COASTAL OCEAN VALUES CENTER

Using the Literature to Value Coastal Uses - Recreational Saltwater Angling in California

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Abstract

Using the literature we examine participation, expenditure, and non-market value estimates of recreational saltwater angling. From this larger literature, we demonstrate how policy analysts can derive reasonable approximations of the potential market impacts and non-market values of coastal recreational uses, even when locally relevant original research results are scarce. Using this approach, we estimate that annual expenditures related to saltwater fishing in California range from $1.5 to $4 billion and that non-market benefits of California anglers fall between $300 million and $1.8 billion.

Keywords: recreation, marine, angling, expenditure, non-market

I. INTRODUCTION

Coastlines in the United States receive millions of visits every year for recreational activities such as swimming, saltwater angling, surfing, wildlife viewing, snorkeling, and beach-going. The availability of these activities is valuable both to local residents and visitors from around the world. However, there are many costs associated with keeping these areas open to the public. These costs include maintaining a clean and healthy environment for visitors and wildlife, nourishing beaches, and forgoing profits of development, among others. State and local governments allocate funds in an attempt to balance the costs and benefits associated with coastal improvement and protection.

Assessing the economic value of marine and coastal recreation is not always straightforward. Unlike commercial fishing, local economic data is not always collected for recreational activities. A large and growing body of literature is available that can provide insight into the potential economic value of marine and coastal recreation. Bibliographic databases and information networks like the "Non-market Literature Portal" (National Ocean Economics Program) and the "Coastal and Ocean Resource Economics" (National Oceanic and Atmospheric Administration) website now make it possible for researchers to quickly locate relevant studies from the literature. Values from the literature can be linked to data on coastal use and visitation to estimate the approximate value of these activities. While not suitable for litigation or even setting fines, the development of approximate values for coastal recreation can be important. In many cases, the coastal manager simply wants to know, to a first approximation, whether the value of a coastal recreational activity (e.g. saltwater angling) is commensurate with other values being considered in a policy action. For instance, the manager may want to know how the value of recreational saltwater angling compares with the operating budget of recreational fishing activities within the Department of Fish and Game or whether the cost of improving coastal water quality is within reason given the expenditures and values associated with beach going. There are often no serious estimates of the value of such activities. As a result, the economic importance of many types of coastal recreation remains unknown and is thus excluded from the economic debate that is frequently central to coastal policy decisions.

In this paper, we demonstrate how the literature and estimates of coastal recreational activity can be used to better inform policy makers about the potential economic impact and value of coastal recreation. Our focus is on recreational saltwater angling in California, but similar data and expenditure and value estimates are also available for beach going, scuba diving, boating, and wildlife viewing. Furthermore, this information can be found for most coastal states. We review the literature (both journal publications and technical reports) to provide an overview of the economic impact and value of recreational saltwater angling. From the literature, we develop a range of estimates for trip-related expenditures and non-market values associated a recreational saltwater angling day. We combine these ranges with estimates of recreational saltwater angling activity in California to estimate upper and lower bounds of the economic expenditures (impact) and value of recreational saltwater angling in the state.

II. The Importance of Recreational Saltwater Angling in California

In 1999 and 2000, more than 43% of Americans participated in some form of marine recreation (Leeworthy and Wiley, 2001). Americans flock to beaches and shores to swim, fish, boat, and view the natural scenery (see Table 1). While the proportion of the population that participates in marine recreation is expected to decline over the coming decade, population growth in the coastal zone is expected to offset this trend. Overall, the total number of people participating in all forms of marine recreation is expected to increase (Leeworthy et al. 2005). California ranks second only to Florida in the number of participants in coastal recreation with 17.7 million participants (Leeworthy and Wiley, 2001). While a smaller percentage of California's population participates in marine recreation annually (8.7% for California versus 10.7% for Florida), California has a larger population and thus places first nationally in the number of residents that participate in marine recreation (12.2 million) (Leeworthy and Wiley, 2001).

Saltwater angling represents a large portion of marine recreation in the United States. Saltwater angling alone draws nearly 21.3 million participants nationwide, which accounts for 10.3 percent of the population aged 16 or older (Leeworthy and Wiley, 2001). Saltwater angling was the third

most popular activity in marine recreation in the United States after beach-going and swimming (Leeworthy and Wiley, 2001). Although the forecasts provided by Leeworthy et al. (2005) project that the percent of the population participating in saltwater angling will decrease through the year 2010, a larger population will offset this drop in percentage, thus causing the absolute number of saltwater angling participants to rise. Saltwater angling is expected to attract over 24 million participants by 2010 (Leeworthy et al. 2005). California ranks second nationally in terms of participation in saltwater angling, attracting more than 2.7 million participants (Leeworthy and Wiley, 2001). California falls behind only Florida, and Texas ranks third with more than 1 million fewer saltwater angling participants than California (Leeworthy and Wiley, 2001).

III. The Economic Contribution of Recreational Saltwater Angling

Recreational saltwater angling in coastal and marine waters generates value for participants and local businesses that support this activity. The quantification of the economic impacts associated with recreational saltwater angling is complicated by the fact that these activities generate both market and non-market impacts. The market impact of recreational saltwater angling is usually assessed by examining how much money anglers contribute to the local economy through spending related to access, equipment, and goods and services (e.g. ice and bait). The more common focus of market-based studies is on gross expenditures, and fewer studies focus on profits or taxes. While gross expenditures do not represent net benefits to the economy, they do capture the importance that recreational saltwater angling expenditures have in the local economy. Furthermore, gross expenditures represent the base upon which tax revenues can be generated and gross expenditures can be used to estimate jobs and wages supported by recreational saltwater angling.

The non-market value of recreational saltwater angling is more difficult to determine. Non-market value represents the economic value anglers place on the marine resources they use, beyond what they have to pay to access these resources. For example, a day of saltwater angling often costs the angler less money than the maximum amount he would be willing to pay for the

activity. This gap between the cost of the activity and how much the activity is "worth" represents the non-market value that results from a day of saltwater angling. Figure 1 illustrates this point using a hypothetical angler. A particular angler's willingness to pay for saltwater angling days is represented by the downward sloping line – following the standard assumption of diminishing marginal benefits from "consumption", or in this case, activity days. Figure 1 shows that at a cost, C, the angler will want to spend D days saltwater angling. The shaded region represents his total cost for D days of saltwater angling, and the triangle above this region represents the total amount of money he would have been *willing* to pay, but was not charged. This triangle represents the non-market value of his saltwater angling excursions.

Non-market values are often associated with outdoor recreational resources, including recreational saltwater angling sites, and have been shown to generate substantial economic value beyond the expenditures generated by these resources. These non-market values represent the net economic value of saltwater angling opportunities to the angler; they capture the added economic well-being that anglers enjoy as a result of access to areas with high quality saltwater angling. Funds raised directly from anglers to protect marine resources reflect only a lower bound for these non-market values because many anglers have the opportunity to "free ride" on the efforts of other anglers.

In the literature, two primary methods are used to estimate the non-market value of recreational saltwater angling: travel cost methods (including random utility methods) and contingent methods. Travel cost methods are used to estimate the trade-offs anglers make between travel costs (time and out-of-pocket expenses) and recreational saltwater angling opportunities. Travel cost methods include single and multiple site travel cost models and a variety of site choice models including random utility models. Travel cost methods use real angler behavior to estimate the non-market value of recreational saltwater angling, but because the method requires considerable variation in the travel costs faced by anglers, the method works best when applied to non-resident anglers (those living outside the immediate area).

Authors also use contingent methods to estimate values for saltwater angling. However, the application of these methods to saltwater angling is much less frequent than travel cost based methods. The contingent valuation method (CVM) estimates non-market values by surveying recreational anglers on what they would be willing to pay for their recreational activity, contingent on certain factors. These factors could include a number of attributes associated with a hypothetical saltwater angling trip such as the expected number of fish caught on a trip or access to a new saltwater angling site.

Below we summarize studies that provide estimates of both market values (expenditures) and non-market values associated with recreational saltwater angling in the United States, with a special focus on saltwater angling in California. Because the goal of this paper is to provide values that may be similar to values for saltwater angling in California, we limit our review to studies of saltwater angling in the continental United States and Hawaii. It is important for the reader to note that the methods for estimating these market expenditures and non-market values often differ between studies. In what follows, we provide these estimates with brief explanations of the basic methods. We break down the expenditure and value estimates by visitor days (e.g. $/person-day) when possible. By doing so, we hope the reader will be better able to compare these results across studies and understand how these values may compare to the values that are generated by saltwater angling in California.

The Market Impact Of Recreational Saltwater Angling

Gross expenditures by anglers generate net revenues for local firms and businesses. With the exception of studies on the charter fishing industry, we are unaware of studies of the net revenues associated with trip-related expenditures by recreational saltwater anglers. As a result, we are unable to provide good estimates of the net economic market value of recreational saltwater angling. The literature, however, does provide numerous estimates of the gross economic value of expenditures made by recreational anglers. Expenditures by anglers support jobs and wages for charter captains and crews, employees at local hotels and eateries, and numerous other ancillary services. Using ratios derived from the United States Economic Census, analysts have estimated the taxes, wages, and jobs supported by recreational saltwater

angling (see for instance Leeworthy and Wiley, 2001). In this section, we review the literature to find estimates of expenditures by saltwater recreational anglers in the United States with a focus on California. To help the reader better use these values to understand the potential economic impact of recreational saltwater angling in California, we provide estimates in terms of 2005 dollars per person per day when possible (otherwise we provide estimates in terms of 2005 dollars per trip).

The literature contains estimates of daily expenditures made by anglers in Alaska, the Gulf Coast, select states on the East Coast, and California. Table 3 summarizes recreational saltwater angling expenditures in California, and Tables 4a, b, c, and d provide expenditures for locations outside California.

Estimates of expenditures on saltwater angling in California range from $21 to $564 per person-day (Table 3). Daily expenditures tend to be higher for non-resident anglers than for resident anglers and higher for anglers using a party or charter boat than for those using private boats. The literature shows that daily expenditures for anglers using a party or charter boat in California range from $94 to $564, while anglers using private boats only spend from $21 to $251 (all four values are coincidentally found in Southern California, Table 3). Results provided by Gentner et al. (2001) show that daily expenditures for resident anglers range from $21 (Southern California) to $128 (Northern California). Daily expenditures for non-resident anglers range from $143 (Northern California) to $564 (Southern California).

The same pattern of saltwater angling-related expenditures is found in estimates from the literature for sites on the Pacific Coast excluding California (Table 4a). Daily saltwater angling expenditures for residents range from $43 (Washington) to $221 (Washington) for mainland angling and even higher for anglers fishing in Alaska. Daily saltwater angling expenditures for non-residents range from $116 (Oregon) to $307 (Washington). In the Southeast region (Table 4b), daily saltwater angling expenditures range from $14 (Mississippi) to $236 (North Carolina) and from $37 (West Florida) to $259 (South Carolina) for residents and non-residents, respectively. The Northeast region maintains this pattern with expenditures for residents ranging

from $16 (Rhode Island) to $116 (Maryland) and expenditures for non-residents ranging from $22 (New York) to $119 (Maryland) per angler per day (Table 4c).

There is no magical method for determining upper and lower bounds from the literature. Averages of estimates do not account for the fact that studies differ in quality, number of observations, levels of confidence, or geography and season. Further, types of recreational saltwater angling cannot be easily aggregated. Nevertheless, upper and lower bounds can be drawn from the literature by examining first the values from geographically similar areas (in this case, studies of California and West Coast saltwater angling) and then comparing these with the findings of the larger body of literature. Because the goal of the analysis is to provide an approximation of the potential value of recreational saltwater angling, the exact upper and lower bounds are less important than the order of magnitude defined by these bounds. In many cases, the coastal manager simply wants to know, to a first approximation, whether the value of recreational saltwater angling is commensurate with other values being considered in a policy action. For instance, legislators may want to know how the value of recreational saltwater angling compares to recreational fishing programs or budgets within the Department of Fish and Game. Based on the literature, we estimate the potential economic expenditures that would be associated with recreational saltwater angling in California if the average daily expenditures of anglers to be between $75 and $200 per person day – values that are well within ranges in the literature.

Leeworthy and Wiley (2001) estimated that national participation in saltwater angling in 2000 was over 10% of the American non-institutionalized population which translates into roughly 21.3 million participants (Table 2). The same study estimated the California participation of saltwater anglers in California alone accounted for over 1.3% of Americans which is over 2.7 million participants who fished for more than 20 million days in 2000. Based on these estimates and an estimated value range of $75 to $200 per participant per day (from the estimates given in tables 3 and 4), the annual expenditures associated with recreational saltwater angling in California ranged from $1.6 billion to $4 billion in the year 2000. The number of people participating in coastal activities is expected to increase from the year 2005 to the year 2010

(Leeworthy et al. 2005). As the number of participants increases, so too should the economic impacts associated with that activity. Leeworthy et al. (2005) estimate that the nationwide participation in saltwater angling changes from 22 million in the year 2000 to 23 million and 25 million in the years 2005 and 2010, respectively (Table 1). These figures indicate that between 2000 and 2010, the nation will see an increase of 12% in saltwater angling participation. Applying these national percentage estimates to California, the expenditures associated with recreational saltwater angling in California could increase to between $1.7 billion and $4.5 billion annually by 2010.

The Non-Market Value of Recreational Saltwater Angling

Recreational saltwater angling generates direct economic benefits to anglers beyond the costs associated with saltwater angling. These non-market values reflect the net benefit of coastal and saltwater angling resources to anglers. Changes in these non-market values, for better or for worse, reflect changes in the net economic value of the resource. Fluctuations in value could result from alterations in access to saltwater angling sites, variations in catch per unit effort at sites, or changes in interactions with other users at saltwater angling sites (including congestion and conflicts with other users). In this section, we review the literature to summarize estimates of the non-market values of recreational saltwater angling in the United States. As before, we present our findings in two tables: Table 5 provides estimates from the literature for California, Table 6 provides estimates for locations outside of California.[1]

Estimates of the non-market values for a recreational day of saltwater angling in California range from $15 to $97 per day and from $34 to $44 per trip. Non-market values (Table 5) tend to be higher for anglers using a party or charter boat than for those using private boats. Estimates provided by Wegge et al. (1986) show that the non-market value of a day of saltwater angling in Southern California for anglers using a party or charter boat ranges from $24 to $97, while anglers using private boats have a daily non-market value ranging only from $15 to $59.

[1] Table 6 is divided into two parts: (a) estimates from original research and (b) estimates from secondary data sources that cite value estimates from other papers. Secondary estimates may also have come from databases where value estimates are given, but we were not able to locate the original research.

Nationally, non-market values for recreational saltwater angling are similar; values range from $17 per day in Delaware to $146 per person day in Alaska.

Based on the 2000 participation estimates of 20.3 million person days spent angling in California (Leeworthy and Wiley, 2001) and an estimated value range of $15 to $90 per person day, the annual non-market value of recreational saltwater angling in California was likely to range from $305 million to $1.83 billion for the year 2000. The annual non-market value of recreational saltwater angling will likely increase as participation in recreational saltwater angling increases. Leeworthy et al. (2005) estimate the nationwide participation change from the year 2000 to the years 2005 and 2010. These figures (Table 1) indicate that in the span of ten years, the nation will see an increase in recreational saltwater angling activity of 12%. Based on these national percentage estimates, the non-market value of recreational saltwater angling in California could increase to a range of $342 million to over $2 billion annually by the year 2010.

IV. DISCUSSION

Saltwater angling is the third most popular water-based recreation activity in the United States (after beach-going and swimming), and it is the fourth most popular coastal activity in California (Leeworthy and Wiley, 2001). The literature also reveals that recreational saltwater angling contributes substantially to local economies both in direct revenues (and the jobs these revenues support) and in the overall economic wellbeing of coastal users. Recreational saltwater angling also represents important economic resources for individual states like California. We estimate that recreational saltwater angling in California, statewide, generates on the order of $1.6 billion to $4 billion in annual expenditures related to just saltwater angling trips[2], and the non-market value of recreational saltwater angling is likely to lie between $300 million and $1.8 billion annually. These estimates of expenditures associated with recreational saltwater angling in California are greater than the economic revenues from commercial fishing landings in the state

[2] Note that these estimates differ from those of the American Sportfishing Association (ASA). The ASA includes in its estimates expenditures on items that are not directly related to marine angling trips, but are related to marine angling generally (e.g. magazine subscriptions and vehicles).

which are estimated at roughly $115 million in 2005 and $138 million in 2004 (National Ocean Economics Program). Recreational saltwater angling also generates non-market benefits for the many anglers along the California coast. Even though the per person per day non-market value of saltwater angling is similar to those estimates from the literature for SCUBA diving and wildlife viewing (Pendleton 2005a, b and 2006), the large number of marine anglers and their high avidity result in very high overall market and non-market values for recreational saltwater angling in California. The non-market value of recreational saltwater angling is comparable to that of beach going in the state (Pendleton and Kildow, 2006). As the population of California and the nation grows, so too will the number of people participating in recreational saltwater angling.

By estimating California recreational saltwater angling expenditures and values, this paper provides the framework for similar studies that can be conducted for other states in order to estimate the economic impact of recreational activities nationwide. California is fortunate that a number of studies of non-market valuation have been conducted in the state. Similar studies also exist for other states such as Florida and many of the East Coast. While original studies (especially those that estimate non-market values) are expensive, states and local areas can use our approach to better understand the potential value and impact of recreational saltwater angling in those areas. Leeworthy et al. (2005) estimate that participation in recreational saltwater angling nationwide should increase by 12% from 2000 levels by the year 2010. As other sectors of the coastal economy continue to decline in value along the United States coast (e.g. commercial fishing and marine construction), the importance of recreational activities like saltwater angling may continue to grow.

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Figure 1: Non-Market Value of an Angler's Marine Angling Days

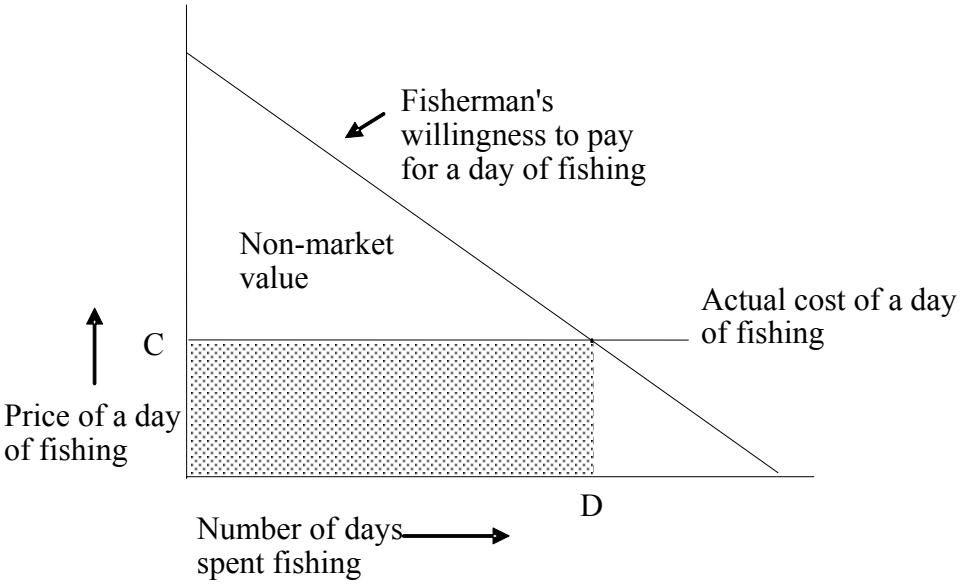
Fisherman's
willingness to pay
for a day of fishing
Non-market
value
Actual cost of a day
of fishing
C
Price of a day
of fishing
D
Number of days
spent fishing

Table 1: National Projections of Marine Recreation (from Leeworthy et al. 2005)

Activity/Setting (by Rank)	2000 Number of Participants (millions)	2005 Number of Participants (millions)	Growth Rate (compared to 2000)	2010 Number of Participants (millions)	Growth Rate (compared to 2000)
Visiting Beaches	63.67	67.59	6%	70.94	11%
Swimming	54.13	57.21	6%	59.64	10%
Marine angling	**21.88**	**23.31**	**7%**	**24.54**	**12%**
Viewing or Photographing Scenery	19.49	20.62	6%	21.62	11%
Bird-Watching	15.2	16.1	6%	16.86	11%
Motorboating	15.08	15.95	6%	16.7	11%
Viewing other Wildlife	13.68	14.41	5%	15.01	10%
Snorkeling	10.75	11.38	6%	11.88	11%
Visiting Watersides Besides Beaches	9.54	10.22	7%	10.84	14%
Sailing	6.32	6.69	6%	7	11%
Personal Watercraft Use	5.45	5.77	6%	5.99	10%
Surfing	3.37	3.63	8%	3.81	13%
Scuba Diving	2.86	3.12	9%	3.34	17%
Kayaking	2.82	3.01	7%	3.15	12%
Water Skiing	2.44	2.57	5%	2.69	10%
Canoeing	2.23	2.35	5%	2.45	10%
Rowing	1.12	1.21	8%	1.28	14%
Wind Surfing	0.83	0.89	7%	0.94	13%
Hunting Waterfowl	0.7	0.77	10%	0.83	19%

Table 2: Participation in Marine angling and Ocean Marine angling, 2000 (From Leeworthy and Wiley, 2001)

	Participation Rate (%)*	***Number of Participants (millions)***	***Number of Days (millions)***
United States			
Saltwater Marine angling	*10.32*	*21.28*	*258.81*
California			
Saltwater Marine angling	*1.32*	*2.73*	*20.32*

*Participation rate is the percent of all non-institutionalized Americans age 16 or over that did the activity in each state. Note: figures differ from Leeworthy et al. (2005) due to the use of different base population levels.

Table 3: Expenditures for California Recreational Marine angling

Party/Charter Boat

Species and Author	Region	Mode[3]	$/Day
Residents			
Gentner et al. (2001)			
Species Not Specified	Southern California	N/A	94.12
	Northern California	N/A	127.71
Non-Residents			
Gentner et al. (2001)			
Species Not Specified	Southern California	N/A	563.97
	Northern California	N/A	373.61

Private Boat

Author and Species	Region	Mode	$/Day
Residents			
Gentner et al. (2001)			
Species Not Specified	Southern California	R	42.36
	Southern California	S	21.32
	Northern California	R	50.05
	Northern California	S	55.27
Non-Residents			
Gentner et al. (2001)			
Species Not Specified	Southern California	R	251.05
	Southern California	S	188.96
	Northern California	R	143.04
	Northern California	S	198.13

[3] R = Rental boat; S = Shore; OS = Offshore; PC = Party/Charter boat; P = Private boat; MM = Man Made Structures, NS=not specified.

Table 4a: Expenditures for Non-California Recreational Marine angling on the Pacific Coast

Author and Species	Location	Mode[4]	$/Day
Residents			
Gentner et al. (2001a)	Oregon	PC	165.02
Species Not Specified	Oregon	P; R	50.62
	Oregon	S	56.61
	Washington	PC	220.73
	Washington	P; R	43.46
	Washington	S	78.42
Hamel et al. (2000)	Alaska (Regional Resident)	PC	203.74
Halibut, Salmon	Alaska (Regional Resident)	S	40.26
	Alaska (Regional Resident)	P	76.86
	Alaska (Alaska Resident)	PC	250.10
	Alaska (Alaska Resident)	S	47.58
	Alaska (Alaska Resident)	P	109.80
Non-Residents			
Gentner et al. (2001a)	Oregon	PC	250.75
Species Not Specified	Oregon	P; R	116.18
	Oregon	S	127.06
	Washington	PC	288.33
	Washington	P; R	227.81
	Washington	S	306.98
Hamel et al. (2000)	Alaska	PC	358.68
Halibut, Salmon	Alaska	S	157.38
	Alaska	P	139.08

[4] R = Rental boat; S = Shore; OS = Offshore; PC = Party/Charter boat; P = Private boat; MM = Man Made Structures, NS=not specified.

Table 4b: Expenditures for Recreational Marine angling in the Southeast Region

Author and Species	Location	Mode	$/Trip	$/Day
Residents				
Gentner et al. (2001b)	Alabama	PC		149.18
Species Not Specified	Alabama	P; R		111.16
	Alabama	S		39.23
	East Florida	PC		112.45
	East Florida	P; R		77.91
	East Florida	S		43.17
	West Florida	PC		153.83
	West Florida	P; R		59.55
	West Florida	S		22.01
	Georgia	PC		178.37
	Georgia	P; R		188.77
	Georgia	S		37.18
	Louisiana	PC		201.73
	Louisiana	P; R		68.56
	Louisiana	S		48.38
	Mississippi	PC		186.62
	Mississippi	P; R		39.94
	Mississippi	S		13.56
	North Carolina	PC		235.94
	North Carolina	P; R		84.57
	North Carolina	S		74.42
	South Carolina	PC		163.47
	South Carolina	P; R		42.01
	South Carolina	S		63.32
Bell et al. (1982), Other	All Florida Regions	PC; P; S		56.79

Table 4b: Expenditures for Recreational Marine angling in the Southeast Region (continued)

Author and Species	Location	Mode	$/Trip	$/Day
Southwick Associates, Inc. (2001)	Florida	PC	131.04	
Red Drum	Florida	P; R	67.86	
	Florida	S	31.59	
	Georgia	PC	177.84	
	Georgia	P; R	188.37	
	Georgia	S	37.44	
	North Carolina	PC	236.34	
	North Carolina	P; R	83.07	
	North Carolina	S	74.88	
	South Carolina	PC	163.80	
	South Carolina	P; R	42.12	
	South Carolina	S	59.67	
Non-Residents				
Gentner et al. (2001b)	Alabama	PC		159.14
Species Not Specified	Alabama	P; R		68.11
	Alabama	S		59.41
	East Florida	PC		229.51
	East Florida	P; R		110.16
	East Florida	S		165.32
	West Florida	PC		203.95
	West Florida	P; R		113.48
	West Florida	S		36.87
	Georgia	PC		182.40
	Georgia	P; R		90.69
	Georgia	S		134.70
	Louisiana	PC		146.53
	Louisiana	P; R		65.88
	Louisiana	S		103.95
	Mississippi	PC		133.82
	Mississippi	P; R		97.68

Mississippi	S	65.79

Table 4b: Expenditures for Recreational Marine angling in the Southeast Region (continued)

Author and Species	Location	Mode	$/Trip	$/Day
Gentner et al. (2001b) (Continued)	North Carolina	PC		129.53
	North Carolina	P; R		107.82
	North Carolina	S		88.37
	South Carolina	PC		258.53
	South Carolina	P; R		78.47
	South Carolina	S		122.00
Southwick Associates, Inc. (2001)	Florida	PC	210.6	
Red Drum	Florida	P; R	112.32	
	Florida	S	79.56	
	Georgia	PC	181.35	
	Georgia	P; R	91.26	
	Georgia	S	134.55	
	North Carolina	PC	129.87	
	North Carolina	P; R	107.64	
	North Carolina	S	88.92	
	South Carolina	PC	258.57	
	South Carolina	P; R	78.39	
	South Carolina	S	121.68	
Bell et al. (1982), Other	All Florida Regions	PC; P; S		100.25
Residents and Non-Residents				
Southwick Associates, Inc. (1998)	Mississippi	All	220.71	

Table 4c: Expenditures for Recreational Marine angling in the Northeast Region

Author and Species	Location	Mode	$/Trip	$/Day
Residents				
Steinback and Gentner (2001)	Connecticut	PC		72.54
Species Not Specified	Connecticut	P; R		44.96
	Connecticut	S		25.40
	Delaware	PC		57.08
	Delaware	P; R		46.34
	Delaware	S		25.73
	Maine	PC		75.70
	Maine	P; R		32.96
	Maine	S		22.74
	Maryland	PC		115.66
	Maryland	P; R		32.96
	Maryland	S		43.00
	Massachusetts	PC		82.68
	Massachusetts	P; R		51.25
	Massachusetts	S		34.85
	New Hampshire	PC		56.53
	New Hampshire	P; R		44.66
	New Hampshire	S		29.71
	New Jersey	PC		68.50
	New Jersey	P; R		73.82
	New Jersey	S		38.33
	New York	PC		54.25
	New York	P; R		60.86
	New York	S		24.92
	Rhode Island	PC		90.01
	Rhode Island	P; R		40.44
	Rhode Island	S		16.10
	Virginia	PC		73.72
	Virginia	P; R		58.63

Virginia	S	48.76

Table 4c: Expenditures for Recreational Marine angling in the Northeast Region (continued)

Author and Species	Location	Mode	$/Trip	$/Day
Southwick Associates, Inc (2001)	Virginia	PC	71.37	
Red Drum	Virginia	P; R	57.33	
	Virginia	S	47.97	
Steinback (1999)	Maine	PC		61.31
Species Not Specified				
Non-Residents				
Steinback and Gentner (2001)	Connecticut	PC		49.96
Species Not Specified	Connecticut	P; R		50.81
	Connecticut	S		23.04
	Delaware	PC		49.49
	Delaware	P; R		62.66
	Delaware	S		64.90
	Maine	PC		84.84
	Maine	P; R		47.06
	Maine	S		67.27
	Maryland	PC		118.78
	Maryland	P; R		61.99
	Maryland	S		76.54
	Massachusetts	PC		106.19
	Massachusetts	P; R		46.16
	Massachusetts	S		59.71
	New Hampshire	PC		45.61
	New Hampshire	P; R		43.49
	New Hampshire	S		55.09
	New Jersey	PC		83.94
	New Jersey	P; R		67.07
	New Jersey	S		41.48
	New York	PC		162.12
	New York	P; R		72.65

New York	S	21.50
Rhode Island	PC	111.30

Table 4c: Expenditures for Recreational Marine angling in the Northeast Region (continued)

Author and Species	Location	Mode	$/Trip	$/Day
Steinback and Gentner (2001)	Rhode Island	P; R		49.24
(Continued)	Rhode Island	S		52.81
	Virginia	PC		94.08
	Virginia	P; R		63.98
	Virginia	S		62.56
Southwick Associates, Inc (2001)	Virginia	PC	142.74	
Red Drum	Virginia	P; R	87.75	
	Virginia	S	136.89	
Steinback (1999)	Maine*	NS		108.68
Species Not Specified				
Both Residents and Non-Residents				
Southwick Associates, Inc. (2005)	New England	PC	171.49	
Striped Sea Bass	New England	P; R	47.66	
	New England	S; MM	41.55	
	Mid Atlantic	PC	111.79	
	Mid Atlantic	P; R	64.46	
	Mid Atlantic	S; MM	46.79	

Table 4d: Expenditures for Recreational Marine angling in Texas

Author (Species Not Specified)	Location	Mode	$/Day
Residents			
Southwick Associates, Inc. (2003)			
Flounder	Texas	NS	45.35
Red Drum	Texas	NS	31.52
Seatrout	Texas	NS	39.38
All	Texas	NS	98.92
Non-Residents			
Southwick Associates, Inc. (2003)			
Flounder	Texas	NS	62.14
Red Drum	Texas	NS	35.78
Seatrout	Texas	NS	30.18
All	Texas	NS	36.74

Table 5: Non-Market Values for California Recreational Marine angling

Party/Charter Boat

Author and Species	Region	Mode[5]	Measurement Method[6]	$/Trip	$/Day
Residents					
Huppert, Thomson (1984)					
Species Not Specified	California		TC	33.54[7]	
Both Residents and Non-Residents					
Wegge et al. (1986)					
Other	Southern California	O	TC		43.34 (for trips ≤ 1 day)
	Southern California	NO	TC		96.53 (for trips ≤ 1 day)
	Southern California	O	TC		24.33 (for trips > 1 day)
	Southern California	NO	TC		30.04 (for trips > 1 day)
Pacific Mackerel, Kelp Bass, Rockfish	Southern California	PC	CVM	44.33	

[5] PC = Party/Charter boat; P = Private boat; R = Rental boat; O = Boat Owner; NO = Non-Boat Owner; S = Shore; OS = Offshore; MM = Man Made Structure

[6] CVM = Contingent Valuation Method; TC = Travel Cost Method; OLS = Ordinary Least Squares; NLS = Nonlinear Least Squares; TML = Truncated ML Model

[7] This value is based on a travel cost method in which the time travel is valued at 1/3 the wage rate.

Table 5: Non-Market Values for California Recreational Marine angling (continued)

Private Boat

Author and Species	Region	Mode[8]	Measurement Method	$/Trip	$/Day
Residents					
Kling and Herriges (1995), Other	Southern California	OS	TC and RUM	35.15-56.90[9]	
	Southern California	S	TC and RUM	10.84-21.35[8]	
Both Residents and Non-Residents					
Wegge et al. (1986) Other	Southern California	R	CVM		29.55
	Southern California	S	CVM		14.78
	Southern California		CVM		59.10
	Southern California	O	TC		35.30
	Southern California	NO	TC		29.10
	Southern California	S; O	TC		16.21
	Southern California	S; NO	TC		29.57

[8] PC = Party/Charter boat; P = Private boat; R = Rental boat; O = Boat Owner; NO = Non-Boat Owner; S = Shore; OS = Offshore; MM = Man Made Structure

[9] Values given per undefined choice occasion.

Table 6a: Non-Market Values for Recreational Marine angling Outside of California (primary data available)

Author and Species	Location	Mode[10]	Measurement method[11]	$/Trip	$/Day
Residents					
Hamel et al. (2000) Halibut, Salmon	Alaska	PC	CVM and TC		99.39
Hausman et al. (1995) Species not Specified	Alaska	NS	TC and RUM	188.02	
Bell et al. (1982), Other	Florida[12]	PC; P; S	CVM		82.90
Downing and Ozuna (1996) Species Not Specified	Texas	General boating	CVM	60.23-407.69 (mean of counties 171.11)	
Non-residents					
Hamel et al. (2000) Halibut, Salmon	Alaska	PC	TC and CVM		146.14
Bell et al. (1982), Other	Florida[12]	PC; P; S	CVM		61.86
Residents and Non-residents					
Hamel et al. (2000) Halibut, Salmon	Alaska	PC	TC and CVM		119.62
Bell et al. (1982), Other	Florida	PC; P; S; MM	CVM		77.00
Bishop et al. (1990)	Wisconsin	NS	CVM	46.54	
Residential Status Not Specified					
Bell, F.W. (1997), Other	East Florida Coast	NS	TC		100.64
	West Florida Coast	NS	TC		66.70

[10] PC = Party/Charter boat; P = Private boat; R = Rental boat; O = Boat Owner; NO = Non-Boat Owner; S = Shore; OS = Offshore, NS=not specified
[11] CVM = Contingent Valuation Method; TC = Travel Cost Method, RUM = Random Utility Model, NRUM = Nested Random Utility Model
[12] Includes Northwest Gulf, West Gulf, Northeast Gulf, Southwest Gulf, and Southeast Atlantic.

Kaoru, Y. (1995), Other	North Carolina	General Boating	TC and RUM	4.42

Table 6b: Non-Market Values for Recreational Marine angling Outside of California (secondary data available only):

Author and Species	Location	Mode	Measurement Method	$/Trip	$/Day
Residents					
Jones and Stokes Associates (1987)*	Alaska	PC; P; R	TC and RUM	33.90 (CO)	
Halibut	Alaska	S	TC and RUM	6.21 (CO)	
	Alaska	NS	TC and RUM	7.68 (CO)	
Jones and Stokes Associates (1987)*	Alaska	PC: P; R	TC and RUM	30.82 (CO)	
King Salmon	Alaska	NS	TC and RUM	10.34 (CO)	
Jones and Stokes Associates (1987)*	Alaska	PC; P; R	TC and RUM	23.38 (CO)	
Silver Salmon	Alaska	NS	TC and RUM TC and RUM	7.19 (CO)	
Jones and Stokes Associates (1987)*	Alaska	PC; P; R	TC and RUM	18.20 (CO)	
Other species	Alaska	NS	TC and RUM	4.60 (CO)	
Norton et al.* (1983)	CT, MA, ME, NH, RI	NS	TC	207.26	
Other species	DE, NJ, NY	S	TC	407.29	
	MH, VA	PC ; P ; S	TC	93.99	
	NC	NS	TC	277.15	

Table 6b (continued): Non-Market Values for Recreational Marine angling Outside of California (secondary data available only):

Author and Species	Location	Mode	Measurement Method	$/Trip	$/Day
Non-Residents					
Rowe, R.* (1985), Salmon	Oregon	PC; P; S	TC and RUM	116.07	
	Washington	PC; P; S	TC and RUM	100.52	
Crutchfield and Schelle* (1978), Other	Washington	PC; P	CVM		55.48
Bockstael et al.* (1986), Other	S. Carolina	P	CVM		97.92
McConnell et al.* (1993), Other	Mid-Atlantic/ Eastern States[13]	PC; P; S	CVM		215.85
McConnell and Strand*(1994) Other	New York	PC; P; S	TC and RUM		98.31
	New Jersey	PC; P; S	TC and RUM		56.95
	Delaware	PC; P; S	TC and RUM		18.51
	Maryland	PC; P; S	TC and RUM		44.67
	Virginia	PC; P; S	TC and RUM		77.58
	N. Carolina	PC; P; S	TC and RUM		111.23
	S. Carolina	PC; P; S	TC and RUM		114.44
	Georgia	PC; P; S	TC and RUM		70.12
	Florida	PC; P; S	TC and RUM		135.86
	New York	PC; P; S	TC and RUM		96.35
	New Jersey	PC; P; S	TC and RUM		54.03
	Delaware	PC; P; S	TC and RUM		17.07
	Maryland	PC; P; S	TC and RUM		45.73
	Virginia	PC; P; S	TC and RUM		64.01
	N. Carolina	PC; P; S	TC and RUM		114.81
	S. Carolina	PC; P; S	TC and RUM		113.03
	Georgia	PC; P; S	TC and RUM		66.06
	Florida	PC; P; S	TC and RUM		113.03

[13] This region includes the following states: DE, FL, GA, MD, NC, NJ, NY, SC, VA.

* Information and values pertaining to this study were taken from Industrial Economics, Inc. Sportfishing Values Database.

† Information and values pertaining to this study were taken from Freeman III (1995).

Table 6b (continued): Non-Market Values for Recreational Marine angling Outside of California (secondary data available only):

Author and Species	Location	Mode	Measurement Method	$/Trip	$/Day
Residential Status Not Specified					
Rowe et al.† (1985)	Oregon	NS	RUM	8.65	
Pacific Salmon	Washington	NS	RUM	0.63	
Wegge et al.† (1988), Pacific Salmon	Alaska	NS	RUM	69.94	
Leeworthy† (1990)	Florida	NS	TC	81.33	