SOUTHERN CALIFORNIA BEACH VALUATION PROJECT

Economic Impact of Beach Closures and Changes in Water Quality for Beaches in Southern California

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Foreword

The Southern California Beach Valuation Project is a multi-agency partnership that was initiated in 1998 by the National Oceanic and Atmospheric Administration (NOAA). In the early 1990s, NOAA's Coastal and Ocean Resource Economics Program had estimated single-site travel cost models for 10 California beach sites as well as 40 others nationally using the Public Area Recreation Visitors Survey (PARVS). The results from these efforts were being used in damage assessment cases due to oil spills and sewage spills by California State agencies. Two major deficiencies were noted for single-site travel cost models for these types of applications; 1) the models don't account for substitution to other sites and 2) the models can't include the evaluation of changes in water quality or other beach attributes.

In 1998, NOAA started the process of forming a partnership to develop a state-of-the-art model to address the two above deficiencies. Two elements of NOAA's National Ocean Service joined the partnership; the Coastal and Ocean Resource Economics Program and the Damage Assessment Center. From the State of California, three agencies joined the effort; the State Water Resources Control Board, the California Department of Fish and Game's Office of Spill Prevention and Response, and the Southern California Coastal Water Research Program. The Santa Monica Bay Restoration Foundation also joined the partnership. These organizations were the original project partners. Later in the process, the U.S. Department of Interior's Minerals Management Service joined the partnership.

The project not only involved multiple funding partners, the Research Team also came from multiple organizations. Many researchers have contributed to the effort since the projects inception, including many students at the universities. The overall project Principal Investigator was Professor Michael Hanemann of the University of California – Berkeley. Dr. Linwood Pendleton was the Co-Principal Investigator and during the project went from the University of Southern California to the University of Wyoming and is now at the University of California – Los Angeles. Dr. Craig Mohn was hired under a Post Doctoral Fellowship at the University of California – Berkeley to lead the estimation and implementation of the Southern California Beach Valuation Model. Dr. David Layton, originally at the University of California – Davis, now at the University of Washington was also brought on to help design a contingent valuation/behavior element and do preliminary analysis of the project survey data (see Recruitment report on our web site). As noted above, there were many other researchers involved at different stages of the project. Also, each of the agencies has economists and other social scientists that provided internal peer review as well as doing some of the analyses (this report). Outside paid peer reviewers were also used through every stage of the project.

The surveys were conducted by Chico State University's Survey Research Center. The surveys were complex. A panel approach was used, which was not common for studies in outdoor recreation. Panel members were recruited through a telephone survey of the general population, then interviewed every two months on the details of each trip they took to Southern California beaches over the previous two-month period. Even though a computer-aided telephone instrument (CATI) software system was used, the many complex types of trips taken pushed the technology beyond its limits. Trips were categorized as single-day, single-site trips; single-day, multiple-site trips; multiple-day, single-site trips; and multiple-day, multi-site trips. The original software could not handle all these complexities and some portions of the early surveys had to be coded by hand. Later in the project, upgraded software allowed for programming the complexities of all trip types. These complexities led to delays in processing the data and final delivery to the research team for analysis. The Research Team and the Survey Research Center spent a great deal of time on quality analysis/quality control (QA/QC) on the survey data. Again, this delayed analysis of the data.

The delays have been worth the effort. We believe we now have a state-of-the-art model based on high quality data. On our web site (see link below), you can find reports detailing how the survey was conducted (the Production Report); an analysis of who are the beach users in southern California (the Recruitment Report); a report summarizing the estimated model, including brief literature reviews of modeling issues and research judgments made on these issues in the estimated model; a report on demonstrating the use of the model for estimating welfare (consumer's surplus or the net value people receive from a good or service over and above what they actually pay for the good or service—often referred to as net economic user value or nonmarket economic use value because it is a value that doesn't show up in our normal economic accounts) gains/losses for five policy/management scenarios involving water quality changes and beach closures; and finally the user manual for the electronic model, which is distributed on CD-ROM.

This report adds to the collection of above reports by adding estimation of the economic impacts of beach recreation on the local economies. Market economic impacts include expenditures by beach users and the associated impacts on sales/output, income and employment in a local area, including multiplier impacts. Definitions of these concepts are provided in this report. Following the welfare report, we used the same five policy/management scenarios for estimating economic impact. In addition, we provided a scenario where all beaches in Los Angeles and Orange counties are closed for one year.

We are currently working on a summary report, which will include summaries for the entire project without technical details on how things were estimated. This report will be posted on our web site. All project data and documentation will be available on CD-ROM. The data from this project is extremely rich and much of the data has not been analyzed, so there are many opportunities for further research. We will make the data available in a variety of data formats.

All project reports are available on our web site in portable document format (pdf) using the following link:

http://marineeconomics.noaa.gov/SCBeach/laobeach1.html

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Background

The results presented here focus on what we call the "economic impact" of beach use or changes in beach use versus "economic welfare".

The results presented here use different methods of analysis than presented in SCBVP Research Team (2001), which was done as a preliminary look at the expenditure data and was limited to estimating the impact during the summer season.

Other previous project reports include details on the estimated economic model of beach use (see Hanemann et al, 2004), which was used in a follow-up effort to estimate "economic welfare" gains/losses from five policy-management scenarios (see Hanemann et al, 2005). The policy-management scenarios include changes in water quality and beach closures.

The same five policy-management scenarios are included here plus one in which all beaches is closed for one year, for all activities. These scenarios are described later in the report.

Economic Impact versus Economic Welfare. It is important to understand the difference between what is meant by "economic impact" versus "economic welfare" because each has its own uses. Economic welfare includes what economists call consumer's surplus (CS). CS is the amount of value a consumer of a good or service receives over and above what he or she has to pay for a good or service. It represents the net result of both demand and supply factors. The demand-side represents what people are willing and able to pay for a good or service and the supply-side represents what producers of a good or service are willing to sell it for, i.e., what consumers have to pay to obtain it from producers.

CS is a *net value* and is often referred to as "net economic use value", or "non market economic use value". Recent terminology has also has extended the qualifiers with the term "non market direct economic use value". The added term of "direct" is included to distinguish this portion of value from non use or "passive economic use value". Non use or "passive economic use values" include such values as existence value and bequest value. Existence value being the willingness to pay a given amount just to know something exists in a certain condition, without directly using it. Bequest value is the willingness to pay to ensure something is available for future generations in a certain condition. The term "passive use" has become more popular than "non use" because people have to know about something in order to have economic values for it. People learn about natural resources through books, magazines, newspapers, television shows, etc. (the passive use).

The "non market" descriptor is important because unlike "economic impact" measurements, CS (direct use or passive use) doesn't appear in our standard economic accounts (e.g. Gross National Product, Gross Domestic Product, Income, Employment).

CS, whether direct use or passive use, is the appropriate economic measurement to use in a benefit-cost analysis of public investments and in damage assessment cases in establishing a claim against a responsible party.

Economic impact (EI) is measured by actual expenditures that people make while undertaking an activity, and the secondary effects on sales/output, value added, income, employment and tax revenues. These are the measurements that are in our standard economic accounts.

EI can be broken down into direct, indirect and induced effects (see definition box). The indirect and induced effects make up the "multiplier process". When a local economy experiences a change in an activity that results in a change in demand for a good or service, residents of that economy are impacted by more than just the dollar amount of goods and services purchased by those who engage in that activity. The reason for this is that the businesses serving those who participate in that activity must adjust to the change in the amount of labor and other inputs to the production of their good or service. For example, the changes made by the businesses that experience a decrease in sales due to decreases in water quality or beach closures will cause a "ripple effect" on the other businesses that supply them, and those businesses, in turn, affect others down the supply chain. In addition, workers and owners receive income and they spend it on housing, food, transportation, entertainment, etc. The initial spending is called the "direct effect", and the subsequent ripples are the "indirect" and "induced" effects. The indirect and induced effects are also called the multiplier impacts.

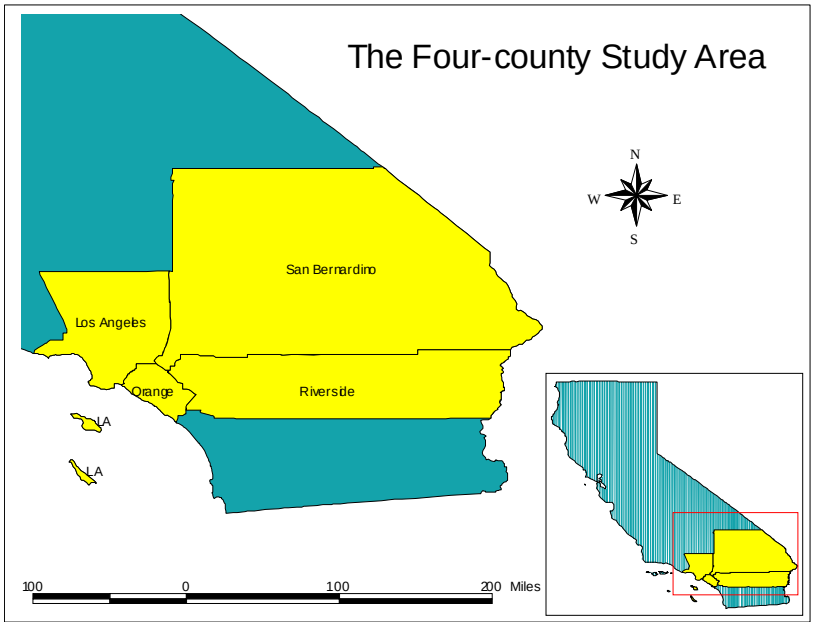
EI is always defined for particular geographic areas depending on the desired scope of the analysis. EI can be done for a particular county, group of counties, an entire State, a region or the Nation. The scope of the analysis determines how much of the "multiplier process" is captured.

- **Direct Effects:** The amount of the change in purchase of inputs used to manufacture or produce the final goods and services purchased by visitors
- **Indirect Effects:** The value of the inputs used by firms that produce the goods and services for those firms first impacted by the closure or change in water quality
- **Induced Effects:** Resultant effects of the direct and indirect effects. Induced effects are related to persons and firms that receive added income as a result of local spending by employees of the firms that are impacted by the direct and indirect effects.
- **Total Effect:** The sum of direct, indirect and induced effects.
- **Output multiplier:** The total output effect divided by the direct output effect. Typically, the output multiplier is between 1.5 and 2.

EI is generally not appropriate to include in calculating benefits or costs in a benefit-cost analysis of a public investment, and is never included in damage assessment cases brought by the government acting as a trustee for the public. The reason is that EI is not a *net value.* If people do not spend their money on one thing in a certain place, they will spend it on something else in another place. Different people in different places might be impacted by changes in water quality and/or beach closures in Los Angeles and Orange counties, but on net, across all people, businesses and places, there is no net value change as measured by EI. However, it will still be important to those who

are affected. If you are one of those whose livelihood is affected (positively or negatively) by a change in water quality and/or a beach closure, it will matter to you. Given this, we decided that EI was important to present.

Study Area. For the economic impact analysis conducted here, the study area has three definitions. The first definition is what beaches would be the focus of the study. The partner/funding agencies decided the focus would be limited to the beaches in Los Angeles and Orange counties. The second definition is what population of beach users the study would include. The Research Team decided that the four-county area of Los Angeles, Orange, Riverside and San Bernardino counties (hereafter referred to as the four-county area or study area) would cost-effectively capture the overwhelming majority of users and use. The third definition of the study area is a more complex issue, since it involves issues of knowing where beach users made their beach use related expenditures (i.e. in which county they made each expenditure) and how interconnected are the different county economies. This latter issue is important because it defines how much of the "multiplier process" is captured, which will determine estimates of EI.



The IMPLAN input-output model is used here to estimate EI (MIG, 1999). IMPLAN is short for IMpact PLANning. IMPLAN is an off-the-shelf product that includes specifications of all the interrelationships between households, businesses, and government entities in the production process. It can take two to three years to build an input-output model from scratch. It can take less than one hour to build an IMPLAN model, once the study area is defined.

So the first step in building an IMPLAN model is to define the study area. A key assumption of the IMPLAN model is that all the people in the study area both live and work in the study area, and therefore spend a good portion of their incomes within the

study area. This is a key assumption and can affect greatly the estimates of EI because of the impact on the "multiplier process".

We used the Census of Inter-county Commuters (Bureau of the Census, 2000) to make our judgments on the "best" study area or local economy for developing estimates of EI. Single county or count-by-county analysis would not be reliable because of the extensive interconnections between counties in terms of where people work and live. Our task was to minimize the amount of people that work in the study area, but live outside the study area, since these people are likely to spend most of the income they receive in the area where they live. We also wanted to define the study area as narrowly as possible to estimate EI on the local area economy.

The "Census of Inter-county Commuters" shows the matrix of where people both live and work (Table 1). About 98,000 people work in the four-county study area, but live in Ventura and San Diego counties. These people are taking their incomes outside the study area. About 65,000 people work in Ventura and San Diego counties, but live in the four-county study area. These people bring their incomes into the study area. On net, 33,000 people or 0.6% of the total four-county study area employment is taking their income out of the four-study area. Generally, this would imply our multipliers for the four-county study area would be overstated because the IMPLAN model assumes all the workers in the four-study area live and work in the four-county study area. However, as we shall see below, the people that live in the four-county study area that work in counties outside the study area make more than those that live outside the four-county study area and work inside the four-county study area. The result is a net decrease in income to the four-county study area of only 0.67% (see Table 2, Adjustment to Income by Place of Residence by the Bureau of Economic Analysis). We think this small amount means that our definition of the study area in the IMPLAN model will yield reasonably good estimates of EI.

Table 1. Inter-County Commuting Patterns[1]

County	Los Angeles		Orange		Riverside		San Bernardino		Total Study Area	
Residents that work in the County(ies)	3,576		1,091		417		457		5,541	
Residents that commute to work outside the county(ies)[2]	264		217		170		198		91	
Breakdown of top five destination counties:										
	Orange	160	Los Angeles	185	San Bernardino	60	Los Angeles	111	Ventura	33
	San Bernardino	41	Riverside	11	Orange	52	Riverside	52	San Diego	32
	Ventura	32	San Bernardino	9	Los Angeles	37	Orange	29	Kern	8
	Riverside	9	San Diego	7	San Diego	19	San Diego	2	Santa Barbara	2
	Kern	6	Ventura	1	Imperial	0.4	Kern	1	San Francisco	2
Non-residents that work inside the county(ies)[3]	440		260		82		120		145	
Breakdown of top five source counties:										
	Orange	185	Los Angeles	160	San Bernardino	52	Riverside	60	Ventura	70
	San Bernardino	111	Riverside	52	Orange	11	Los Angeles	41	San Diego	28
	Ventura	69	San Bernardino	29	Los Angeles	9	Orange	9	Kern	9
	Riverside	37	San Diego	12	San Diego	6	San Diego	2	Santa Barbara	2
	San Diego	8	Ventura	1	Imperial	1	Mohave Co., AZ	1	Clark Co., NV	2

1. Estimates are expressed in thousands of persons. Unless ohterwise noted, counties are in California.

2. For Total Study Area, the estimate is the residents of any of the four counties who work outside of the four counties.

3. For Total Study Area, the estimates are the number of persons residing outside the four counties who work anywhere inside the four counties

Source: United States Census Bureau (2000)

Residents of the Economic Impact Study Area and the Multiplier Process. In regional economic impact analysis, it is customary to not include the spending by residents of the economic impact study area. The reason is that multiplier impacts are derived from "basic" or "export" industries, which attract "new" dollars into the economy. Spending by residents is considered "local spending" from income generated by the "new" dollars

injected into the economy from "export" industries. Resident spending is part of the multiplier process derived from "new" dollars to the "export" industries. So here, beach expenditures would be considered local spending and are part of the multiplier process from "export" industries. It would be double-counting to count the spending impact by residents on beach activities, with additional multiplier impacts. Given our definition of the study area (where people live) and the economic impact area are the same, it is generally thought that we should only include direct impacts.

But there are several reasons why the customary approach is not used here. One reason for defining the study area as the four-county area is that the survey did not breakdown expenditures by county of where the expenditure was made. So if a survey respondent lived in Riverside County and visited a beach in Los Angeles County, we don't know how much was spent in Riverside County in preparation for the beach visit versus how much was spent in Los Angeles County. All we know is that the spending was likely in one or both counties. We know that all the spending took place in the four-county study area. An economic impact analysis that looked at the economic impact area as defined as Los Angeles County would consider spending on beach activities in Los Angeles County as "new" dollars coming into the county and thus beach spending would have multiplier impacts within Los Angeles County.

Above we mentioned the difference between income earned by place of work versus income by place of residence. Overall, 19 percent of income by place of residence is not generated from work within the four-county area. One difference was the "adjustment for residence", which was slightly negative for our four-study area, but very small. Other differences between income by place of work and income by place of residence are also due to sources of income received by people living in the four-county area, but derived from sources other than work in the four-county area. Two major sources are "Dividends, Interest, and Rent" and "Transfer Payments". These are sources of income or "new" dollars into the four-county area economy and can be considered as "export" dollars with multiplier impacts. A portion of beach spending might be made from these sources of income and therefore would have multiplier impacts that would not involve double-counting from other export industries in the four-county area economy. We estimate that in 2004 almost $117 billion in income out of the total income received by people living in the four-county area of $551 billion or 21 percent is export income that is available for discretionary spending for such things as beach activities (see Table 2).

Table 2. Personal Income by Place of Residence versus Work: 2004 (000's $)

Source	Los Angeles	Orange	Riverside	San Bernardino	Total
Place of Residence	329,048,068	124,853,736	49,443,185	48,116,593	551,461,582
Place of Work	280,557,128	103,362,666	29,789,598	32,570,281	446,279,673
Contribution Gov. Insurance	-31,003,949	-11,546,393	-3,450,636	-3,762,369	-49,763,347
Adj. for Residence	**-20,480,913**	**2,957,505**	**7,487,602**	**6,333,406**	**-3,702,400**
Net by Place of Residence from Work	229,072,266	94,773,778	33,826,564	35,141,318	392,813,926
Dividends, Interest & Rent	**51,021,690**	**19,115,079**	**7,720,064**	**4,984,356**	**82,841,189**
Transfer Payments	48,454,112	10,964,879	7,896,557	7,990,919	75,306,467
Retirement & Disability	**12,492,017**	**4,291,303**	**3,050,580**	**2,436,777**	**22,270,677**
Medical	23,841,453	4,236,700	3,021,492	3,351,456	34,451,101
Income Maintenance	**8,192,357**	**1,161,022**	**937,454**	**1,291,054**	**11,581,887**
Unemployment	**1,198,273**	**331,251**	**231,074**	**242,224**	**2,002,822**
Veterans	**428,557**	**145,950**	**177,686**	**158,495**	**910,688**
Federal Education	569,256	138,769	64,552	88,389	860,966
Other Transfers	75,515	11,490	7,368	8,860	103,233
Nonprofits	1,555,220	467,567	293,026	298,300	2,614,113
Individuals from Business	**601,464**	**180,827**	**113,325**	**115,364**	**1,010,980**
Total Non Work Related Income Export Income	**53,453,445**	**28,182,937**	**19,717,785**	**15,561,676**	**116,915,843**
Ratio: Work to Residence (%)	85.26	82.79	60.25	67.69	80.93

Note: Items in bold are sources of non work related income (export icome) available for discretionary spending.
Source: United States Bureau of Economic Analysis (2004)

Another justification for treating beach spending as if it were from export income sources is the argument called “import substitution”. Under this argument, even if all beach spending was from local sources of income, gains or losses associated with changes in beach activities due to water quality and/or beach closures might result in purchases of goods and services from outside the four-county area (imports). Thus, the four-county economy would experience lower multiplier impacts from export incomes as people spend their money on imports.

Our model predicts the number of beach trips that will not be taken to beaches in Los Angeles and Orange counties for a decrease in water quality or a beach closure. Some will substitute to beaches in San Diego, Ventura or Santa Barbara counties. And, some will spend their money on something else. For our estimates to be considered net changes in the local four-county economy, we must assume the money is spent on imports from outside the four-county area. This is the import substitution argument.

This ambiguity in economic impact analysis is why most economists focus on the economic welfare analysis. There is no ambiguity as to whether economic welfare estimates represent net gains or losses. CS is simply harder for many to understand because it cannot be verified by the standard economic accounts (the non market aspect).

Scenario Descriptions

In order to show the economic impact resulting from changes in water quality and beach closures, the analysis is conducted based on five scenarios. These are the same scenarios used in the estimation of welfare estimates using the model of beach choice and activity (Hanemann et al, 2005a). Users may also go to the model user manual to see how other scenarios can be constructed (Hanemann et al, 2005b)

Scenario 1: An Improvement in Beach Water Quality

> *Malibu Surfrider Beach Water Quality Improves by one Heal the Bay (HTB) Letter Grade*[1]
> In 2000, Malibu Surfrider has a low water quality rating of approximately C (2.13 on a scale of 0 to 4). This hypothetical scenario explores the impact of improving water quality at Malibu, perhaps by reducing sewage effluent inputs into Malibu Creek, so that water quality improves to an average annual grade of B (3.0/4.0). All other sites remain unchanged.
> An improvement in water quality at Malibu Surfrider Beach increases by 1,538 visits over the course of the year. Most new visits are made by residents of Los Angeles County, the closest county.

Scenario 2: A Degradation of Beach Water Quality

> *Zuma Beach Water Degrades to an HTB Letter Grade of F*
> In 2000, Zuma Beach enjoyed a high level of water quality, with an annual HTB grades of A/A+ and A/A-. This hypothetical scenario explores the potential impact on beach goers that would result if Zuma Beach water quality declined to a grade of F. All other sites remain unchanged.
> A dramatic decline in beach water quality at Zuma Beach would have serious consequences. Beach attendance would decline by more than 57,000 visitors.

Scenario 3-5: Beach Closures

> *Huntington State Beach (HSB) Closes for One Day, One Month, and One Summer*
> During 2000, Huntington State Beach (HSB) had numerous days with poor water quality ranging from a D to an A-; overall the annual average grade for Huntington State Beach was a B-/C+. This is in contrast to the adjacent beach areas, Huntington City Beach and Santa Ana River, which received higher grades (average A-/B+) This hypothetical scenario explores the potential impacts that would result from beach closures at Huntington State Beach for three duration lengths: one day in July, one month (July), and one summer season (June, July, and August). All other sites remain unchanged.
> It is important to note that these scenarios do not allow for temporal substitution. It is estimated that a one day closure at Huntington State Beach would result in a

[1] For information about the Heal the Bay grading system, please go to the following URL: http://www.healthebay.org/brc/gradingsystem.asp

loss of more than 1,200 beach visits, a month long closure during July would result in a loss of over 38,000 beach visits and a season long closure would result in a decline in attendance of more than 100,000 visits.

Close All Beaches in Los Angeles and Orange Counties for one Year, for all Activities

This scenario results in a reduction of 53 million beach visits or days of beach use, since all were day visitors in the model estimated by Hanemann et al (2004).

Expenditure Profile

In 2001, the Research Team (SCBVP 2001) conducted a preliminary analysis of the economic impact of visitation to the beaches in Los Angeles and Orange counties. The analysis was limited to the three-month period of June – August 2000. Average daily attendance from lifeguard data was used to extrapolate average spending estimates to total spending. The analysis differentiated between whether visitors were locals or non-locals, with non-local's spending having multiplier impacts. Non-locals were defined as anyone not from the county where the beach visitation took place. A range of multipliers of 2 to 2.5 was used.

The previous report described the data in great detail and this won't be repeated here. The same survey data is used here. There were 272 panel members that visited the beaches during the fourth wave of data collection and answered the beach expenditure questions. These 272 survey respondents could have provided information on more than one trip. In deriving the average expenditure profile, we included information on all beach trips reported and develop weighted averages as in the previous report. Our sample size for beach trip profiles is based on reported information for 352 beach trips made by the 272 survey respondents during the summer of 2000. We use these expenditure profiles as representative for trips taken over the entire year.

Per our discussion of the study area, here we make no distinction between locals and non-locals, since all are residents of the four-county area. Previous results were based on two faulty assumptions: 1) that all expenditures were made in the county of the beach visited and 2) county-by-county economic impact analysis could be done (ignored the interconnections between the counties in the four-county area).

In the expenditure profiles presented here, we combine the locals and non-locals as presented in the previous report and do the same weighting by averaging all beach expenditure profiles.

On average, we estimate that visitors to the beaches in Los Angeles and Orange counties spent $20.33 per person per visit or day. Food & beverages accounted for over half of the expenditures, while shopping accounted for about 25%. Parking accounted for about 12.5% of expenditures, while spending on beach supplies and equipment rental accounted for relatively small shares of the spending (Table 3). The survey did gather information

on fishing expenditures, but only one person in the sample reported making these types of expenditures, so they were dropped from the spending profile.

Table 3. Beach Expenditure Profile: Average Expenditure Per Person Per Trip

Expenditure Category	Average Expenditure	Standard Error	Sample Size	Percent of Expenditure
Parking	$2.54	$0.22	312	12.49
Food & Beverages	$11.12	$1.00	352	54.70
Beach Supplies	$0.98	$0.22	352	4.82
Rental Equipment	$0.65	$0.24	351	3.20
Shopping	$5.04	$1.16	352	24.79
Total	$20.33	$2.84	N/A	100.00

Total Expenditures

To estimate total expenditures, we multiply the change in beach visitation under each scenario times the average expenditure per person per visit (day). The changes in beach trips (days), for each scenario, are summarized in Table 4. The total expenditure estimates are summarized in Table 5.

Table 4. Changes in beach attendance associated with scenarios and in total

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Total
Δ Trips	1,538	-57,489	-1,248	-38,699	-100,662	-53,360,892

Table 5. Changes in Total Expenditures for Beach Visitation Due to Water Quality Changes or Beach Closures

Expenditure Category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	All Beaches Closed 1-year
Parking	$4,523	-$169,079	-$3,670	-$113,816	-$296,053	-$156,937,561
Food & Beverages	$18,581	-$694,538	-$15,077	-$467,532	-$1,216,121	-$644,665,553
Beach Supplies	$1,648	-$61,616	-$1,338	-$41,477	-$107,889	-$57,191,897
Equipment Rental	$1,119	-$41,842	-$908	-$28,166	-$73,265	-$38,837,882
Shopping	$8,483	-$317,082	-$6,883	-$213,445	-$555,204	-$294,313,357
Total	$34,354	-$1,284,157	-$27,876	-$864,436	-$2,248,532	-$1,191,946,250

IMPLAN Analysis

The next step in the economic impact analysis is to import the spending profiles and changes in beach visitation into the IMPLAN model. Each of the expenditure categories must first be mapped into industries for which economic accounts are organized. IMPLAN aggregates sectors in the North American Industry Classification System (NAICS), into IMPLAN sectors.

Food & Beverages were mapped into IMPLAN sector 454: Eating and Drinking Places. We assumed that all spending on food & beverages was done at restaurants and bars. Shopping and beach supplies were mapped into IMPLAN sector 455: Miscellaneous Retail, while rental equipment spending was mapped into IMPLAN sector 488: Amusement and Recreation Services. Parking expenditures were assumed to be all spent at municipal parking lots and was mapped into IMPLAN sector 512: Other State and Local Government Enterprises (Table 6).

Table 6. Expenditure Mapping into IMPLAN Sectors

Expenditure Category	IMPLAN Sector
Food and Beverages	454: Eating and Drinking Places
Shopping	455: Miscellaneous Retail
Beach Supplies	455: Miscellaneous Retail
Equipment Rental	488: Amusement and Recreation Services
Parking	512: Other State and Local Government Enterprises[1]

1. Assumes all parking is municipal

IMPLAN uses the "Social Accounts Matrix" (SAM), which specifies all the interrelationships between households, businesses, government entities, and private non profit organizations. Each IMPLAN sector has different production functions, which specify the inputs used in production. The SAM also includes "foreign trade" and "domestic trade", which represent inputs from outside the study area. This explains why "direct" output is less than initial expenditures. A portion of the expenditure revenue received goes outside the four-county area to purchase inputs in the production process. Also as noted above, IMPLAN produces estimates of direct, indirect and induced effects for output, value added, income and employment.[2] Also, because IMPLAN data are in 1999 dollars and the expenditure profiles are in 2001 dollars, the expenditures are first deflated to 1999 dollars when inputted into the model. On final output tables, dollars are inflated to 2006 dollars.

Results

All Beaches Closed for One Year, for All Activities. Closing all the beaches in Los Angeles and Orange counties for a full year and for all activities resulted in an estimated loss of 53 million person-days of beach use. This resulted in an estimated loss in beach expenditures of approximately $1.2 billion. This had a direct effect on output of $956.4

[2] At this point, any expenditure categories that involve retails sales are categorized as such in order to take account the difference between the producer and the purchaser prices. The margin basis is set to "household." For this analysis, these categories were "shopping" and "beach supplies." The remaining categories are considered under IMPLAN to be services. Although some of the food and beverages were probably bought in grocery stores or convenience stores, which are considered retail, the judgment was made that this category consisted of eating and drinking places for the most part, and is thus a service industry, not retail.

million; value added $533.7 million; $348.7 million in income; and 15,879 full and part-time jobs in the four-county economy (Table 7).

Once we include multiplier impacts, the total estimated loss is $1.6 billion in output; $913.3 million in value added; $586 million in income; and 21,234 full and part-time jobs.

Table 7. Economic Impacts from Closing all Beaches for One Year

	Direct	Indirect	Induced	Total
Total				
Output	-956,382,012	-304,602,252	-318,410,659	-1,579,394,925
Value Added	-533,692,804	-175,095,941	-204,531,404	-913,320,156
Employment	-15,879.3	-2,309.4	-3,045.3	-21,234.0
Income	-348,732,954	-115,784,246	-121,476,278	-585,993,466

Scenario 1. As mentioned above, Scenario 1 is an improvement in water quality at Malibu Surfrider Beach by one HTB letter grade. This scenario results in an estimated increase in visitation of 1,538 visits over the course of the year and an increase in spending of $34,354.

This increase in beach spending results in an increase in the direct effect on output of about $28 thousand, which would result in about $15 thousand in direct value added, $10 thousand in direct income, and 0.5 jobs in direct employment. These impacts represent the amount required to purchase inputs for the final production of goods and services purchased as a result of the increase in beach visitation.

The total impact, after adding in the indirect and induced impacts (multiplier impacts), is about $46 thousand in output, $26 thousand in value added, $17 thousand in income, and 0.6 jobs. Full results for Scenario 1 can be found in Table 8.

Table 8. Economic Impacts from Scenario 1 (2006 $)

	Direct	Indirect	Induced	Total
Scenario 1				
Output	27,565	8,779	9,177	45,522
Value Added	15,382	5,047	5,895	26,324
Employment	0.5	0.1	0.1	0.6
Income	10,051	3,337	3,501	16,890

Scenario 2. Scenario 2 is a degradation of water quality at Zuma Beach Water resulting in an HTB Letter Grade of F. This scenario results in an estimated decrease in visitation of 57,489 visits over the course of the year and a reduction on beach spending of $1.28 million.

This decrease in beach spending results in a decrease in direct effect on output of about $1 million, which would result in a decrease of about $575 thousand in direct value

added, $376 thousand in direct income, and 17 jobs in direct employment. These impacts represent the loss of the amount required to purchase inputs for the final production of goods and services purchased as a result of the decrease in beach visitation.

The total impact, after adding in the indirect and induced impacts (multiplier impacts), is about $1.7 million in output, $984 thousand in value added, $631 thousand in income, and 23 jobs. Full results for scenario 2 can be found in Table 9.

Table 9. Economic Impacts from Scenario 2 (2006 $)

	Direct	Indirect	Induced	Total
Scenario 2				
Output	-1,030,370	-328,167	-343,044	-1,701,580
Value Added	-574,980	-188,642	-220,354	-983,977
Employment	-17.1	-2.5	-3.3	-22.9
Income	-375,712	-124,742	-130,874	-631,327

Scenario 3. Scenario 3 is the closure of Huntington State Beach for one day. This scenario results in an estimated decrease in visitation of 1,248 visits over the course of the year, and a reduction in beach spending of $27,876.

This decrease in beach spending results in a decrease in the direct effect on output of about $22 thousand, which would result in a decrease of about $12 thousand in direct value added, $8 thousand in direct income, and 0.4 jobs in direct employment. These impacts represent the loss of the amount required to purchase inputs for the final production of goods and services purchased as a result of the decrease in beach visitation.

The total impact, after adding in the indirect and induced impacts (multiplier impacts), is about $37 thousand in output, $21 thousand in value added, $14 thousand in income, and 0.5 jobs. Full results for scenario 3 can be found in Table 10.

Table 10. Economic Impacts from Scenario 3 (2006 $)

	Direct	Indirect	Induced	Total
Scenario 3				
Output	-22,368	-7,124	-7,447	-36,939
Value Added	-12,482	-4,095	-4,784	-21,361
Employment	-0.4	-0.1	-0.1	-0.5
Income	-8,156	-2,708	-2,841	-13,705

Scenario 4. Scenario 4 is the closure of Huntington State Beach for one month. This scenario results in an estimated decrease in visitation of 38,699 visits over the course of the year, and a reduction in beach spending of $864 thousand.

This decrease in beach spending results in a decrease in the direct effect on output of about $694 thousand, which would result in a decrease of about $387 thousand in direct value added, $253 thousand in direct income, and 12 jobs in direct employment. These

impacts represent the loss of the amount required to purchase inputs for the final production of goods and services purchased as a result of the decrease in beach visitation.

The total impact, after adding in the indirect and induced impacts (multiplier impact), is about $1.1 million in output, $662 thousand in value added, $425 thousand in income, and 15 jobs. Full results for scenario 4 can be found in Table 11.

Table 11. Economic Impacts from Scenario 4 (2006 $)

	Direct	Indirect	Induced	Total
Scenario 4				
Output	-693,598	-220,907	-230,921	-1,145,427
Value Added	-387,051	-126,985	-148,333	-662,369
Employment	-11.5	-1.7	-2.2	-15.4
Income	-252,912	-83,970	-88.098	-424,981

Scenario 5. Scenario 5 is the closure of Huntington State Beach for one summer. This scenario results in an estimated decrease in visitation of 100,662 visits over the course of the year and a reduction in beach spending of over $2.2 million.

This decrease in beach spending results in a decrease in the direct effect on output of about $1.8 million, which would result in a decrease of about $1 million in direct value added, $658 thousand in direct income, and 30 jobs in direct employment. These impacts represent the loss of the amount required to purchase inputs for the final production of goods and services purchased as a result of the decrease in beach visitation.

The total impact, after adding in the indirect and induced impacts (multiplier impacts), is about $3 million in output, $1.7 million in value added, $1.1 million in income, and 40 jobs. Full results for scenario 5 can be found in Table 12.

Table 12. Economic Impacts from Scenario 5 (2006 $)

	Direct	Indirect	Induced	Total
Scenario 5				
Output	-1,804,155	-574,613	-600,662	-2,979,430
Value Added	-1,006,778	-330,308	-385,836	-1,722,922
Employment	-30.0	-4.4	-5.7	-40.1
Income	-657,863	-218,420	-229,157	-1,105,440

Discussion

Estimates of Economic Impact: Underestimates. The Southern California Beach Valuation Model (Hanemann et al, 2004) is limited to modeling changes in "day use" only. In the scenario where all beaches in Los Angeles and Orange counties were closed for an entire year, for all activities, the model estimated a reduction in beach use of 53.36

million person-days of use (one person visiting a beach for a day, any part of a day counted as a whole day).

Using survey information, we developed a separate estimate of total beach use for people living in the four-county study area. Our estimate includes both "day use" and use from multiple-day use trips. We estimate 52.93 million person-days of "day use". This is 99.2% of the number estimated by the Southern California Beach Valuation Project Model. Thus, the model would appear to be very reliable.

We estimate total person-days from multi-day trips at 4.05 million and total person-days (day use plus multi-day use) at 56.98 million. Thus, "day use" accounts for 93% of all beach use by people living in the four-county study area.

There is one other source of use not counted by limiting the study area to the four-county area, i.e., those people residing outside the four-county area who visit beaches in Los Angeles and Orange counties.

Using data collected on beach attendance from lifeguard data on beaches in Los Angeles and Orange counties, for year 2000, we estimate total beach attendance at about 80 million person-days. The database doesn't include all beaches. The database numbers added to 79.2 million person-days. To account for all beaches we raised the estimate to 80 million.

The estimate of 80 million person-days of total annual beach use implies that people who reside outside the four-county area account for 23 million person-days of beach use, which is 28.75% of the total beach use.

Combining all the information on beach use, we derived an approximate blow-up factor for extrapolating the Southern California Beach Valuation Project Model estimates of changes in day use to changes in total use. The estimated blow-up factor is about 1.5 (80/53).

An additional source of underestimation for "economic impact analysis" comes from the expenditure profile. The expenditure profile used here was based on day use from the people in the four-county area. Those from the four-county area who took multiple-day trips, as well as those who reside outside the four-county area, would be expected to have, on average, higher costs for housing and transportation, even when costs are averaged on a per person per day basis.

King and Symes (2003) did a survey of California beach users in 2002. They concluded that over 97% of all California beach use was done in Southern California as defined by the counties of Santa Barbara south through San Diego County. King and Symes also provided expenditure profiles per person per day for four kinds of beach visitors; 1) CA Day trippers, 2) CA vacationers, 3) U S vacationers, and 4) Foreign vacationers.

For CA Day Trippers, Kings and Symes estimate spending of $20.73 per person per day. This is very close to our estimate of $20.33. The other three types of visitors correspond to those who are not included in the Southern California Beach Valuation Project model or multiple-day trippers. King and Symes estimates of spending include transportation and housing and were estimated at $51.30 for CA vacationers; $59.83 for U S vacationers; and $53.03 for Foreign vacationers. Using an average of $55 per person per day for all multi-day trippers visiting beaches in Los Angeles and Orange counties and multiplying by our estimate of 27 million person days of multi-trip beach use, we estimate a total spending impact $1.485 billion. Thus, multi-day beach use has a total spending impact greater than our estimate for day use of $1.2 billion. This implies a net blow-up factor for spending of 2.2375 [($1.2 billion + $1.485 billion)/$1.2 billion].

Estimate of Economic Impact Accounting for All Beach Use. If we assume that the relationships between the added spending and direct, indirect, and induced effects are the same, we estimate that closing all beaches for one year, for all activities in Los Angeles and Orange counties would result in a decrease in beach visitation of 80 million person-days and a reduction in beach related spending of $2.685 billion. This reduction in beach spending would result in the direct effect on output of $2.14 billion; $1.19 billion in value added; $780.3 million in income; and 35,530 full and part-time jobs.

The total impact, after adding in the indirect and induced impacts (multiplier impacts) is estimated to be about $3.53 billion in output; $2.04 billion in value added; $1.31 billion in income; and 47,511 full and part-time jobs (Table 13).

The blow-up factor of 2.2375 could also be applied to the other five policy/management scenarios.

Table 13. Estimates of Economic Impact Accounting for All Beach Use (2006 $)

	Direct	Indirect	Induced	Total
Expenditures	$2.685 billion	-	-	$2.685 billion
Output	$2.14 billion	$681.5 million	$712.4 million	$3.53 billion
Value Added	$1.19 billion	$391.8 million	$457.6 million	$2.04 billion
Income	$780.3 million	$259.1 million	$271.8 million	$1.31 billion
Employment	35,530	5,167	6,814	47,511

Conclusions

The Southern California Beach Valuation Model is a very reliable model for predicting changes in beach use and the corresponding changes in economic welfare and economic impact (when combined with the IMPLAN Model) for “day use”. However, day use visitation only accounts for 66% of all beach use and multi-day beach users spend considerably more per person per day resulting in significant under estimates of economic impact, if the analysis is limited to the impact of day use only.

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