki, Nakatani, and Sato 2014; Mitchell, Carson, and Carson 1989). Respondents were asked if they would pay a specific amount to preserve Elkhorn Slough or sea otters via a hypothetical entrance fee to Elkhorn Slough (Supplemental Material 2 for question language). These hypothetical fees

are considered a consumer surplus, the difference between what one is willing to pay and what one actually paid (Mitchell, Carson, and Carson 1989). The initial proposed access fee amount was randomized for each respondent, ranging between 10 to 50 dollars. The order in which the Elkhorn Slough and sea otter questions were asked was also randomized so that half the respondents were asked first about the Elkhorn Slough and then sea otters and the other half were asked about fees in reverse.

Following the respondent's initial response, the respondent's willingness to pay a higher or lower amount was tested. If the respondent agreed to pay the initial offer, they were then asked if they would pay a slightly higher amount; if they declined the initial offer, they were asked if they would pay a slightly lower amount (bid amounts varied in \$10 increments, except for the lowest starting bid of \$10 which decreased to \$5 if the respondent voted against). The mean fee respondents were willing to pay for each question was calculated by the number of votes at each offered fee amount. The mean values were then extrapolated with annual visitor estimates for potential added annual revenue source if such fees were created.

We used a logistic regression to assess which factors best predicted the double bid dichotomous choice outcome (R package DCchoice; Nakatani 2020). Factors examined included the scaled attribute ranks (described above), the number of previous visits to Elkhorn Slough, whether the respondent had previously visited Monterey Bay Aquarium (binomial), the vector of the bid amounts (e.g., \$10, and then either \$5 or \$20), as well as the log scale of respondent's age and income. Three error distributions were also examined for best fit (Borzykowski, Baranzini, and Maradan 2018). The best fit model was selected by Akaike information criterion (Burnham and Anderson 1998).

3. RESULTS

3.1 Visitor summary

Overall, 424 respondent interviews were completed, representing individuals and groups totaling 1,418 visitors. Respondent demographics were similar to local county data and demonstrated a high prevalence of "local tourism." Compared to local county census data (data.census.gov), survey respondents were slightly older (mean age \pm SD = 47 ± 15.5 years) than Monterey County (34 years) and Santa Cruz County (38 years), but that was likely due to exclusion of individuals under 18 years in the survey methods (Figure S2). Mean household income was also slightly higher ($\$118,131 \pm 63,931$) than Monterey County ($\$102,000 \pm 4500$) but comparable to Santa Cruz County ($\$119,000$; Figure S2).

A majority (55%) of respondents visited Elkhorn Slough in the 12 months prior to the trip during which they were interviewed, with a median of 3 previous visits and a small proportion of frequent users (greater than 10 previous visits; Figure S2). Respondents came from both within (76% of respondents) and outside (24%) of California. Within California, 38% came from the Monterey Bay area (Monterey and Santa Cruz counties) while another 23% came from the San Francisco Bay area (Figure 2A). This makes a total of 61% of the respondents from the regions closest to Elkhorn Slough. The majority (61%) of visitors were on a one-day trip, that we

categorized as “day-trippers.” The remaining 39% were on multi-day trips of varying length from two to nine days, termed “multi-day trippers” (Figure 2B).

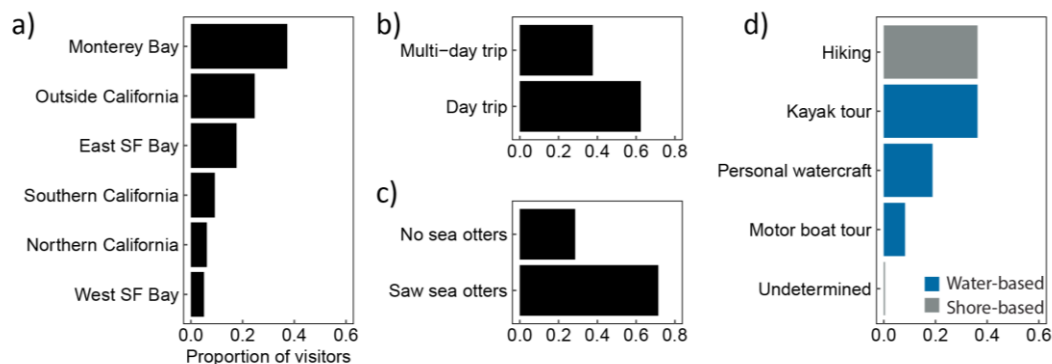


Figure 2. Survey respondents represented typical recreational visitors to Elkhorn Slough. a) Majority of visitors were local to Monterey Bay area (Monterey and Santa Cruz Counties). b) With the local homes, most respondents were day-trip visitors versus multi-day trip visitors. c) Majority of respondents saw sea otters versus those who did not see any. d) Majority of visitors reported they primarily experienced the estuary on the water (blue), via motorized and non-motorized watercraft.

The sample reflects the observed distribution of user type by access point and activity. The majority of respondents explored the estuary via water-based activities (63%) rather than land-based walking tours (37%; Figure 2D). Of water-based respondents, 87% were in self-propelled watercraft (kayaks, standup paddle boards, etc.) and 70% of these users paid for rentals or guided tours while 30% were in their own watercraft (Table S2). Motor tours launched from both harbor areas, but variation in operator hours may have contributed to under-sampling. Sea otters were commonly observed by visitors, with 71% reporting having seen at least one sea otter (Figure 2C), and this occurred while on land and on water.

3.2 Economic impacts of recreational visitors

Survey respondents reported spending an average of \$45.69 and \$111.75 per person per day by day-trippers and multi-day trippers, respectively. Adjusting for the reported average party size and proportion of visitor types (day, or multi-day trippers), this amounted to \$3.2 million direct spending to Moss Landing and the surrounding counties related to Elkhorn Slough recreation, based on an estimate of 45,000 annual recreational visitors. Reported expenses included meals, rental and tour fees, other incidentals, and transportation (Figure 3).

Table 1. Estimated annual economic impacts of direct and indirect factors for Monterey and Santa Cruz counties. Dollar values USD \$2019. Data from IMPLAN Input-Output models.

Impact Type	Employment (# Jobs)	Labor Income	Value Added	Output
Direct	196	\$1,180,000	\$1,440,000	\$2,310,000
Indirect	138	\$670,000	\$1,000,000	\$1,260,000
<i>Total</i>	<i>334</i>	<i>\$1,850,000</i>	<i>\$2,440,000</i>	<i>\$3,580,000</i>

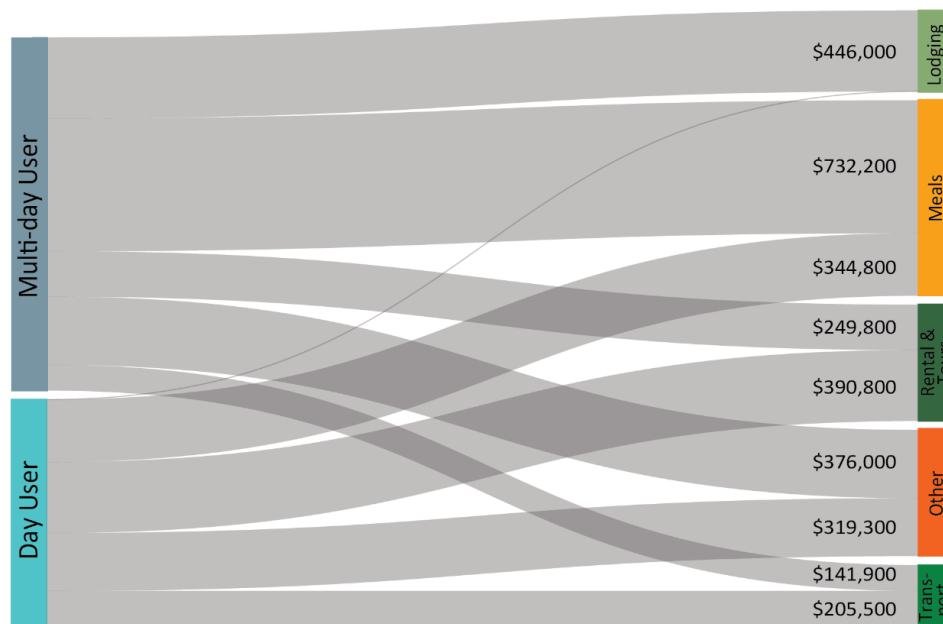


Figure 3. Survey respondents reported estimates of direct spending while visiting Elkhorn Slough related to lodging, meals, transportation, tours and rental, and other incidentals. These values were extrapolated to annual spending based on an estimate of 45,000 visitors, split as proportion of day trip versus (61%) multi-day trip visitors (39%) based on survey results.

IMPLAN models used direct spending reports to estimate indirect and induced effects. Approximately \$1.85 million in wages, salaries, and other compensation could be attributed from direct spending, and thus supported 334 full-time and part-time jobs in the region. Model output information was not available to distinguish among these job types. Estimated employment may be fully or partially related to recreational activity in Elkhorn Slough (e.g. tour guides, kayak rental agents). Employees such as those in hotels and restaurants may also attribute a portion of their income to recreational activity in the Slough. Industry-specific contribution to the regional economy was estimated at \$2.44 million and total business output at \$3.58 million (Table 1).

3.3 Perceptions of Elkhorn Slough

Respondents ranked six attributes related to their relevance to the visitor's experience (Table S5). Overall, ranking differed by attribute type ($\chi^2 = 474.96$, $n = 360$, $p < 0.001$). The "uniqueness" attribute had the highest mean ranking (7.9) followed closely by "convenience" (7.8) and "other wildlife" (7.7). Although sea otters also had a high mean ranking (7.4), this depended on whether the respondent had seen at least one sea otter during their visit. Seventy one percent of respondents indicated they had seen sea otters on their visit, and of those, 80% reported seeing "many." The mean ranking of the sea otter attribute question was 8.2 by those who saw sea otters, compared with 5.5 for those who did not (Figure 4). Conversely, the ranking score for all other attributes declined slightly when sea otters were seen. The 8% of respondents who rated sea otters as least important (ranking score of 1) in their responses were all interviewed at the ESNERR sites where there is a smaller likelihood of seeing sea otters.

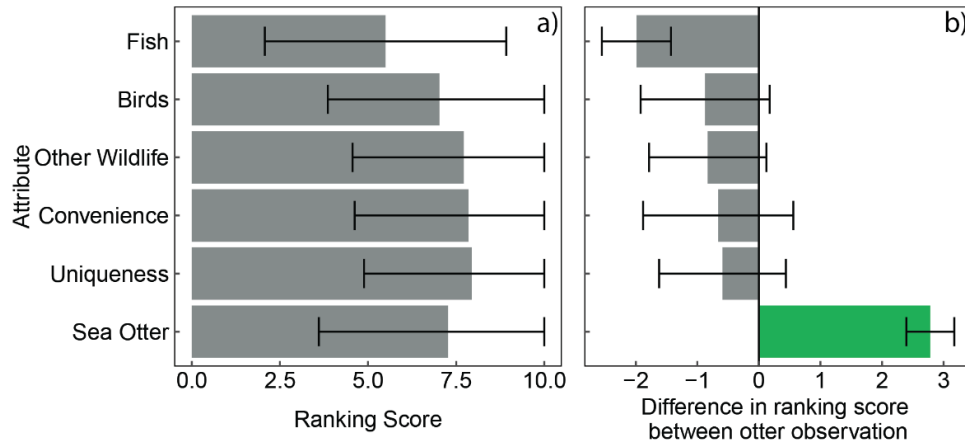


Figure 4. The opportunity to view sea otters impacted how visitors ranked the importance of attributes to their visit. A) Each respondent ranked each attribute from 1 to 10, with 10 representing higher valued parts of the trip. B) The difference in ranking score is shown between respondents who saw no sea otters and those who saw a few or many. On average, respondents ranked sea otters higher as a positive attribute of their trip to Elkhorn Slough if they had seen sea otters (green bar). The ranking of fish decreased while other attributes only slightly decreased. Bars represent mean difference in ranking score with standard error.

3.4 Perceived value of Elkhorn Slough and sea otters

The survey respondents indicated a willingness to pay an entrance fee on average of \$28.65 USD (95% CI: \$25.25-32.22) to maintain the sea otter population (as specified in the question asked) and \$29.93 USD (95% CI: \$26.52-33.54) to preserve Elkhorn Slough. Assuming an annual population of 45,000 visitors, these average amounts yield a potential value of \$1.29 million to \$1.35 million. The best fit models for predicting the respondent's choice of value included their ranking of sea otters as an attribute, reported annual income, the vector of the bid amounts, and a logistic error distribution (Table S6). As expected for both questions, the probability of selecting yes to a bid decreased as the price increased overall, although some inconsistencies were observed by question (Figure 5a, Figure S3). There was a significant positive relationship with the sea otter attribute ranking for both questions (Elkhorn Slough: $\beta = 0.1812$, $p < 0.001$; Sea Otter: $\beta = 0.2897$, $p < 0.001$; Figure 5b). The likelihood of selecting a hypothetical fee increased as annual income (Table 2). The number of previous visits to Elkhorn Slough, and whether the respondent had visited Monterey Bay Aquarium did not improve model fit and were dropped from both models (Table S7).

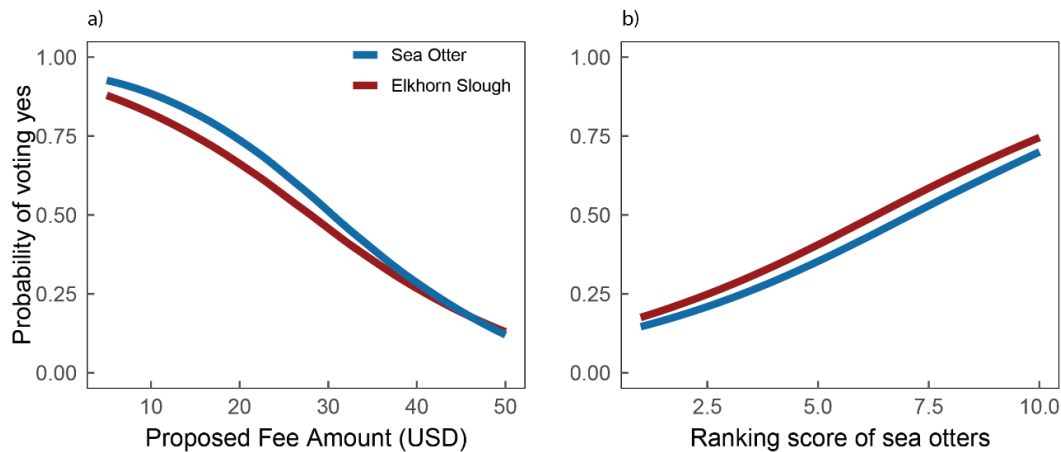


Figure 5. The importance of sea otters to a visitor's trip impacts the financial value placed on species and area preservation. Respondents demonstrated a willingness to pay a hypothetical entrance fee to support the protection of Elkhorn Slough and sea otters. A) The probability of voting yes decreased as the proposed fee amount increased. B) The probability of respondents being willing to pay a fee amount varied based on the key subject of the question (Elkhorn Slough (red line) or sea otters (blue line)) and increased as their ranking of sea otters as a trip attribute increased.

Table 2. Double bid dichotomous choice survey model results. Models were analyzed by logistic regression to determine predictors of selecting proposed bid amounts to preserve Elkhorn Slough or sea otters. Income, ranking of sea otter attribute, and vector of bid amounts best predicted the choice of respondent when assessing a hypothetical fee to access Elkhorn Slough.

	Estimate	Std. Error	z-value	P-value (> z)
<i>Elkhorn Slough</i>				
Intercept	-3.021	1.465	-2.062	0.039
Log (Income)	0.393	0.131	2.998	0.002
Sea otter rank	0.181	0.036	5.015	1e-06
Fee Amount	-0.094	0.006	-14.74	< 2.2e-16
<i>Sea otter</i>				
Intercept	-1.585	2.031	-0.780	0.435
Log (Income)	0.139	0.178	0.778	0.436
Sea otter rank	0.289	0.067	4.328	1.5e-05
Fee Amount	-0.085	0.009	-9.269	< 2.2e-16

4. DISCUSSION

The recovery of native species through range expansion or population increase has the potential to impact ecosystem health as well as established or growing business industries. Assessing potential trade-offs to the range of stakeholders impacted by species recovery efforts is an essential part of

conservation management (Seppelt, Lautenbach, and Volk 2013). Recovering megafauna are particularly suited to attract tourism and promote a recreational tourism industry (Cisneros-Montemayor et al. 2013; Di Minin et al. 2013; Krüger 2005), and we found that sea otters are no exception. This study shows that the use of a small estuary for recreational tourism had positive impacts on the local economy. Additionally, the value visitors placed on viewing and protecting wildlife and associated habitats was influenced by their recreational activities and encounters with wildlife. These findings add quantified evidence to support the economic benefits of the recovery of a marine mammal and support future planning as a species recolonizes historical habitat ranges.

By using intercept survey methods, the results of this study reflected the views and activities of visitors at the time and for the study area of interest. This differs from many previous sea otter economic research studies which surveyed potential visitors rather than actual visitors (Kildow and Pendleton 2010; Loomis 2006; Martone et al. 2020). We found that the majority of respondents in this survey lived locally and some visited the area repeatedly. The local nature of visitors had the potential to reduce the expected direct spending. However, most respondents still paid for tours or rental equipment which supported multiple recreational businesses in the area. This also suggests economic gains are possible without requiring visitors to travel great distances. The association between the presence of sea otters and tourism businesses builds on previous research demonstrating the positive economic impacts of sea otters at larger geographic scales, and in regions with varying perceptions of the value wildlife conservation (Gregar et al. 2020; Kildow and Pendleton 2010; Loomis 2006; Martone et al. 2020).

While the recreational use of Elkhorn Slough is a modest contribution to regional economies, it can have a large local impact. Annually, recreational visitors can contribute \$2.44 million in total business output and support over 300 jobs. In comparison, Santa Cruz and Monterey County estimate \$796 million and \$1.6 billion in annual revenue output from all hospitality jobs, respectively (JobsEQ 2020; Partnership 2019). As sea otters expand to their historical range along the Pacific coast, whether through natural range expansion or reintroduction efforts, new areas with limited to no existing marine recreational industries could financially benefit from pursuing new tourism opportunities. The number of businesses serving recreational visitors supported by visitors to Elkhorn Slough increased dramatically between 2010 and 2019. In this time, the population of sea otters increased which also had a positive impact on estuary health (Hughes et al. 2013). The increased abundance of eelgrass supports other fish, birds, and invertebrates that use the area as a nursery and for foraging (Grimes et al. 2020; Wasson et al. 2015) which may in turn support additional visitors.

The total economic contribution of tourists to Elkhorn Slough is likely greater than estimated in this study. While this study's estimate of 45,000 annual visitors was higher than the 35,000 used in the previous economic study of Elkhorn Slough (Kildow and Pendleton 2010), that study noted it was possible that visitors could range upwards of 115,000 to 135,000. This would mean the estimates here are significantly low. We also did not calculate non-use values, wherein people who have not visited Elkhorn Slough in person may still value the resource and sea otters either because they may visit it one day (option value) or simply because they value the return of an endangered species to the California coast (existence value). These non-use values may be quite significant given the unique features of Elkhorn Slough and the attraction of sea otters but measuring them would require a survey of a much broader population than was done here.

Additionally, our estimates do not reflect the economic contribution of all visitors to the surrounding town of Moss Landing. These visitors were excluded from the survey unless they also visited Elkhorn Slough as they were not directly relevant to the study questions. Additionally, the seasonal influx of visitors to Moss Landing that were focused on birdwatching would likely confer an additional economic impact and the moderate climate of the California central coast allows visits to the Slough year-round. Our survey period from June-October would not fully capture their activity or economic impacts (Lee et al. 2010). However, even in the absence of the full range of visitors, recreational visitors to this small estuary measurably contributed to the greater regional economy. Future research would benefit from assessing the full scope of recreational activities in the area across multiple seasons of wildlife activities that are both continuous and discrete.

The continued use of Elkhorn Slough as a recreation destination was supported by rankings of attributes. Convenience of access and the uniqueness of the area were the highest ranked features of all respondents and are likely to remain true over time. The interaction between visitors seeing sea otters, and how they ranked sea otters as a feature of their trip suggests that the opportunity to view sea otters, specifically, is key to creating value. The importance of observing wildlife to the recreational value has been previously documented with bird watchers and other wildlife viewers (Barr, Utech, and Hoagland 2000; Johnston et al. 2002). Although not analyzed here, this also suggests the potential higher value of guided activities to increase the likelihood that visitors get the best experience of viewing desired wildlife. Guided activities would potentially also help mitigate some of the negative impacts of wildlife tourism due to human disturbance (Barrett 2019; Machernis et al. 2018; Tyagi et al. 2019).

In addition to the economic impact at the time of the study, we explored how visitors might value the area and species in the future. We determined the visitors' willingness to pay (WTP) hypothetical access fees to provide insight into the value of protecting the area or sea otters. Unsurprisingly, higher incomes were associated with higher WTP. The positive relationship between sea otter ranking score and WTP, and the importance of observing sea otters to rank score, supports that viewing sea otters has the potential to positively impact the financial valued placed on preservation of species and land. Thus, while sea otters are not necessarily the reason people come to Elkhorn Slough, they are a key element in the value of the visit. The importance of recent wildlife experience has previously been shown to impact WTP estimates (Di Minin et al. 2013; Martone et al. 2020). However, additional study would be needed to better evaluate potential drivers for visitors who did not come to see sea otters (such as bird watchers). Although such fees are unlikely to be implemented in the Elkhorn Slough area, they may provide a viable strategy in other locations to financially support the protection and restoration of recovering areas and be supported by visitors.

While this study used well-established survey methods, there is potential that the use of intercept surveys can introduce some biases, in this case as we specifically targeted resource users. Risks associated with these types of studies that can result in results biased to the upside (the chances are the true values are higher than those estimated) as described above, and to the downside (the chances are the true values are lower than estimated). Over-representation of frequent visitors (avidity bias) has the potential to create upside risk (the chances are the true values are higher than those estimated; Landry et al., 2016). However, Landry (2016) found that a correction for avidity bias had little effect on the WTP estimates, but an underestimate of economic impacts. Given 70% of our sample of visitors were either first-time or one-time visitors to Elkhorn

Slough, we expect that any avidity bias in this study would not be large. A similar issue may be present with length-based bias in which the sample over represents people who stay for a long time. This was not measured in the survey, so its effects are unknown. Downside risks are noted about the possible under-representation of motor tour customers in the sample along with a lack of sampling of bird watchers in the spring and fall flyway seasons. However, downside risks, or conservative estimates, in this case are generally preferred to provide base estimates of economic impacts.

This study uses multiple metrics to assess the value and importance of a single species' presence. Such work can contribute towards ongoing and future conservation initiatives by demonstrating benefits and opportunities should a species of interest return to parts of their former range of habitats. These methods can be useful for other recovering populations needing to quantify current impacts, rather than predicting potential future impacts and their associated uncertainty. Additionally, measuring and communicating economic impacts that may not be directly related to ecosystem services may be beneficial for species or populations that are expected to have a range of reactions across stakeholders.

5. CONCLUSION

In this study, we focused on the economic value of sea otter presence to recreational visitors. The economic benefits that sea otters may provide through ecosystem restoration and climate resiliency should also be measured in future studies and provide a more accurate picture of the full impact sea otters and their restored habitats can have to a broader economy. As sea otter conservation efforts provide opportunity for population expansion and ecosystem recovery, areas that currently have limited ecotourism may see new economic niche opportunities or help grow existing industries. We hope that future sea otter conservation coalitions will focus on all aspects of value that southern sea otters may bring through their recovery to historical habitat.

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Supplemental Material:

Supplemental Material 1- Results

Changes in recreational businesses over time

The number of businesses supporting recreational visitors established in Moss Landing increased over time. Opening year was collected from the Better Business Bureau (<https://www.bbb.org/us/ca/moss-landing>) and California State Business Entities (<https://businesssearch.sos.ca.gov/>). The number of businesses was also compared with the annual count of sea otters in Elkhorn Slough (Hatfield et al 2019).

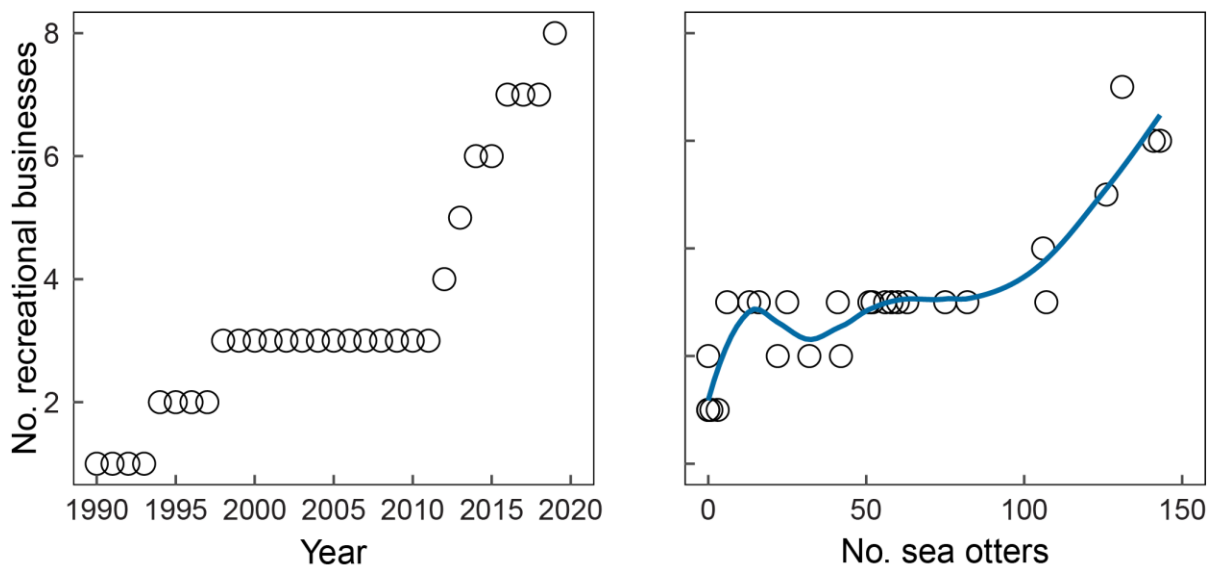


Figure S1. The number of businesses supporting recreational visitors open in Moss Landing, California increased over time (a), which also coincided with the increase in sea otters in Elkhorn Slough (b).

Survey Questions and responder demographics

Table S1. Survey respondents were asked a series of demographic and grouping questions to categorize the type of visitors to Elkhorn Slough. Respondents could skip any questions, so sample size may vary for each question. Full survey available in Supplemental Material 2.

Survey Question	Details	Sample Size (N)
Survey Location	North Harbor	145
	Southern Harbor	117
	ESNERR headquarters	150
Gender	Male	201
	Female	201
Age	Age (years) of respondent (≥ 18 years minimum)	355
Party Size	Number of individuals in group (any age)	400
Planned activity	Walking tours	150
	Own watercraft	78
	Rented watercraft	150
	Motorized watercraft tour	34
Home Geographic Area	Monterey Bay	130
	San Francisco Bay	80
	Northern California	20
	Southern California	33
	Outside California	82
Length of trip	1 day	258
	> 1 day	156
Number of previous visits	0 to 200	217
Annual household Income	Categorized annual income	359
Seen sea otters	Yes, a few	55
	Yes, many	242
	No	119
Visited Monterey Bay Aquarium	Yes	340
	No	75

Table S2. Distribution of reported visitor type of activity by 2 survey locations that catered to water-based recreational activities.

Location	Mode of Activity				
		Kayak Tour	Motor Tour	Individual	Total
North Harbor	N	112	5	28	145
	Mode percent of location	77%	3%	19%	100%
	Location percent of mode	75%	15%	36%	
	Percent of Total	43%	2%	11%	56%
South Harbor	N	38	29	50	117
	Mode percent of location	32%	25%	43%	100%
	Location percent of mode	25%	85%	64%	
	Percent of Total	14%	11%	19%	44%
Water-based Visitors	N	150	34	78	262
	Percent of Total	57%	13%	30%	

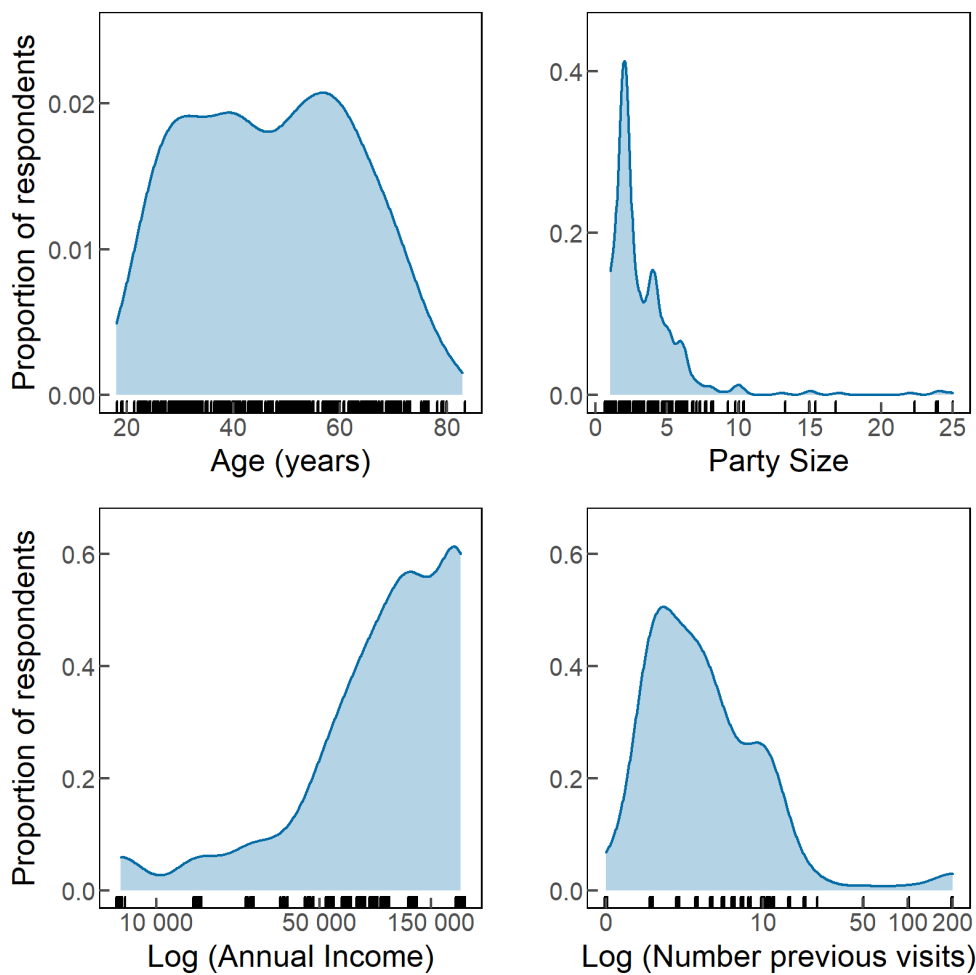


Figure S2. Survey respondents represented typical visitors to Elkhorn Slough. Density plots (blue) show proportion of all respondents, with sample aggregation represented by black tick marks. Respondents were asked a series of demographic questions including (a) age of respondent, (b) reported annual income, (c) the number of previous visits to Elkhorn Slough, and (d) size of party with respondent (included all ages).

Estimating the Economic Impacts of the Tour/Rental Companies

The estimation of multiplier effects using the IMPLAN model was consistent for hotels, restaurants, retail, and transportation related spending, but the impacts of the companies that offer tours of Elkhorn Slough and rent kayaks is more complicated because the sector within IMPLAN in which those companies are located are combined with a number of other industries in the IMPLAN model (Table S1). This sector is thus too broadly defined to analyze only the activity in NAICS 487210.

To correct for this inappropriate classification of industries, the estimate of the economic impacts of the expenditures on tours and rentals was done using the multiplier effects computed by IMPLAN for this sector and then applying those to the actual figures derived from the survey. These multipliers are shown in Table S3. The estimate of labor income and value added are calculated as the IMPLAN-estimated ratio of these two measures to the output estimate. Indirect and induced multipliers are based on the ratio of indirect to direct and induced to direct for labor income, value added, and output.

Table S3. NAICS code and industry name for IMPLAN sector scenic and sightseeing transportation and support activities for transportation.

NAICS Code	Industry Name
487210	Scenic and Sightseeing Transportation, Water
487990	Scenic and Sightseeing Transportation, Other
488111	Air Traffic Control
488119	Other Airport Operations
488190	Other Support Activities for Air Transportation
488210	Support Activities for Rail Transportation
488310	Port and Harbor Operations
488320	Marine Cargo Handling
488330	Navigational Services to Shipping
488390	Other Support Activities for Water Transportation
488410	Motor Vehicle Towing
488490	Other Support Activities for Road Transportation
488510	Freight Transportation Arrangement
488991	Packing and Crating

Table S4. Multiplier estimates and economic impacts from IMPAN simulations for scenic tours.

	Labor Income		Value Added		Output	
	Multiplier	Amount (USD)	Multiplier	Amount (USD)	Multiplier	Amount (USD)
Direct	0.492	\$314,996	0.581	\$372,153	1.000	\$640,717
Indirect	0.289	\$185,101	0.329	\$210,510	0.307	\$197,001
Induced	0.219	\$140,615	0.343	\$219,737	0.316	\$202,450

Perceived Value of Elkhorn Slough and Sea Otters

Respondents were asked two questions to evaluate the monetary value they place on preserving Elkhorn Slough, and sea otters in Elkhorn Slough. Respondents were asked both questions, with the order of the questions randomized. The initial value of the hypothetical fee was also randomized and ranged from 10-50 dollars. Based on response, the fee value increased or decreased. Language used for each question is seen in Table S4. Estimation of the willingness to pay values for otters and for Elkhorn Slough was done using the R package DCchoice (Aizaki et al. 2014). Contingent Valuation analyses are sensitive to error distribution, we tested three distributions (Table S6) and selected the best model fit using Akaike Information Criterion (AIC). Once error distribution was selected, models were examined with a combination of factors and evaluated with AIC. Examined models are summarized in Table S7.

Table S5. Respondents ranked 6 attributes on their importance on visitor experience to Elkhorn Slough. 1 was not important at all, and 10 was “best thing about the trip.” Values show the percent of respondents who ranked each attribute with a given score. Reported values are grouped for all respondents, regardless of location whether they had observed sea otters during their trip.

Score	Uniqueness	Otters	Birds	Fish	Other Wildlife	Convenience
1	0.3%	8.0%	0.8%	8.4%	0.5%	0.3%
2	0.3%	0.8%	2.1%	6.6%	0.0%	0.5%

3	0.5%	1.3%	1.8%	6.6%	0.3%	0.8%
4	0.5%	1.3%	4.0%	3.9%	1.1%	2.1%
5	3.2%	5.9%	7.7%	13.4%	3.2%	3.5%
6	3.4%	2.9%	6.9%	8.7%	6.1%	2.9%
7	8.4%	4.5%	14.5%	10.8%	7.5%	8.8%
8	18.7%	10.1%	16.4%	10.0%	17.6%	12.2%
9	12.1%	11.7%	13.5%	14.7%	18.7%	11.7%
10	52.6%	53.5%	32.5%	17.1%	45.1%	57.2%
Mean	7.9	7.4	7.0	5.5	7.7	7.8
N	380	376	379	371	375	376

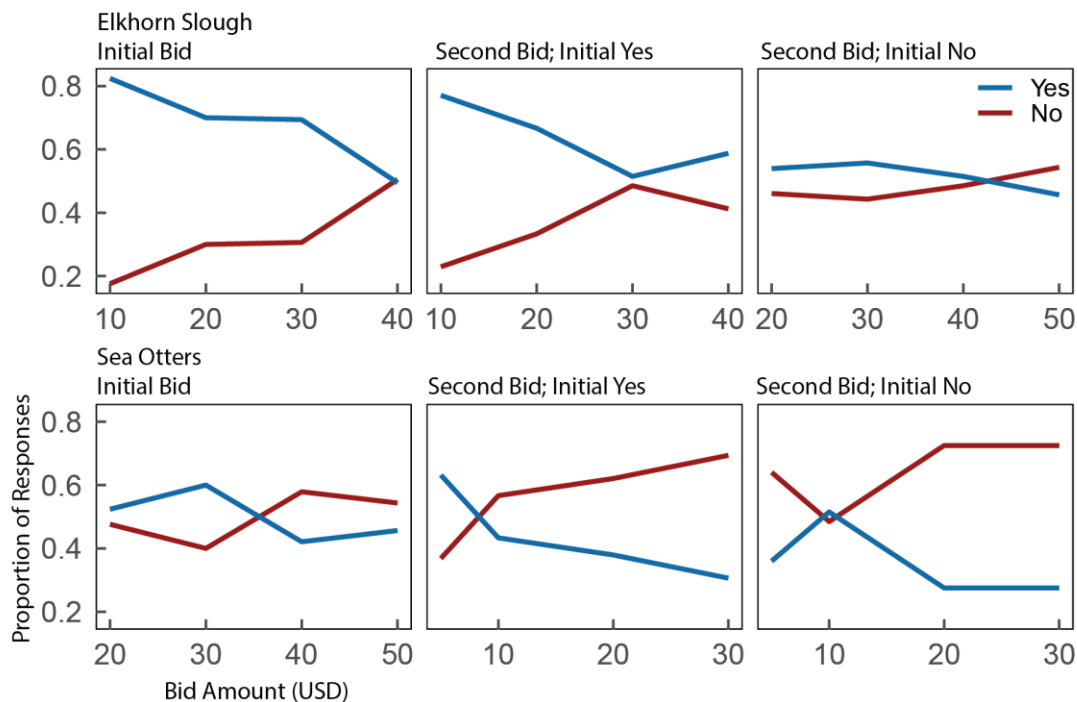


Figure S3. Trends to visitor survey responses to willingness to pay (WTP) questions. For each question topic (Elkhorn Slough (top) or Sea otters (bottom), respondents indicated their willingness to pay a given fee amount. Blue lines indicate positive responses to accepting a proposed fee amount, while red lines indicate negative responses.

Table S6. Coefficient estimates and model fit parameters using three error distributions in double-bound dichotomous choice regression models. Outputs only shown for responses to Elkhorn Slough question.

	Logistic	Log-Logistic	Log-Normal
Bid	-0.1027	-	-
Log(Bid)	-	-2.3423	-1.3416
Log(Income)	0.3577	0.4228	0.2239
Log (Age)	0.3095	0.3051	0.2108
Attribute			
Otter	0.2988	0.3386	0.2048
Convenience	-0.1925	-0.1928	-0.1077
Unique	0.1615	0.14344	0.0817

Number of Previous Visits	-0.00124	-0.001387	-0.0008
Visited MBA?			
No	-0.0012	-0.0607	-0.0673
Constant	-5.0772	-0.6184	-0.3823
LR Chi2	768.740	769.794	772.376
AIC	380.750	385.380	387.330
BIC	407.470	412.110	414.060

Table S7. Tested models for double bid dichotomous surveys and changes in AIC score.

Question	Fixed Effects	AIC	Δ AIC
Elkhorn Slough	Null	400.25	26.02
	Log(Income) + log(Age) + Otter + Unique + Convenience + No.Visits + MBA + BID	380.75	6.52
	Log(Income) + Otter + BID	374.23	0
	Log(Income) + Bid	392.94	18.71
Sea Otters	Null	427.10	19.11
	Log(Income) + log(Age) + Otter + Unique + Convenience + No.Visits + MBA + BID	411.53	3.54
	Log(Income) + Otter + BID	407.99	0
	Log(Income) + Bid	427.28	19.29

Supplemental Material 2- Survey Questions

Survey Questions

Surveyors opportunistically approached visitors to complete a survey about their experience in Elkhorn Slough. The survey could be completed in person, or via a link e-mailed to the respondent. Some questions were shown dependent on prior responses. Full questionnaire is provided below.

Start of Block: Interview Information

Q1.1 [INTERVIEWER ENTER] Location of Interview

- North Harbor Kayak Tour (1)
- North Harbor Motor Tour (2)
- North Harbor Individual Kayak/Boat (3)
- South Harbor Kayak Tour (4)
- South Harbor Motor Tour (5)
- South Harbor Individual Kayak/Boat (6)
- Wildlife Trail (7)
- National Research Reserve (8)
- Other (9)

Display This Question:

If [INTERVIEWER ENTER] Location of Interview != National Research Reserve

Q1.2

Hi, I'm [Surveyor's Name] and I'm with the Middlebury Institute of International Studies at Monterey, and we are asking people to help with some questions to learn about their experience in Elkhorn Slough. The interview will take about 5 minutes, you can choose not to answer any questions, and we are not asking for any personal identifying information.

The study is being conducted for the Monterey Bay Aquarium. If you have any questions or concerns you can contact the director of the study, Dr. Charles Colgan or or the Institutional Review Board at Middlebury College. I can give you their contact information if you would like.

Are you OK with answering some questions now?

Yes (1)

No (2)

Display This Question:

If [INTERVIEWER ENTER] Location of Interview = National Research Reserve

Q1.3

Hi, I'm [Surveyor's Name] and I'm with the Middlebury Institute of International Studies at Monterey, and we are asking people to help with some questions to learn about their experience in Elkhorn Slough. The interview will take about 5 minutes, you can choose not to answer any questions, and we are not asking for any personal identifying information.

The study is being conducted for the Monterey Bay Aquarium. Our project is not affiliated with the Elkhorn Slough Reserve or the California Department of Fish and Wildlife.

If you have any questions or concerns you can contact the director of the study, Dr. Charles Colgan or or the Institutional Review Board at Middlebury College. I can give you their contact information if you would like.

Are you OK with answering some questions now?

Yes (1)

No (2)

Q1.4 Can you confirm that you are over 18?

- Over 18 Continue (1)
- Under 18, thank and exit (2)

Skip To: End of Survey If Can you confirm that you are over 18? = Under 18, thank and exit

Display This Question:

*If HI, I'm _____ and I'm with the Middlebury Institute of International Studies at... = No
And HI, I'm _____ and I'm with the Middlebury Institute of International Studies at... =
No*

Q1.5 Would you be willing to give me an email address so you can complete the survey online?

- Enter email address (1) _____
- Exit survey (2)

*Skip To: End of Survey If Would you be willing to give me an email address so you can complete the survey online?
= Exit survey*

Display This Question:

*If Would you be willing to give me an email address so you can complete the survey online? = Enter email
address*

Q1.6 What date would be best to send you the email? [ENTER AS MM/DD]

Skip To: End of Survey If Condition: What date would be best to ... Is Displayed. Skip To: End of Survey.

Display This Question:

If [INTERVIEWER ENTER] Location of Interview = North Harbor Individual Kayak/Boat

Or [INTERVIEWER ENTER] Location of Interview = South Harbor Individual Kayak/Boat

Q1.7 Did you rent your kayak [SUP] or are you using your own?

Rent (1)

Own (2)

End of Block: Interview Information

Start of Block: About the party

Q2.1 Did you come to Elkhorn Slough today from your home?

Yes (1)

No (2)

Q2.2 Including yourself, how many people are here with you today?

- 1 (1)
 - 2 (2)
 - 3 (3)
 - 4 (4)
 - 5 (5)
 - 6 (6)
 - 7 (7)
 - 8 (8)
 - 9 (9)
 - 10 (10)
 - Other (11) _____
-

Q2.3 Is this a day trip or part of a multi-day trip?

- Day trip (1)
 - Multi day trip (2)
-

Display This Question:

If Is this a day trip or part of a multi-day trip? = Multi day trip

Q2.4 How many days will you be spending in the Monterey Bay area [CARMEL TO SANTA CRUZ]

- 1 (1)
 - 2 (2)
 - 3 (3)
 - 4 (4)
 - 5 (5)
 - 6 (6)
 - 7 (7)
 - 8 (8)
 - 9 (9)
 - 10 (10)
 - 11 (11)
 - 12 (12)
 - 13 (13)
 - 14 (14)
 - Other (15) _____
-

Q2.5 Have you been to Elkhorn Slough before today?

- Yes (1)
 - No (2)
-

Display This Question:

If Have you been to Elkhorn Slough before today? = Yes

Q2.6 Over the past 12 months, about how many times have been to Elkhorn Slough before this trip? [ENTER CHOICE CLOSEST TO ANSWER]

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)
- Other (11) _____

End of Block: About the party

Start of Block: Travel Expenses

Q3.1 How did you get to Elkhorn Slough today?

- Car [INCLUDES MOTORCYCLES, VANS, TRUCKS] (1)
 - Public Transportation (2)
 - Tour Company (3)
-

Display This Question:

If Did you come to Elkhorn Slough today from your home? = No

Q3.2 Where did you spend last night?

- Hotel/Motel/B&B (1)
- Airbnb/VRBO (2)
- With Friends or Relatives (3)
- Camping/RV Park (4)
- Other (6) _____

Display This Question:

If Did you come to Elkhorn Slough today from your home? = No

Q3.3 From which city did you start your trip to Elkhorn Slough today? [ENTER CHOICE CLOSEST TO ANSWER]

- Carmel (2)
- Monterey (3)
- Seaside/Sand City/Marina (4)
- Salinas (5)
- Capitola/Aptos (6)
- Santa Cruz (7)
- Watsonville (9)
- Other [ASK FOR CITY] (8) _____

Display This Question:

If Where did you spend last night? = Airbnb/VRBO Or Hotel/Motel/B&B Or Camping/RV Park

Q3.4 About how much will you spend last night for accommodation for your whole party? Your best estimate is fine. [ENTER CHOICE CLOSEST TO ANSWER]

- \$1-9 (1)
 - \$10-\$19 (2)
 - \$20-\$29 (3)
 - \$30-\$39 (4)
 - \$40-\$49 (5)
 - \$50-\$59 (6)
 - \$60-\$69 (7)
 - \$70-\$79 (8)
 - \$80-\$89 (9)
 - \$90-\$99 (10)
 - \$100-\$119 (11)
 - \$120-\$139 (12)
 - \$140-\$159 (13)
 - \$160-\$189 (14)
 - \$190-\$209 (15)
 - \$210-\$249 (16)
 - >\$250-299 (17)
 - \$300-\$349 (21)
 - >\$400 (22)
-

Display This Question:

If Is this a day trip or part of a multi-day trip? = Multi day trip

Q3.5 About how much will you spend for meals today for you and your party? Your best estimate is fine. [ENTER CHOICE CLOSEST TO ANSWER]

- \$1-9 (1)
- \$10-\$19 (2)
- \$20-\$29 (3)
- \$30-\$39 (4)
- \$40-\$49 (5)
- \$50-\$59 (6)
- \$60-\$69 (7)
- \$70-\$79 (8)
- \$80-\$89 (9)
- \$90-\$99 (10)
- \$100-\$119 (11)
- \$120-\$139 (12)
- \$140-\$159 (13)
- \$160-\$189 (14)
- \$190-\$209 (15)
- \$210-\$249 (16)
- >\$250 (17)
- Zero (21)

Display This Questio

If Is this a day trip or part of a multi-day trip? = Day trip

Q3.6 About how much will you spend for meals outside the home today for you and your party? Your best estimate is fine. [ENTER CHOICE CLOSEST TO ANSWER]

- \$1-9 (1)
- \$10-\$19 (2)
- \$20-\$29 (3)
- \$30-\$39 (4)
- \$40-\$49 (5)
- \$50-\$59 (6)
- \$60-\$69 (7)
- \$70-\$79 (8)
- \$80-\$89 (9)
- \$90-\$99 (10)
- \$100-\$119 (11)
- \$120-\$139 (12)
- \$140-\$159 (13)
- \$160-\$189 (14)
- \$190-\$209 (15)
- \$210-\$249 (16)
- >\$250 (17)
- Zero (21)

Display This Question:

If Is this a day trip or part of a multi-day trip? = Day trip

Q3.7 About how much will you spend in the Monterey Bay area today other than meals and transportation. Your best estimate is fine. [ENTER CHOICE CLOSEST TO ANSWER: TOUR FEES NOT INCLUDED]

- \$1-9 (1)
- \$10-\$19 (2)
- \$20-\$29 (3)
- \$30-\$39 (4)
- \$40-\$49 (5)
- \$50-\$59 (6)
- \$60-\$69 (7)
- \$70-\$79 (8)
- \$80-\$89 (9)
- \$90-\$99 (10)
- \$100-\$119 (11)
- \$120-\$139 (12)
- \$140-\$159 (13)
- \$160-\$189 (14)
- \$190-\$209 (15)
- \$210-\$249 (16)
- >\$250 (17)
- Zero (21)

End of Block: Travel Expenses

Start of Block: Experience

Q4.1 On a scale of 1-10 where 1 is not important at all and 10 is "this was the best thing about the trip", how would you rate each of the following parts of your experience at Elkhorn Slough today?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)
A unique place (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeing Sea Otters (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeing Birds (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeing other wildlife (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeing Fish (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A convenient place to visit a natural area (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4.2 On your visit today, did you see any sea otters?

- Yes (1)
 - No (2)
-

Display This Question:

If On your visit today, did you see any sea otters? = Yes

Q4.3 Did you see one sea otter, a few, or many?

- One (1)
 - A Few (2)
 - Many (3)
-

Q4.4 Have you been to the Monterey Bay Aquarium in Monterey?

- Yes (1)
 - No (2)
-

End of Block: Experience

Start of Block: Valuation Block \$10

Q5.1 Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by changes in water levels, erosion, the effects of development, and other factors. Keeping it a special place requires constant attention to the many parts of its natural systems. It may be necessary one day to impose a fee for visitors to the region to assure the slough and its wildlife are sustained into the future.

This fee would be charged at entrance points for walking access, as an additional fee for tours or rentals, or as a special license fee for watercraft.

Though no such fee is currently contemplated as part of the California Land Pass or any other program, we would like to ask a couple of questions to help understand how you value the experience here. The first is whether you would be willing to pay an access fee of \$10 for the general preservation of the slough and its wildlife.

- Yes (1)
- No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = Yes

Q5.2 Would you be willing to pay \$20?

- Yes (1)
- No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = No

Q5.3 Would you be willing to pay \$5?

- Yes (1)
- No (2)

Q5.4 Elkhorn Slough is one of only a few places where otters can easily be seen, but the current population of otters in the slough has only recently begun to grow after many decades of decline. Assuring continuation of habitat, clean water, and food supply for the otters is critical. Would you be pay an additional fee of \$10 specifically to assure that the sea otter population stays about the same into the future?

- Yes (1)
 - No (2)
-

Display This Question:

If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= Yes

Q5.5 Would you pay an additional fee of \$20?

Yes (1)

No (2)

Display This Question:

If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= No

Q5.6 Would you pay an additional fee of \$5?

Yes (1)

No (2)

End of Block: Valuation Block \$10

Start of Block: Valuation Block 2 \$20

Q6.1 Elkhorn Slough is one of only a few places where otters can easily be seen, but the current population of otters in the slough has only recently begun to grow after many decades of decline. Assuring continuation of habitat, clean water, and food supply for the otters is critical. Assuring continuation of habitat and food supply for the otters is critical. Maintaining the population may require additional funding in the future, which might come from a fee to visit the slough.

This fee would be charged at entrance points for walking access, as an additional fee for tours or rentals, or as a special license fee for watercraft.

Though no such fee is currently contemplated as part of the California Land Pass or any other program, we would like to ask a couple of questions to help understand how you

value the experience here. The first is whether you would be willing to pay an access fee of \$20 for the general preservation of the slough and its wildlife.

Yes (1)

No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= Yes*

Q6.2 Would you be willing to pay \$30?

Yes (1)

No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= No*

Q6.3 Would you be willing to pay \$10?

Yes (1)

No (2)

Start of Block: Valuation Block 2 \$20

Q6.4 Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by changes in water levels, erosion, the effects of development, and other factors. Keeping it a special place requires constant attention to the many parts of its natural systems. It may be necessary one day to impose a fee for visitors to the region to assure the slough and its wildlife are sustained into the future. This fee would be separate from any fee to support otters.

Again, no such fee is contemplated, but would you agree to pay a fee of \$20 to assure the health of the slough?

Yes (1)

No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = Yes

Q6.5 Would you pay an additional fee of \$30?

Yes (1)

No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = No

Q6.6 Would you pay an additional fee of \$10?

Yes (1)

No (2)

End of Block: Valuation Block 2 \$20

Start of Block: Valuation Block 3 \$30

Q7.1 Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by changes in water levels, erosion, the effects of development, and other factors. Keeping it a special place requires constant attention to the many parts of its natural systems. It may be necessary one day to impose a fee for visitors to the region to assure the slough and its wildlife are sustained into the future.

This fee would be charged at entrance points for walking access, as an additional fee for tours or rentals, or as a special license fee for watercraft.

Though no such fee is currently contemplated as part of the California Land Pass or any other program, we would like to ask a couple of questions to help understand how you value the experience here. The first is whether you would be willing to pay an access fee of \$30 for the general preservation of the slough and its wildlife.

- Yes (1)
- No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = Yes

Q7.2 Would you be willing to pay \$40?

- Yes (1)
- No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = No

Q7.3 Would you be willing to pay \$20?

- Yes (1)
- No (2)

Q7.4 Elkhorn Slough is one of only a few places where otters can easily be seen, but the current population of otters in the slough has only recently begun to grow after many decades of decline. Assuring continuation of habitat, clean water, and food supply for the otters is critical. Assuring continuation of habitat and food supply for the otters is

critical. Would you be pay an additional fee of \$30 specifically to assure that the sea otter population stays about the same into the future?

Yes (1)

No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= Yes*

Q7.5 Would you pay an additional fee of \$40?

Yes (1)

No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= No*

Q7.6 Would you pay an additional fee of \$20?

Yes (1)

No (2)

End of Block: Valuation Block 3 \$30

Start of Block: Valuation Block 4 \$40

Q8.1 Elkhorn Slough is one of only a few places where otters can easily be seen, but the current population of otters in the slough has only recently begun to grow after many decades of decline. Assuring continuation of habitat, clean water, and food supply for the otters is critical. Assuring continuation of habitat and food supply for the otters is critical. Maintaining the population may require additional funding in the future, which might come from a fee to visit the slough.

This fee would be charged at entrance points for walking access, as an additional fee for tours or rentals, or as a special license fee for watercraft.

Though no such fee is currently contemplated as part of the California Land Pass or any other program, we would like to ask a couple of questions to help understand how you value the experience here. The first is whether you would be willing to pay an access fee of \$40 for the general preservation of the slough and its wildlife.

- Yes (1)
- No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= Yes*

Q8.2 Would you be willing to pay \$50?

- Yes (1)
- No (2)

Display This Question:

*If Elkhorn Slough is one of only a few places where otters can easily be seen, but the current popul...
= No*

Q8.3 Would you be willing to pay \$30?

- Yes (1)
- No (2)

Q8.4 Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by changes in water levels, erosion, the effects of development, and other factors. Keeping it a special place requires constant attention to the many parts of its natural systems. It may be necessary one day to impose a fee for visitors to the region to assure the slough and its wildlife are sustained into the future. This fee would be separate from any fee to support otters.

Again, no such fee is contemplated, but would you agree to pay a fee of \$40 to assure the health of the slough?

Yes (1)

No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = Yes

Q8.5 Would you pay an additional fee of \$50?

Yes (1)

No (2)

Display This Question:

If Elkhorn Slough is a special place, but the slough and its wildlife are constantly challenged by c... = No

Q8.6 Would you pay an additional fee of \$30?

Yes (1)

No (2)

End of Block: Valuation Block 4 \$40

Start of Block: Demographics

Q9.1 Gender

Male (1)

Female (2)

Q9.2 Finally, a few questions about yourself. In what year were you born?

Q9.3 What is your home zip code?

Q9.4 Do you consider yourself Hispanic or Latino/Latina? [IF THEY ANSWER YES, RECORD BOTH]

Hispanic (1)

Latino (2)

Neither (3)

Q9.5 What ethnicity do you consider yourself to be?

- White (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Pacific Islander (5)
- Other (6)

Q9.6 [SHOW CARD] Approximately what was your household income last year?

- Less than \$10,000 (1)
- \$10,000 - \$19,999 (2)
- \$20,000 - \$29,999 (3)
- \$30,000 - \$39,999 (4)
- \$40,000 - \$49,999 (5)
- \$50,000 - \$59,999 (6)
- \$60,000 - \$69,999 (7)
- \$70,000 - \$79,999 (8)
- \$80,000 - \$89,999 (9)
- \$90,000 - \$99,999 (10)
- \$100,000 - \$149,999 (11)
- More than \$150,000 (12)

End of Block: Demographics
