Ocean & Coastal Management 59 (2012) 13–19

Contents lists available at SciVerse ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Amounts and distribution of recreational beach expenditures in southern California

Ryan H. Dwight [a,*], Sandra N. Catlin [b], Linda M. Fernandez [c]

[a] Coastal Water Research Group, Huntington Beach, CA 92646, USA
[b] Department of Mathematical Sciences, University of Nevada, Las Vegas, NV 89154, USA
[c] Center for Unconventional Security Affairs, University of California, Irvine, CA 92521, USA

ARTICLE INFO

Article history:
Available online 4 January 2012

ABSTRACT

Visitors (n = 2455) were surveyed at fourteen southern California beaches in the summer of 2009 to measure travel expenditures associated with a recreational beach trip. The majority of beach trips were made by California residents (88%), and most traveled by motorized vehicle (90%). Mean distance traveled per beach trip was 35.0 miles; mean time at the beach was 4.0 h; and mean age of adult visitors was 34.8 years. Amounts spent on different cost categories varied; Mean direct beach expenditures spent on parking, food, shopping, lodging and rentals were $46.09 per trip; mean fuel costs were $8.84 per trip; and mean equipment costs (beach gear) were $10.60 per trip. The combined Total Beach Expenditures (TBE) were $65.53 per trip. Beaches with amenities captured greater expenditures ($73.37 per trip) compared to beaches with less facilities ($11.78 per trip). Southern California beaches generate over $3.5 billion annually in beach related expenditures, and $2.5 billion of that is spent directly at beaches. Attendance patterns determine expenditure amounts resulting in more than half of direct beach expenditures occurring at only 20% of the regions most popular beach locations. The beach specific data and results on spending patterns can be helpful for a range of agencies and beach managers when researching the most economically effective maintenance or enhancement options for different sites. The values generated also provide baseline economic activity by beach which may be useful for compensation calculations in the event of a future loss or closure of a particular beach.

1. Introduction

Southern California's world famous beaches are productive assets in terms of the direct generation of economic resources for local, state and the national economies. Southern California's 350 km of coastline has over 75 recreational beaches all with free public access. These beaches experience over 129 million visits annually (Dwight et al., 2007) accounting for almost 60% of all beach visits in the United States. California's $42.9 billion annual ocean economy is the largest in the country, and southern California commands the largest portion of that economy (Kildow and Colgen, 2005). Tourism and recreation accounts for 59% of California's ocean economy and supports 72% of ocean-related employment in the state (Kildow and Colgen, 2005). Ocean-related employment supports an estimated 700,000 jobs, and generates $1.15 trillion of economic activity annually accounting for 86% of the state's total economic activity (Kildow and Colgen, 2005); California has the fifth largest economy in the world.

Numerous different user groups visit the beaches of southern California. Some people go to the beach for recreational activities (swimming, surfing, riding a bike, etc.), and other people go to the beach to quietly relax. Tourists come from around the world to experience the southern California beach scene. The common thread among the varied user groups is they are consumers contributing to economic exchange within the beach economy.

The most common approaches for valuation of beach recreation are travel cost and contingent valuation methods (Deacon and Kolstad, 2004). Contingent valuation studies are based on hypothetical questions regarding environmental changes to elicit consumers' willingness to pay for incremental changes in environmental quality. Travel cost studies involve observed behavior data where consumers (of beach recreation) have expenditures based on how much they spent to engage in the beach recreation activity. Random utility models have also been used in California beach valuation studies to account for beach substitutes. Random utility models are used to explore the more refined marginal value of choice between individual beach locations. The models are

* Corresponding author. Tel.: +1 949 500 5276.
E-mail addresses: admin@coastalwaterresearch.com (R.H. Dwight), catlins@unlv.nevada.edu (S.N. Catlin), lfernan1@uci.edu (L.M. Fernandez).

0964-5691/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ocecoaman.2011.12.010

designed to emphasize choice among sites, usually sampling people before they go to the location and they may not explain total demand for recreation such as for a particular season (Freeman, 1993).

Previous valuation studies of southern California beach recreation have generated a range of values dependent on the method of study employed and the variables included in the analysis. Most studies have been site specific and or used a small study population. Results for the following studies have been adjusted to 2010 dollar values. A Los Angeles centered travel cost investigation at three beaches (Santa Monica, Leo Carillo and Cabrillo) produced a range of values ($12.66–$227.20) per person per day with the opportunity cost of time as the basis of the range and not a point estimate (Leeworthy and Wiley, 1993). The wage rate has been used as an indicator of time value and would vary over a variety of consumers. Small (1992) summarized studies that reported estimates of the average value of travel time relative to the average wage rate. In a small sample travel cost study at Huntington Beach visitors reported average daily expenditures per person per beach trip were $20.27 (King, 1999). Another report using a random utility model estimated per person trip expenditures on beach related services and items averaged $29.31 per southern California beach visit (Hanemann et al., 2002).

Our investigation was designed to answer a different set of questions than those being studied in contingent valuation, travel costs and random utility model studies. The objective of this study was to measure and quantify actual expenditure amounts in regards to beach recreation, and to determine the allocation of money among the different cost categories of parking, food, shopping, lodging and rentals. It is important to investigate the economic impact of different cost categories, and to see how they differ among different beach types as the information can be helpful for decision makers working on beach related policies or projects. Coastal beach management is ideal when empirical measures of economic impact, such as the ones generated in this study, help in guiding beach maintenance and enhancement options. Results may also help beach managers improve decision making and prioritization by focusing limited resources to areas that will generate the most economic activity for each investment dollar made. Since our study includes state and non-state beaches with different characteristics and amenities, the measure of economic impact of various beaches can help balance priorities amidst the dynamic trends in public resources of coastal management. The results also provide baseline economic activity for different beach types that may be of use for future economic studies, or may provide data for the calculation of compensation amounts in the event of a future beach closure or loss.

This study generated direct expenditure amounts for several cost categories by investigating a large representative sample of consumers across a multitude of site locations with variable amenities. This study was conducted on location with visitors; many while they were engaging in spending activity. Results provide measures of each cost category by site for comparison, and results were used to calculate site and regional annual values of direct and total beach expenditures.

2. Materials and methods

Fourteen southern California beaches were sampled; nine in Los Angeles County (Zuma, Will Rogers, Santa Monica, Venice, Manhattan, Hermosa, Redondo, Mothers and Long Beach), and five in Orange County (Huntington, Huntington State Beach, Newport, Crystal Cove, and Laguna Beach). These study beaches attract 50% of annual beach visitations in southern California (Dwight et al., 2007), thus providing a representative sampling of the total beach going population. Beach size, accessibility and amenities varied between study locations; some beaches are highly developed with boardwalks, restaurants, and shops, while other beaches are secluded and lack amenities.

Potential subjects were recruited on the beach with no selection criteria other than age; participants had to be at least 18 years old. Interviews were conducted in Spanish when subjects requested the option. Nine interviewers were used to conduct walk up surveys at beach study sites, surveys were collected June 22–July 31, 2009. More than half (53%) of all annual beach visits occur during the summer months (Dwight et al., 2007), again providing a good representation of the total beach going population. Interviews were conducted on all days of the week, and the study period had typical summer weather resulting in no adverse effect on sampling.

The one page survey consisted of thirteen questions related to the subject's beach visit plus five standard demographic questions. The survey began with an open ended question as to why the visitor had come to the beach; responses were coded for analysis. Visitors were asked the amount of time they were spending at the beach, and the distance traveled and their mode of transportation. They were asked how many people they were with, and their relation to them. Visitors were then asked if they had spent money on: parking; food at the beach; shopping in a local store; beach rentals; or rental lodging. Visitors were also asked how much they spent on their personal beach gear such as bathing suit, towel and sun block. Visitors were asked how many times a year they visit the beach, and finally they were asked the demographic questions of city and state of residence, age, sex, ethnicity and annual income. No personal identification information was collected.

Data were analyzed in aggregate and stratified by individual study sites. Descriptive statistics were generated and dollar amounts were calculated for several different categories of beach related expenditures. Direct Beach Expenditures (DBE) is the combined expenditure amounts that occurred at or near the beach for the services parking, food, shopping, rentals and lodging. Offsite beach expenditures includes amounts spent on fuel and beach specific equipment. Results were calculated at the level of per person per trip (trip). Regional amounts of DBE and Total Beach Expenditures (TBE) were calculated using published data on annual beach attendance. All statistical analyses were conducted using R statistical software.

3. Results

3.1. Descriptive statistics

Interviews were conducted over twenty four sampling days at beaches in Orange County (64%), and Los Angeles County (36%). Participation rates were high with 73% of potential subjects completing the survey ($n = 2455$). Visitors reported being residents from 24 different countries and 39 U.S. States. Visitors came from 390 different cities, with 247 of the cities within California. Visitors reported going to the beach for a range of reasons, and some reported more than one answer, thus percentage totals presented in Table 1 are greater than one hundred. Almost half of the visitors (47%) reported going to the beach for "the scenery" which included the natural beauty as well as the people watching opportunity. The sun attracted 21% of visitors, and swimming in the ocean drew another 21%. Very few beach visitors were alone (6%), while half (50%) reported they were with family members; 30% were with friends, and 14% were with family and friends. The typical grouping was relatively large (mean 5.1; median 4.0), and most visitors reported making multiple beach trips annually (mean 28.1; median 10.0). The breakdown for the number of annual beach visits is presented in Table 1. Visitors reported staying at the beach for

Table 1
Demographics and responses of Southern California beach visitors.

Age (years)	Mean	34.8	
	Median	33.0	
	Min–Max	18–89	
Sex	Female	59%	
	Male	41%	
Ethnicity	Caucasian	51%	
	Hispanic	29%	
	Mixed – other	10%	
	Asian	6%	
	African American	3%	
	Middle Eastern	1%	
Annual income	(Amounts in $1000)	___Cumulative %	
	$0–$12	26%	26%
	$13–$24	7%	33%
	$25–$50	21%	54%
	$51–$75	17%	71%
	$76–$100	12%	83%
	>$100	17%	100%
Annual beach visits	Once a year	13%	
	Up to 5 per year	30%	
	Up to 10 per year	16%	
	Up to 15 per year	7%	
	Up to 20 per year	7%	
	Over 20 per year	27%	
Beach expenditures per visit	$0	20%	
	Up to $10	35%	
	Up to $20	10%	
	Up to $30	6%	
	Up to $40	5%	
	Up to $50	4%	
	Over $50	20%	
Reason for beach visit	For the scenery	47%	
	To sit in the sun	21%	
	To swim in the ocean	21%	
	To relax	7%	
	To play sport or walk	6%	
	On vacation	5%	
	Kid friendly	5%	
	To surf	4%	

significant time periods with a mean and median of 240 min (4.0 h). The majority of beach visitors were from California (88%), only 12% were tourists (8% visiting from out of state and 4% from a foreign country).

3.2. Demographics

Demographics results for the study group are presented in Table 1. Analysis by individual beach showed demographic measures varied by beach type. Quiet, secluded beaches tended to have older, wealthier visitors. For example, the mean age for Crystal Cove visitors was 42.3 years, and 32% reported annual incomes over $100,000. More popular beaches tended to have younger visitors with lower annual incomes. For example, the median age of visitors at Zuma was 29.8 years, and only 5% reported annual incomes above $100 thousand. For comparative purposes the mean age of all beach visitors was 34.8 years and 17% reported annual incomes over $100 thousand. When analyzing age data it is important to note all beach visitors under eighteen were excluded resulting in a higher level of the calculated mean age.

3.3. Direct beach expenditures (DBE)

DBE is the combination of expenditures made in the categories of parking, food, shopping, rentals and lodging. These categories have been analyzed separately by beach because they represent expenditures spent on location. The 2455 participants in this study reported spending a total of $113,148.00 in DBE for services, a mean of $46.09 per trip (Table 2). Parking fees were paid by 61% of visitors, almost a third purchased food, a fifth shopped in local stores, 12% stayed in rented lodging, and only 3% paid for beach rentals. A full 20% of visitors engaged in no direct spending activity at the beach during their visit (Table 1).

The DBE ($46.09) is comprised of amounts spent in the different service categories (Table 2). Although only 12% of subjects rented lodging, those expenditures accounted for the greatest portion of DBE (42%). The reason being that a single day rate for a beach house or hotel room is much greater compared to the amounts spent on concessions and parking meters. Shopping in the local stores contributed 23% to the DBE, and food purchases accounted for 21%. Although the majority of people paid for parking (61%), the cumulative contribution of the small amounts accounted for only 11% of DBE. Beach rentals are relatively inexpensive and few visitors engaged in the activity, thus rental expenditures were a minor (3%) contributor to DBE.

3.4. Direct beach expenditures by site

DBE was analyzed by study site to explore for beach specific variations in DBE and the cost categories of parking, food, shopping, rentals and lodging. DBE was differential across study sites; some beaches were better than others at engaging visitors in the beach economy (Fig. 1). The highest average expenditures per trip were generated at Newport, Santa Monica and Laguna Beaches. Beaches with the lowest mean DBE per trip were Zuma, Will Rogers and Mothers Beaches. The overall mean DBE of $46.09 can be used as a reference to compare how far above or below the mean these beaches are (Fig. 1).

Study sites differed in which expenditure category contributed the most to DBE amounts (Fig. 2). Rental lodging was the largest contributor to the regional DBE; therefore beaches with higher levels of participation in lodging had higher mean beach expenditures per trip. For example, Crystal Cove had a high percentage of visitors who rented lodging which propelled the mean DBE of that beach to far exceed most other beaches (Fig. 1). Participation rates for parking fees ranged between beaches with some capturing 60% or more of visitors, while others such as Huntington City Beach, had only 22% of visitors pay for parking (Fig. 2). Food expenditures also ranged between beach locations (Fig. 2). Newport had the highest participation rates with 45% of visitors' spending money on food, followed by Santa Monica with 37%. Several beaches had lower participation rates for food expenditures such as Huntington (7%), Zuma (12%), and Will Rogers (17%) beaches. Shopping expenditures

Table 2
Expenditures for recreational beach day in Southern California.

Direct beach expenditures (DBE)			
	% of visitors	Mean expenditures	% of DBE
Lodging	12%	$19.36	42%
Shopping	21%	$10.60	23%
Food	31%	$9.68	21%
Parking	61%	$5.07	11%
Rentals	3%	$1.38	3%
		DBE = $46.09 per trip	

Total Beach Expenditures (TBE)		
	Mean	% of TTC
Direct beach expenditures	$46.09	70%
Equipment costs	$10.60	16%
Fuel costs	$8.84	14%
	TE = $65.53 per trip	

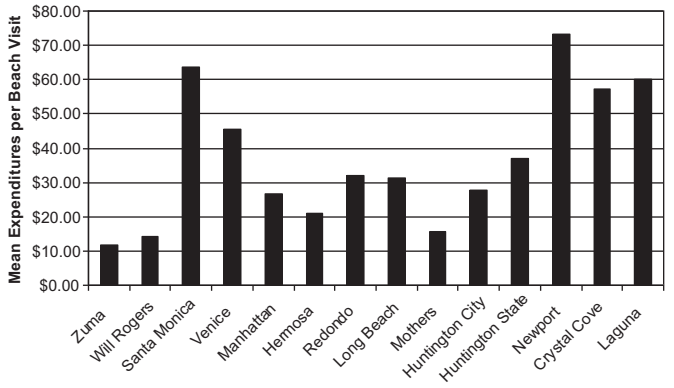

Fig. 1. Direct beach expenditures spent on parking, food, shopping, rentals and lodging by beach Beaches listed north to south.

in the local stores were also distributed differently across beach study sites (Fig. 2). Santa Monica had the most visitors' spending money in a local store (34%). Beaches with little to no shopping available had very low rates such as Zuma with only 4%, and not one visitor to Will Rogers reported shopping. Beach rentals were low to non-existent across all study sites with the exception of Venice, where 15% of visitors paid to use a bike, surfboard, chair or other beach item (Fig. 2). Beaches with the next highest rental rates were Huntington State and Laguna, each with only 5%. Beach rental opportunities are not promoted at Zuma, Will Rodgers, Hermosa, Long Beach, and Mothers, all with 0% of visitors' spending money on beach rentals.

Newport had the highest DBE per trip of $73.35, and Zuma had the lowest with $11.78 (Fig. 1). These two beaches share many similar characteristics as both have large stretches of white sand; both are accessible by primary roadways and have available parking and bathrooms; and both have exceptionally high annual attendance rates of visitors with similar demographics. The stratified

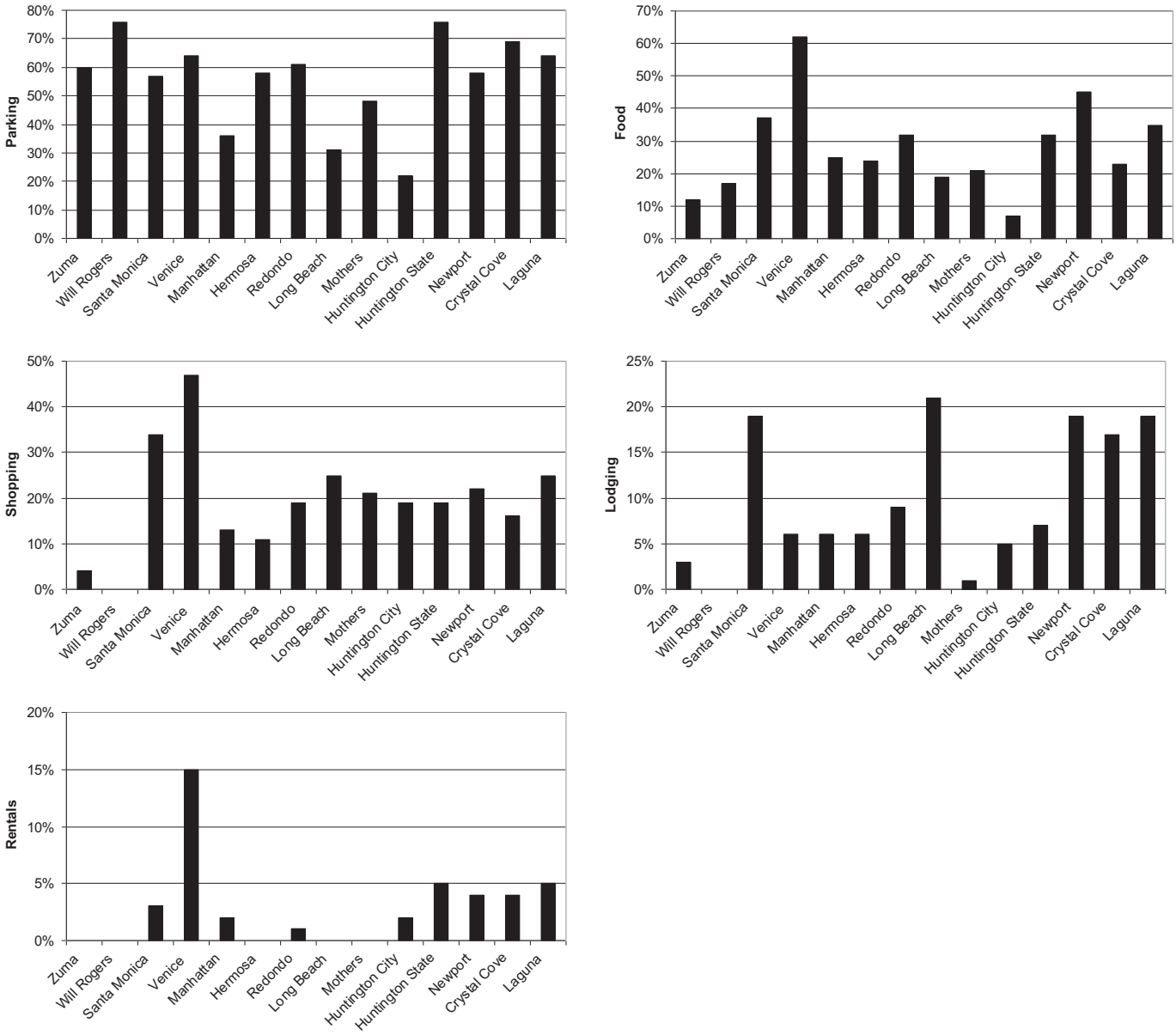

Fig. 2. Direct Beach Expenditures by beach stratified by parking, food, shopping, rentals and lodging Beaches listed north to south.

comparison of the two sites shows both beaches had similar parking rates, equalizing the influence of the parking category (Fig. 2). However, Newport had much higher visitor participation in the other four cost categories of food, shopping, lodging and rentals. Newport generated significantly higher DBE per trip because all five cost categories contributed while the DBE for Zuma consisted primarily of parking fees.

3.5. Off-site beach expenditures

Beach expenditures related to fuel and equipment costs which may not have occurred directly at the beach were calculated across all study sites to generate a mean value per trip. Fuel costs were calculated using the mean distance traveled multiplied by two for the round trip. The result was divided by the mean mileage per gallon, and that result was multiplied by the mean cost of a gallon of fuel at the time of the study. That result was then multiplied by the reported percentage of visitors who drove a vehicle to the beach. Almost all of the beach visitors (90%) traveled to the beach by motorized vehicle: 85% traveled by car; 3% by bus; 2% by motorcycle or large camper, and only 10% of beach visitors arrived by bike or foot. Visitors traveled fairly long distances (mean 35.0 miles) for their beach trip. The mean fuel economy of 2009 light duty vehicles (including sport utility vehicles and pickup trucks) was 21.1 miles per gallon (EPA, 2009). The mean price for a gallon of gasoline in California during the time of the study was $2.96, (US EII, 2010). Fuel Costs = [(35 miles × 2)/(21.1 mpg) × ($2.96)] × 90% = $8.84 in fuel costs per trip.

Equipment costs were calculated by dividing the reported mean money spent on beach gear by the reported median number of annual beach trips. Visitors reported their estimated expenditures on personal beach specific gear for such consumer goods as bathing suit, hat, sunglasses, towel, and sun block (mean $106.06). Items that were not beach specific and could be used for other purposes (e.g.: barbeques and coolers) were not included in the calculation of equipment costs. We assume visitors make only one capital investment in beach equipment a year. Visitors reported an average of 28.1 beach trips a year, the median was 10.0 trips. A small percentage of visitors reported going to the beach every day, and these outlier reports of over three hundred trips a year skewed the calculated average; therefore we used the median value for this variable. Equipment Costs = ($106.06)/(10 trips) = $10.60 in equipment costs per trip.

3.6. Total Beach Expenditures

Total Beach Expenditures are the combination of direct and off-site beach expenditures which includes money spent on parking, food, shopping; rentals, lodging, fuel and beach equipment. Total Beach Expenditures = DBE ($46.09) + fuel ($8.84) + equipment ($10.60) = $65.53 per trip (Table 2).

3.7. Regional amounts of direct and total beach expenditures

Regional amounts of direct beach expenditures were calculated by multiplying the DBE by published data of beach attendance. Daily beach attendance data collected by lifeguards estimates the 75 beaches of southern California host 129,549,073 visits annually (Dwight et al., 2007). For this regional calculation, DBE values collected in Los Angeles and Orange counties were extrapolated to the comparable beach using population of San Diego because the counties are very similar in climate, culture and beach characteristics.

Only a portion of beach trips are made by adults that engage in the beach economy, many visitors are children. For this study we assumed 42% of all beach visits are by people 18 years of age or older. This proportion is based on demographic results of an epidemiology study at Santa Monica Beach conducted on visitors of all ages (Haile et al., 1996) which reported 48% of beach goers were children 0–12 years of age. We assumed another 10% to account for teenagers below legal age to work full time employment (13–17 year olds). This is more likely an underestimation of potential visitors engaging in beach expenditures because children and teenagers are powerful economic demographics that are not included in these calculations. Regional DBE = (129,549,073 trips × 42% adults) × DBE ($46.09) = $2.5 billion spent annually directly at beaches on parking, food, shopping, lodging and rentals.

The distribution pattern of attendance at beaches directly influences the beach expenditure estimates disaggregated from the regional scale (Fig. 3). One third of the $2.5 billion in annual beach expenditures occur at only 6 of the regions 75 beaches (Huntington, Newport, Zuma, Santa Monica, Venice and Mission) because they each receive 5 million visitors or more annually. More than half of the regional beach expenditures occur at the 15 beaches with the highest attendance levels.

Newport and Zuma would be expected to generate a significant portion of the annual expenditures at southern California beaches due to their exceptionally high attendance rates, both with over 7 million trips annually. Applying the mean DBE amount ($46.09) to Newport and Zuma, they would be expected to generate $148 million and $136 million in annual expenditures respectively. However, the amounts of annual expenditures changes significantly when the site specific DBE values are applied to these sites. Newport generates an estimated $235 million in DBE, while Zuma generates only $35 million per year. The result is greater than a six fold difference in expenditures between two comparable beaches.

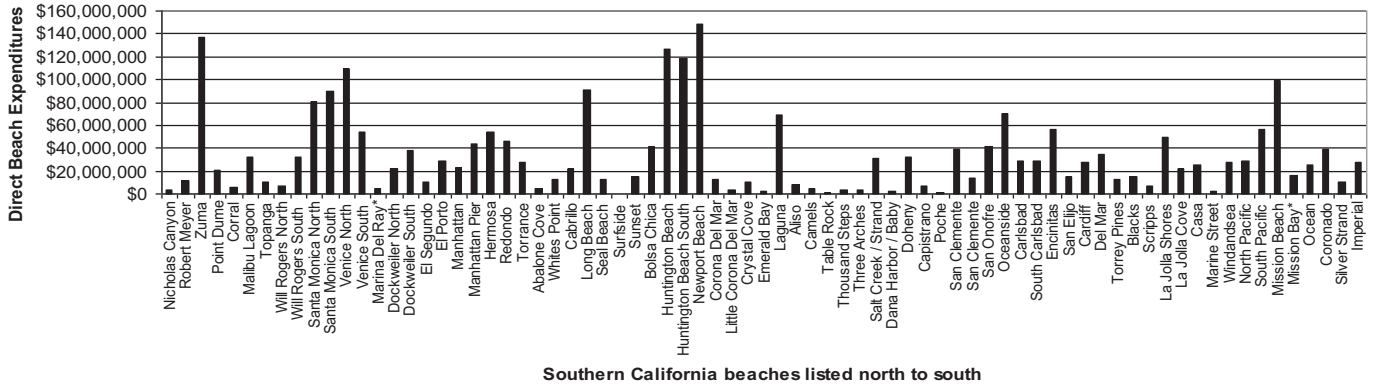

Fig. 3. Southern California beaches: Annual amounts of Direct Beach Expenditures (DBE) spent on parking, food, shopping, rentals and lodging.

Regional estimates of Total Beach Expenditures associated with recreational beach trips were calculated by: [(129,549,073 trips) × (42% adults)] × [TBE ($65.53)] = $3.5 billion spent annually on trips to southern California beaches.

Beach attendance in southern California is seasonally dependant with the peak period occurring in the summer, and the low period during the winter. With attendance driving expenditures, more than half of all beach expenditures occur during the three summer months.

3.8. Opportunity cost of time

For interest, the opportunity cost of time was also calculated by dividing the reported mean annual income by the number of work minutes per year. The result was multiplied by the time spent to engage in the recreational beach trip. Visitors reported the mean and median time spent at the beach was 240 min, or 4.0 h. The time spent driving the average 70 mile round trip is estimated to be 70 min. This estimation is more likely conservative because it assumes no traffic, all freeway driving, and excludes time spent looking for parking at the beach. Combined, subjects spent on average 310 min (over 5 h) of their personal time to engage in a beach trip. Beach visitors reported a mean annual income of $37,500 (Table 1). Annual income data was converted to income earned per minute. Full time employment in the United States typically requires 260 work days per year accounting for holidays and weekends (5 days a week × 52 weeks a year), and 8.0 h (480 min) of work be conducted each work day, equaling 124,800 work minutes per year. Individuals value their leisure time at between 20 and 50% of the wage rate (Hensher, 1978). So, productive working hours are sometimes multiplied by one third to calculate the value of leisure time. Opportunity Cost of Time = [($37,500)/(124,800 work minutes)] × [310 personal minutes] × 0.33 = $31.05 in opportunity cost for time spent per trip.

4. Discussion

This investigation generated detailed valuations of the expenditures made while recreating at several public beaches in southern California. Results may be useful for beach managers, government agencies, communities and researchers by providing site specific monetary values of expenditures made on different cost categories related to a recreational beach visit. Results provide comprehensive measures of the financial expenditures generated by consumers of beach recreation at different beaches. The results also provide baseline data on the economic activity of the different beach types which may be useful in future economic studies, or in the calculation of compensation in the event of a beach closure.

California's $42 billion annual ocean economy is driven by recreation and tourism (Kildow and Colgen, 2005). Results from this study estimate $3.5 billion is spent annually in southern California in total beach expenditures, and $2.5 billion of that is spent directly at beaches on parking, food, shopping, rentals and lodging. This value is most likely conservative due to the 42% adjustment made for those less than 18 years of age assuming they were not contributing to the beach economy.

4.1. Potential application of results

Direct beach expenditures were not equally allocated across beaches; some sites generated significantly more money per trip compared to other beaches (Fig. 1). Of the five DBE categories, rental lodging accounted for the greatest portion of expenditures even though only a small percentage of people participated. Most beach visitors spent very little money per trip, and a small percentage of people spent large sums of money (the tourists). The uncommon high spending beach users would be the most productive visitors for beach communities to attract if interested in increasing consumer spending in beach recreation. For example, Crystal Cove State Beach has on-site cottage rentals which greatly increased the overall DBE making it well exceed the per visit expenditures experienced at most other beaches (Fig. 1).

Another potential application of these results relates to the attractive option for beach managers to increase parking fees to raise revenues. However, results from this study suggest parking fees may not be a productive method to increase spending for State and County beaches. Current parking fees at State and County beaches are already high compared to city beaches investigated in this study. Parking fees account for a small percentage of direct beach expenditures (Table 2), and increasing the cost of this minor contributor could potentially influence visitors to choose alternate nearby beaches which would negatively impact overall beach expenditures. State and County beach managers may want to consider investing in the other categories of food, shopping, lodging and or beach rentals. Beach rentals contribute a small fraction to beach expenditures, yet this category can be better promoted to increase expenditures and provide wider opportunities for recreational beach users.

The results of this study are also informative for city beach managers as well. For example, a comparison between the contiguous Huntington City and State Beaches offers insight into potential opportunities to increase economic exchange in the beach economy. The City beach has over 6.5 million visitors annually, but only 22% of them paid for parking and the cost was relatively low (mean of $3.27). At the State beach, a comparable 6.1 million people visited annually, yet 76% of visitors paid for parking, and at a higher cost (mean of $6.71). If the City beach were to increase their visitor participation for parking (by adding parking meters, pay lots, etc.) to align with the regional average of 61%, and the city were to increase parking fees to equal the regional mean of $5.07 (both levels are still below those at Huntington State Beach), the City beach could potentially increase the annual parking revenues from $1.9 million to over $8.4 million. Study results suggest Manhattan and Long Beach could also benefit from increasing visitor participation in parking fees.

Another potential application of these study results relates to Zuma State beach which experiences over seven million visitors annually. The very low DBE per visit of $11.78 for Zuma results in a low annual amounts of only $35 million in beach expenditures. The exceptionally high attendance rates at this beach provide great potential to increase annual expenditure amounts because any increase in per trip expenditures multiplies into large expenditure totals. In detail, Zuma had high participation rates for parking (Fig. 2), and the parking fees were relatively high allowing little room to increase capitalization. However, Zuma had low visitor participation for the services; food, shopping, rental and lodging. For every $5.00 dollar increase in expenditures per trip there would be an expected increase in direct beach expenditures of over $15 million annually. If the regional average DBE value of $46.09 per trip were an objective for Zuma beach managers, the result would be over $136 million in annual beach expenditures.

4.2. Discussion points

Results presented here do not suggest all beaches should be developed to maximize profits, as beaches should not be viewed as economic opportunities to be exploited. Rather, these results offer a proportional breakdown of expenditures made at beaches thus providing valuable information for beach communities and decision makers to aid in prioritizing their site specific beach management decisions. The economic impact of beaches that we have measured in this analysis can help justify and encourage

protection and prevent degradation of beach resources through coastal beach management. By having estimates of beach recreation expenditures by users surveyed in our study it is possible to quantify the costs of inaction or direct loss of economic impact of beaches if they are not maintained through adaptive coastal management. California's beaches are public treasures entrusted to governments for safe keeping and prudent stewardship. A large part of what makes some beaches special is that they are not developed as city beaches with piers, boardwalks and other attractions. A quiet escape can provide a great service while generating little to no market expenditures. A day at the beach with family and friends has value that goes beyond the expenditures incurred for parking, gas and food. Measuring the value of the non-market experience (the personal value) is difficult and is best captured using contingent valuation techniques. However, demand analysis for beaches with direct expenditures from surveyed beach goers provides a lower bound measure of the personal value for a particular activity or location because actual expenditures are a fair measure of the minimal monetary value a person holds for that recreational opportunity.

California's beaches are managed by a disparate patchwork of government entities where borders and responsibilities often times overlap other important jurisdictional boundaries for cities, lifeguards, fire and police. For example within the sphere of Newport Beach alone there are several city and municipal beaches, two county beaches and two state beaches. Zuma is owned and operated by the county, Will Rogers is owned by the state and operated by the county, Venice is owned by the city and operated by the county, and Laguna is owned and operated by the city. Yet, they are all owned by the citizens of the state of California.

Recreational beach expenditures are distributed to a variety of entities in the economy. For example, the average beach visitor spends $46.09 per trip on parking, food, shopping, rentals and lodging, and $8.84 on gas and $10.60 on beach equipment. These funds are transferred from the beach user to different business owners, who in turn distribute the monies to vendors, employees, and to local, state and federal taxes. Southern California's beaches promote economic exchange thus generating jobs and revenues; all while providing valuable recreational opportunities for the public. Southern California's beaches are a source of pride and identity for communities, and they are a powerful economic engine for one of the largest economies in the world.

5. Conclusions

Southern California's world renowned beaches are a productive economic contributor to the region. Annually they stimulate an estimated $2.5 billion in direct beach expenditures, and $3.5 billion in total beach expenditures. A single recreational beach trip generates an average of $46.09 in Direct Beach Expenditures, and $65.53 in Total Beach Expenditures. There is large variability between beaches in expenditures over different cost categories (parking, food, shopping, rentals and lodging). Attendance patterns determined that one third of overall expenditures occur at only six of seventy five beaches in the region. The results may be helpful for a range of researchers, public agencies and beach managers who may need data on beach specific spending patterns.

Acknowledgments

We are grateful to the interviewers and subjects for their participation in this study. This study was funded by the Department of Environmental Sciences through RSAP funds, University of California Riverside, and by the Coastal Water Research Group.

References

Deacon, R., Kolstad, C., 2004. Valuing beach recreation cost in environmental accidents. Journal of Water Resources Planning and Management 126 (6), 374–381.

Dwight, R.H., Brinks, M.V., Sharavanakumar, G., Semenza, J.C., 2007. Beach attendance and bathing rates for Southern California beaches. Ocean and Coastal Management 50, 847–858.

Freeman, A., 1993. The Measurement of Environmental and Resource Values: Theory and Methods, Resources for the Future (Washington D.C).

Haile, R.W., et al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay Report for Santa Monica Bay Restoration Project.

Hanemann, M., Pendleton, L., Hilger, J., Layton, D., 2002. Expenditure Report for the Southern California Beach Valuation Project. Prepared for the National Ocean and Atmospheric Administration, Minerals Management Service. (Department of the Interior), The California State Water Resources Control Board, and the California Department of Fish and Game.

Hensher, D., 1978. Valuations of journey attributes: some existing empirical evidence. In: Hensher, D., Dalvi, M. (Eds.), Determinants of Travel Choice. Saxon House, Farnborough.

Kildow, J., Colgen, C.S., 2005. California's Ocean Economy The National Ocean Economics Program.

King, P., 1999. The fiscal impact of beaches in California. In: A Report Commissioned by California Department of Boating and Waterways. San Francisco State University: Public Research Institute.

Leeworthy, V.R., Wiley, P.C., 1993. Recreational Use Value for Three Southern California Beaches, Strategic Environmental Assessments Division, Office of Ocean Resource Conservation and Assessment. National Oceanic and Atmospheric Administration, Rockville Maryland.

Small, R., 1992. Urban Transportation Economics. Harwood Academic Publishers (Reading).

U.S. Energy Information Industry, 2010: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_history.html.

U.S. Environmental Protection Agency, 2009: http://www.epa.gov/otaq/fetrends.htm.