1991 Net Economic Values for Bass and Trout Fishing, Deer Hunting, and Wildlife Watching

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1991 Net Economic Values for Bass and Trout Fishing, Deer Hunting, and Wildlife Watching

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This report is intended to complement the National and State reports from the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. The conclusions are the authors and do not represent official positions of the U.S. Fish and Wildlife Service.

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Abstract

State-by-state estimates of the net economic value of bass and trout fishing, deer hunting, and primary nonresidential wildlife watching based on contingent-valuation questions from the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation are presented in this report. States were classified as having primarily bass fishing or primarily trout fishing. Based on this classification, anglers were asked to answer a contingent-valuation question for either their bass or their trout fishing during 1991. Bass fishing refers to smallmouth and largemouth bass and excludes white bass, spotted bass, striped bass, striped bass hybrids, and rock bass. Trout fishing refers to all species commonly known as trout. Deer hunters in all 50 states were asked a contingent-valuation question for their 1991 deer hunts, and people who took trips to watch wildlife at least one mile from their residence were asked a contingent-valuation question for these activities during 1991. Net economic values are developed for current resource conditions, and marginal net economic values are also developed for changes in angler catch rates and changes in hunter harvest rates for deer. The net economic values reported here are appropriate measures of economic value for use in cost-benefit analyses, damage assessments, and project evaluations.

I. Introduction

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Survey hereafter) is the only source of data on human use of wildlife resources that is collected on a consistent, state-by-state basis. The first time net economic value data were collected was in the 1980 Survey, and this effort was repeated in the 1985 and 1991 Surveys. Estimates of net economic value for bass and trout fishing, deer hunting, and wildlife watching derived from contingent-valuation questions in the 1991 Survey are presented in this report. Bass fishing refers to smallmouth and largemouth bass and excludes white bass, spotted bass, striped bass, striped bass hybrids, and rock bass. Trout fishing refers to all species commonly known as trout. Wildlife watching refers to trips at least one mile from home taken for the primary purpose of observing, photographing, or feeding wildlife.

In the following section we discuss the conceptual framework for net economic values of wildlife-related recreation, differentiating between net economic values and economic impacts. A discussion of the contingent-valuation questions and the procedures used to analyze the contingent-valuation data are presented in the third section. Net economic value estimates are reported in the fourth section. The fifth section contains a discussion of how to use the value data presented in this report and concluding comments are presented in the last section.

II. Measures of Economic Value

In 1991 more than 35 million Americans 16 years of age and older took trips to fish and spent nearly $12 billion on trip-related expenditures. Expenditures are a useful indicator of the importance of sport fishing activities to local, regional, state and national economies, but expenditures (economic impacts) do not measure the economic benefit to individual participants. Net economic value, or consumer surplus, is the appropriate economic measure of the benefit to individuals from participation in wildlife-related recreation (Bishop, 1984; Freeman, 1993; Loomis et al., 1984; McCollum et al., 1992). Net economic value is measured as participants' "willingness to pay" above what they actually spend to participate. The benefit to society is the summation of willingness to pay across all individuals.

There is a direct relationship between expenditures and net economic value, as shown in Figure 1. A demand curve for a representative angler is shown in the figure. The downward sloping demand curve indicates that each additional trip is valued less by the angler than the preceding trip. All other factors being equal, the lower the cost per trip (vertical axis) the more trips the angler will take (horizontal axis). The cost of a fishing trip serves as an implicit price for fishing since a market price generally does not exist for this activity. At $60 per trip, the angler would choose not to fish, but if fishing were free, the angler would take 20 fishing trips.

At a cost per trip of $25 the angler takes 10 trips, with a total willingness to pay of $375 (area acde in Figure 1). Total willingness to pay is the total value the angler places on participation. The angler will not take more than 10 trips because the cost per trip ($25) exceeds what he would pay for an additional trip. For each trip between zero and 10, however, the angler would actually have been willing to pay more than $25 (the demand curve, showing willingness to pay, lies above $25).

The difference between what the angler is willing to pay and what is actually paid is net economic value. In this simple example, therefore, net economic value is $125 (($50 – $25) 10 ÷ 2) (triangle bcd in Figure 1) and angler expenditures are $250 ($25 × 10) (rectangle abde in Figure 1). Thus, the angler's total willingness to pay is composed of net economic value and total expenditures. Net economic value is simply total willingness to pay minus expenditures. The relationship between net economic value and expenditures is the basis for asserting that net economic value is an appropriate measure of the benefit an individual derives from participation in an activity and that expenditures are not the appropriate benefit measure. Expenditures are out-of-pocket expenses on items an angler purchases in order to fish. The remaining value, net willingness to pay (net economic value), is the measure of an individual's satisfaction after all costs of participation have been paid.

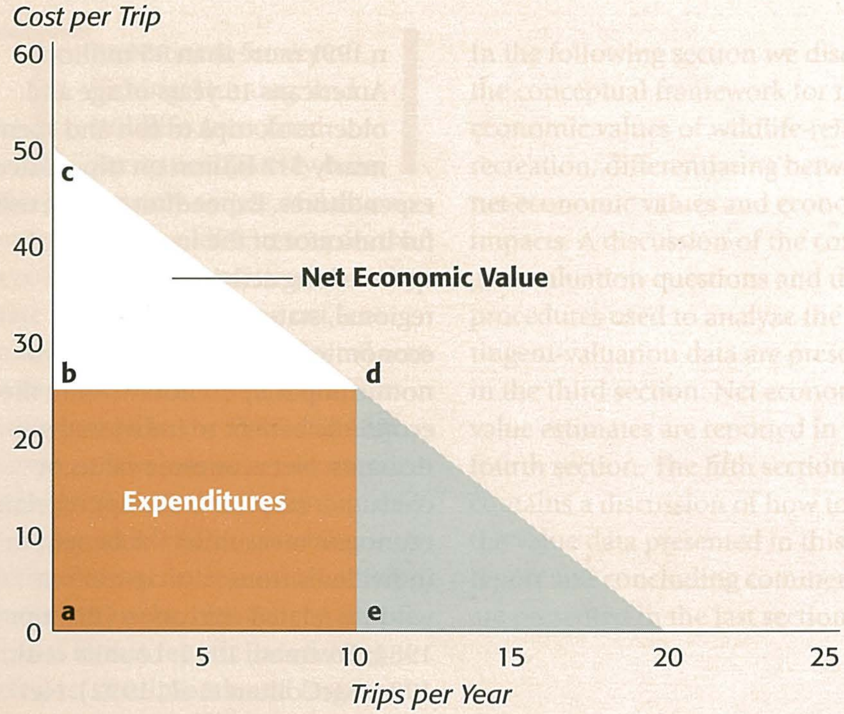
The value to society is derived by summing the net economic values of all individuals who participate in an activity. For our example let us assume that there are 100 anglers who fish and all have demand curves identical to that of our typical angler presented in Figure 1. The total value of this sport fishery to society is $12,500 ($125 × 100).

Note that we have purposely excluded angler expenditures from the computation of societal benefits. Because individuals spend all of their income, with savings being a form of expenditure, angler expenses are not counted as benefits from a national accounting perspective. Money that is not spent for fishing at a particular site will be spent for fishing at another site or might be spent on an entirely different activity (e.g., attending a baseball game). Thus, any change in expenditures is simply a transfer from one subgroup of society to another subgroup.

There are very limited conditions under which expenditures might be counted as benefits (McCollum et al., 1992). For example, assume that 50 resident anglers and 50 nonresident anglers fish a lake in Colorado. If fishing was not allowed at the lake, Colorado residents are likely to fish elsewhere in Colorado. Their expenditures are not lost from the State's economy, they are simply transferred to another geographic area of the State. If nonresidents, however, choose to fish in another state, their

FIGURE 1.

Individual Angler's Demand Curve for Fishing Trips



expenditures would be lost to Colorado's economy. In this case, nonresident expenditures would constitute new money in the State's economy and would be counted as a regional benefit of $12,500 ($25 × 10 × 50).

Fishing, hunting and wildlife watching expenditures are recorded in the National and State reports generated from the 1991 Survey. Economic impacts of fishing and hunting are documented in separate reports.[1] In this report we present net economic values, which are appropriate measures of value for any benefit-cost evaluation of a wildlife project. Net economic values can enter these analyses as either benefits gained for improvements or benefits lost due to decrements. Expenditures should only enter into analyses to the extent that projects are regional or local in nature, and expenditures by participants would clearly increase or decrease in the study area as a consequence of the proposed wildlife management decision.

The example we developed for sport fishing could have been developed in the context of deer hunting or wildlife watching. The basic concept of net economic value is the same for all three activities.

[1] *The 1991 Economic Impacts of Sport Fishing in the United States* is available from the American Sportfishing Association, 1033 N. Fairfax Street, Suite 200, Alexandria, VA 22314. *The 1991 Economic Benefits of Hunting in the United States* is available from Southwick Associates, PO Box 5662, Arlington, VA 22205. Both reports are available for individual states.

III. Estimating Net Economic Values

Net economic values are estimated using contingent valuation (Mitchell and Carson, 1989). Contingent valuation is a direct-questioning approach by which individuals are asked to reveal the value they place on an item or activity within a survey setting. The contingent-valuation questions were asked using the dichotomous-choice format (Bishop, Heberlein, and Kealy, 1983; Cameron, 1988; Hanemann, 1984; McConnell, 1990). Respondents were asked whether they would pay a fixed dollar amount to participate in an activity. The dollar amounts and respondents' "yes/no" responses are used to infer the mean of the values respondents place on each activity.

Respondents were asked to report their total trip expenses to participate in an activity during 1991, which is the expenditure rectangle abde in Figure 1. Respondents' expenditures constitute what is called the payment vehicle in the contingent-valuation questions (Mitchell and Carson, 1989). The payment vehicle is the mechanism by which respondents can express the net economic value they place on the activity being evaluated.

Taking bass fishing as an example, respondents were asked to recall their total number of bass fishing trips, bass caught, average length of bass caught, and their total trip expenditures for 1991 before answering the contingent-valuation question. The wording of the contingent-valuation question was:

> Fishing expenses change over time. For example, gas prices rose dramatically during the 1970's, fell somewhat during the early 1980's, and rose again in the late 1980's. Would you have taken any trips to fish primarily for bass during 1991 if your total bass fishing costs were _____ dollars more than the amount you just reported?

Response categories were yes or no. Note: respondents were only asked to value fishing trips where bass fishing was the "primary" activity. The trout fishing question was exactly the same except "trout" was substituted for "bass" in the question. Similar questions were employed for the deer hunting and wildlife watching contingent-valuation questions. The fishing, hunting and wildlife watching valuation sections of the 1991 Survey are replicated in Appendix A.

Dollar amounts in the valuation questions were developed using contingent-valuation responses from the 1985 Survey and the procedure developed by Duffield and Patterson (1991) for assigning dollar amounts to dichotomous-choice questions (Boyle, 1990). The dollar amounts for each activity and their respective frequency of use are replicated in Appendix B.

Responses to the contingent-valuation questions are used to estimate probit equations as formulated by Cameron and James (1987). One equation was estimated for each activity within each state. The estimation of these equations used respondents "yes/no" responses as dependent variables, and the dollar stimulus and other independent variables as explanatory variables. The dollar amount from the valuation questions is included in all equations. Each equation was initially estimated using a number of explanatory variables. After initial runs of the equations for each activity, it was clear the coefficients on most variables were not significant. Variables included in the final estimation are presented in Table 1.

TABLE 1.

Explanatory Variables in the Probit Equations

Bass Fishing	*Trout Fishing*	*Deer Hunting*	*Wildlife Watching*
Bid	Bid	Bid	Bid
# Bass	# Trout	# Deer	Private
Inches	Inches	Big Game	Public
			Photo
			Fished

The final fishing equations include the dollar amount from the valuation question (bid), the number of fish the anglers caught (# bass, # trout) during 1991 and the average length of the fish caught during 1991.[2] The deer hunting equations include the bid variable, the number of deer a hunter harvested (# deer) during 1991 and a dummy variable to indicate whether the individual hunted other big game during 1991 (yes=1).[3] Similar variables are not appropriate for wildlife watching because resources are not being harvested and a single species is not as likely to be targeted. In turn, variables that characterize different types of wildlife watching and activities in which the individuals participated are included to assess whether these categorizations significantly affect estimated net economic values. Dummy variables are included to indicate whether individuals watch wildlife on private land (yes=1) or public land (yes=1). The omitted category is individuals who took trips to watch wildlife on both private and public land. Dummy variables indicating whether individuals photographed wildlife while on trips to watch wildlife (yes=1) and whether they were an angler (yes=1) are also included.[4]

The fish caught and deer harvested variables are included in the fishing and hunting equations to allow computation of marginal values, the amount by which net economic value increases or decreases as the number of fish caught (deer harvested) increases or decreases. The purpose of including these variables is to allow the computation of marginal values for fish and wildlife projects that either increase harvest rates or protect resources to prevent declines in harvest rates. In many instances, all or nothing values, as shown in Figure 1, are not appropriate. Rather, a change in quality shifts

[2] The initial fishing equations also included variables reflecting whether the person lived in an urban area or rural area (small town or city was the omitted variable), whether they fished for other warm water species (bass equations) and cold water species (trout equations), whether they fly fished, and whether the angler participated in wildlife watching activities within one mile of home and more than one mile from home.

[3] The initial deer hunting equations also included variables reflecting whether the person lived in an urban area or rural area (small town or city was the omitted variable), whether the hunter bagged a buck, the age the hunter first started hunting, and whether the hunter participated in wildlife watching activities within one mile of home and more than one mile from home.

[4] The initial equations for wildlife observation also included variables reflecting whether the person lived in an urban area or rural area (small town or city was the omitted variable), whether they fed wildlife on their trips, whether they participated in wildlife watching activities within one mile of their home, and whether they hunted.

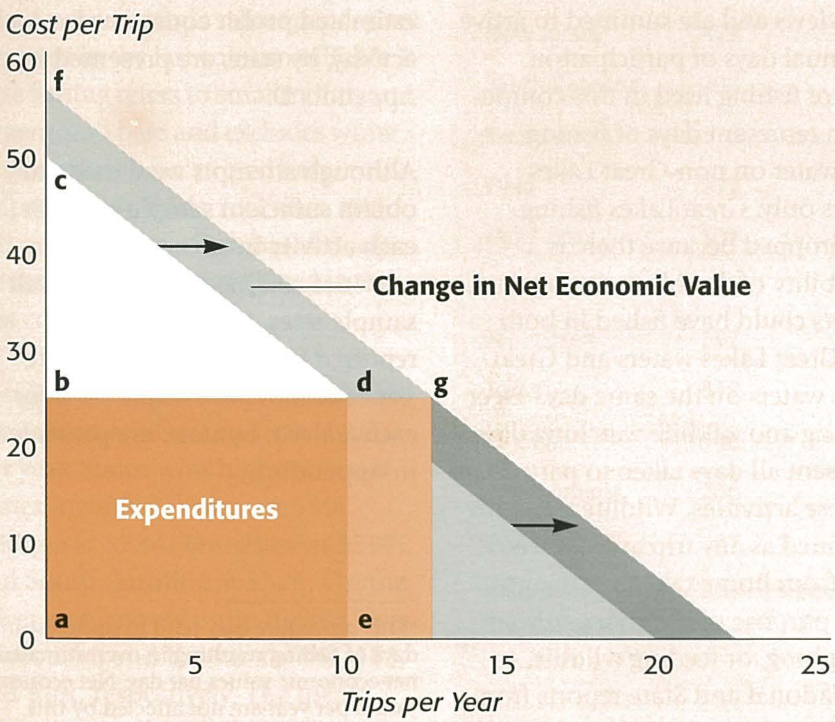
the demand curve, thereby resulting in a change in net economic value (Figure 2). In these instances, the change in net economic value is the appropriate benefit measure.

For example, assume a management activity will increase catch rates for anglers by 10 percent. This change in the resource results in a shift of the demand curve upward and to the right, as presented in Figure 2. The benefit to the angler of this increase in catch rate is the area cfgd. Estimation of this area is possible by including harvest rates as explanatory variables in the estimated probit equations.

Responses to the contingent-valuation questions are analyzed by estimating probit equations using weighted maximum likelihood procedures (Cameron, 1988; Greene, 1992). Maximum likelihood estimation is used because the dependent variable is discrete (0/1) and the estimation is weighted because the Survey is conducted with a probability sample where observations have unequal probabilities of being selected into the sample. The estimated probit equations are used to derive estimates of average net economic value per year for each activity within each state. Ninety percent confidence intervals are developed for these averages (Cameron, 1991). A discussion of the estimation procedures is presented in Appendix C.

FIGURE 2.

Shift in Angler Demand Curve for Fishing Trips Due to an Increase in Catch Rate



IV. Estimated Net Economic Values

The 1991 Survey was conducted for the U.S. Fish and Wildlife Service by the U.S. Bureau of Census. The Bureau of Census collected the data primarily by telephone; respondents who could not be reached by phone were interviewed in-person. Three interviews were conducted at four month intervals to reduce recall bias associated with asking respondents to report participation in an activity for an entire year. The response rate was 93 percent. Contingent-valuation data were collected in January 1992 for the 1991 calendar year. Net economic values per day are computed by dividing estimated net economic value per year for each respondent by the number of days that individual participated in the activity. Days of participation were collected in each of the three interviews and are summed to arrive at annual days of participation. Days of fishing used in this computation represent days of fishing freshwater on non-Great Lakes waters only. Great Lakes fishing was dropped because there is a possibility of double counting days; anglers could have fished in both non-Great Lakes waters and Great Lakes waters on the same day.[5] Deer hunting and wildlife watching days represent all days taken to participate in these activities. Wildlife watching is defined as any trip at least one mile from home taken for the primary purpose of observing, photographing, or feeding wildlife. In the National and State reports from the 1991 Survey, wildlife watching is referred to as a nonresidential, nonconsumptive activity.

Net economic values for bass and trout fishing were estimated for selected states. Data from previous surveys indicate that bass fishing is a popular activity in some states, while less popular in other states. The same is true for trout fishing. In states with smaller numbers of bass or trout anglers, the Survey contains too few observations to estimate net economic values. Therefore, each state was classified as being either a bass fishing state or a trout fishing state. Bass fishing states tend to be midwestern, southeastern, and some eastern states, whereas trout states are mostly western and some northeastern states. Net economic values are estimated for all states for deer hunting and wildlife watching. The estimated probit equations for each activity, by state, are presented in Appendix D.

Although attempts were made to obtain sufficient sample sizes for each activity in all states, some activities still have relatively small sample sizes. Results are not reported for states with a sample size less than 50. Sample sizes for each activity, by state, are presented in Appendix E.

[5] This procedure may tend to underestimate days of fishing resulting in overestimates of net economic values per day. Net economic values per year are not affected by this calculation.

There is an important caveat to consider when interpreting the net economic value estimates for each of the activities. All net economic values are based on respondents' state of residence. For example, if an angler fished for bass in his state of residence and another state, this angler's net economic value will reflect all of his fishing effort and the value will be attributed to his state of residence. Value estimates for each state, therefore, do not reflect fishing effort in the state by nonresidents. However, value estimates for state residents do reflect their fishing effort in other states. Although this grouping of the data is not ideal, it was necessary in order to contain the cost of the Survey.

Bass fishing

State-by-state estimates of net economic value per year with ninety percent confidence intervals for bass fishing are shown in Table 2. Computed net economic values per day are reported in the last column of Table 2. Bass fishing refers to smallmouth and largemouth bass and excludes white bass, spotted bass, striped bass, striped bass hybrids, rock bass, and others. States for which bass fishing values are estimated are listed in the first column of Table 2.

Results show substantial variation in the estimates of net economic value per year. States with high value estimates include Arkansas at $801, Georgia at $794, Tennessee at $597, and South Carolina at $589. On the lower end, annual estimates for Iowa, Wisconsin, and Kansas are $61, $63, and $191, respectively. The mean value across all states is $433.

TABLE 2.

Net Economic Value for Bass Fishing by State

	Net Economic Value Per Year			
State	*Mean*	*Standard Error of the Mean*	*Ninety Percent Confidence Interval*	*Net Economic Value Per Day*
Alabama	515	88	371-660	32
Arkansas	801	147	559-1043	39
Delaware[1]				
Florida	472	59	374-570	28
Georgia	794	268	354-1235	40
Illinois	503	102	335-670	38
Indiana	521	64	416-626	31
Iowa[2]	61	114	−127-248	6
Kansas	191	78	63-319	14
Kentucky	467	83	330-603	33
Louisiana	486	91	336-637	32
Maryland	527	145	288-766	47
Michigan	247	136	24-470	22
Minnesota	330	72	212-448	31
Mississippi	491	82	356-625	26
Missouri	420	56	328-512	32
New Jersey	473	91	323-622	29
North Carolina	295	98	134-457	16
Nebraska	379	74	257-501	29
Ohio	372	74	251-493	28
Oklahoma	302	71	185-419	18
South Carolina	589	168	312-866	44
Tennessee	597	91	447-748	29
Texas	519	82	384-654	35
Virginia	548	100	384-711	33
West Virginia	288	60	190-386	28
Wisconsin[2]	63	172	−219-346	5

[1]Mean is not reported because the equation is not significant.
[2]Ninety percent confidence interval includes zero.

A net economic value is not reported for Delaware because the estimated probit equation is not significant (Chi-square = 2.76, df = 3, p = 0.43). A reduced equation was used to test for significance with the bid being the only independent variable, and neither the equation nor the bid coefficient were significant at the 0.10 level.

Results for Iowa and Wisconsin should be interpreted with caution because the 90 percent confidence intervals include zero. Annual net economic values are not statistically significantly different from zero.

Net economic value per year for bass fishing, average number of bass caught per angler per year, and the marginal value of catching an additional bass are presented in Table 3. The marginal values show the change in net economic value per year that would result from changing the average catch rate by one bass per year. For Michigan, an increase in the average number of bass caught by one fish per year increases net economic value per year for the average angler by $15.88. Other states with relatively high marginal values (>$5) include Illinois, Louisiana, Maryland, Minnesota, and South Carolina. States with low marginal values (<$1) include Alabama, Kansas, and Kentucky. These differences in marginal values are not surprising. Anglers in states with high marginal values caught an average of 44 bass in 1991, while anglers in states with low marginal values caught an average of 59 bass in 1991. Assuming diminishing marginal utility of consumption, declining marginal values associated with

TABLE 3.

Marginal Values for Catching an Additional Bass by State

State	*Net Economic Value Per Year*	*Average Number Bass Caught*	*Marginal Value*
Alabama	515	57	0.47
Arkansas	801	71	2.52
Delaware[1]		26	
Florida	472	39	2.95
Georgia	794	55	2.64
Illinois	503	41	9.04
Indiana	521	50	2.43
Iowa[2]	61	39	2.56
Kansas	191	56	0.60
Kentucky	467	65	0.22
Louisiana	486	76	5.85
Maryland	527	46	6.67
Michigan	247	27	15.88
Minnesota	330	24	7.55
Mississippi	491	76	2.14
Missouri	420	59	1.14
Nebraska	473	56	2.01
New Jersey	295	42	4.78
North Carolina	379	55	2.77
Ohio	372	43	1.20
Oklahoma	302	62	2.59
South Carolina	589	53	5.47
Tennessee	597	73	1.45
Texas	519	75	3.46
Virginia	548	70	1.18
West Virginia	288	55	2.20
Wisconsin[2]	63	43	1.24

[1]Means and marginal values are not reported because the equation is not significant.
[2]Ninety percent confidence interval on the mean includes zero.

increasing catch rates is an expected outcome. The average marginal value across all states for which bass fishing values were estimated is $3.62.

Trout fishing

State-by-state estimates of the net economic value per year with ninety percent confidence intervals for trout fishing are presented in Table 4. Computed net economic values per day are reported in the last column of Table 4. Trout fishing refers to all species commonly known as trout (rainbow, brown, brook, lake, etc.). As with the bass fishing results, contingent-valuation data on trout fishing were only collected in selected states.

Estimates of net economic value per year range from highs of $965, $584, and $485 in California, New York and Arizona, respectively, to lows of $235 for Maine and $236 for Pennsylvania. The mean value across all states is $374.

Sample sizes for the trout valuation data varied substantially across states, from 16 in North Dakota to 256 in Colorado. Samples sizes for all the trout valuation data are presented in Appendix E, Table E-2. Estimates of net economic value are not reported for Hawaii, North Dakota, and South Dakota because their sample sizes are less than 50.

A net economic value for Rhode Island trout fishing is not reported because the equation is not a significant predictor of responses (Chi-square = 0.33, df = 3, p = 0.954). Reduced equations for Rhode Island were also not significant. Results for

TABLE 4.

Net Economic Value for Trout Fishing by State

	Net Economic Value Per Year			
State	*Mean*	*Standard Error of the Mean*	*Ninety Percent Confidence Interval*	*Net Economic Value Per Day*
Alaska	385	52	300-471	41
Arizona	485	103	315-656	56
California	965	400	307-1623	132
Colorado	351	44	278-424	42
Connecticut	417	74	295-539	34
Hawaii[1]				
Idaho	305	47	228-382	29
Maine	235	48	156-315	17
Massachusetts[2]				
Montana	271	61	171-372	23
Nevada	401	49	320-482	44
New Hampshire	306	60	208-404	23
New Mexico[3]	262	130	48-476	30
New York	584	115	395-773	57
North Dakota[1]				
Oregon	368	41	300-436	42
Pennsylvania	236	40	171-301	15
Rhode Island[4]				
South Dakota[1]				
Utah	260	74	139-382	23
Vermont	263	65	157-369	19
Washington	344	72	225-463	30
Wyoming	299	65	193-405	28

[1]Mean is not reported because the sample size is less than 50.

[2]Mean is not reported because the estimated mean is negative and not statistically significantly different from zero.

[3]Mean is based on a reduced equation.

[4]Mean is not reported because the equation is not significant.

TABLE 5.

Marginal Values for Catching an Additional Trout by State

State	*Net Economic Value Per Year*	*Average Number Trout Caught*	*Marginal Value*
Alaska	385	46	1.18
Arizona	485	38	2.67
California	965	24	26.67
Colorado	351	35	0.71
Connecticut	417	39	7.44
Hawaii[1]		17	
Idaho	305	37	1.00
Maine	235	47	1.65
Massachusetts[2]		30	
Montana	271	66	1.96
Nevada	401	23	2.38
New Hampshire	306	32	2.01
New Mexico[3]	262	38	2.61
New York	584	35	3.11
North Dakota[1]		17	
Oregon	368	41	1.38
Pennsylvania	236	35	0.92
Rhode Island[4]		34	
South Dakota[1]		57	
Utah	260	42	2.97
Vermont	263	40	1.33
Washington	344	45	3.63
Wyoming	299	43	3.26

[1]Mean and marginal value are not reported because the sample size is less than 50.

[2]Mean and marginal value are not reported because the estimated mean is negative and is not statistically significantlly different from zero.

[3]Mean and marginal value are based on a reduced equation.

[4]Mean and marginal value are not reported because the equation is not significant.

New Mexico are based on a reduced equation with bid being the only independent variable. The full equation was insignificant (Chi-square = 4.73, df = 3, p = 0.19), but the reduced equation proved to be significant (Chi-square = 4.86, df = 1, p = 0.03). Results are not reported for Massachusetts because the estimated mean is negative and not statistically significantly different from zero (the 90 percent confidence interval includes zero).

Net economic values per year for trout fishing, the average number of trout caught per angler per year, and the marginal value of catching an additional trout are reported in Table 5. Marginal values show the change in net economic value per year that would result from changing the average catch rate by one trout per year. California has the highest marginal value, $26.67 per trout. Connecticut, with a marginal value of $7.44 per trout, is the only other state with a marginal value greater than $5. Colorado and Pennsylvania have the lowest marginal values, less than $1. As with bass fishing, states with high marginal values, on average, have lower average annual catch rates than do states with low marginal values. The average marginal value across all states for which trout fishing values were estimated is $3.72.

Deer hunting

State-by-state estimates of net economic value per year with ninety percent confidence intervals for deer hunting are presented in Table 6. Computed net economic values per day are reported in the last column of Table 6. Data for deer hunting were collected in all 50 states.

Estimates of net economic value per year vary substantially from state to state. Values range from highs of $768, $744, $705, and $701 for Maryland, New Hampshire, Alabama, and Rhode Island, respectively, to lows of $168 for Iowa, $252 for Idaho, and $254 for Montana. The mean over all the states is $490.

Sample sizes for deer hunting valuation data vary considerably across states, from 13 in Hawaii to 358 in Wisconsin (Appendix E, Table E-3). Results for California and Hawaii are not reported because their sample sizes are less than 50. Sample sizes and average number of days spent deer hunting per year are presented in Appendix E, Table E-3.

New Hampshire's results are based on a reduced equation where the bid and the number of deer bagged were the only independent variables. The equation with a larger number of variables did not converge in the estimation.

Results for Arizona, Idaho, Kansas, and Washington are based on a reduced equation, with bid being the only independent variable. In the larger equation for each of these states the variable for number of deer bagged was not significant and

TABLE 6.

Net Economic Value for Deer Hunting by State

	Net Economic Value Per Year			
State	*Mean*	*Standard Error of the Mean*	*Ninety Percent Confidence Interval*	*Net Economic Value Per Day*
Alabama	705	101	539-870	45
Alaska	512	65	405-619	63
Arizona[1]	559	169	311-865	81
Arkansas	663	84	524-802	50
California[2]				
Colorado	335	92	183-486	66
Connecticut	374	89	228-520	25
Delaware	549	65	442-656	50
Florida	628	114	441-815	41
Georgia	647	110	467-828	44
Hawaii[2]				
Idaho[1]	252	88	107-396	45
Illinois	535	75	412-658	48
Indiana	592	171	310-874	38
Iowa	168	92	17-319	22
Kansas[1]	331	80	201-466	34
Kentucky	657	113	471-843	58
Louisiana	659	125	454-864	36
Maine	271	62	169-373	27
Maryland	768	205	431-1105	53
Massachusetts	560	110	380-741	61
Michigan	513	52	427-599	41
Minnesota	333	49	253-413	55
Mississippi	695	89	548-841	35
Missouri	464	59	367-562	61
Montana	254	49	173-335	36
Nebraska	296	69	183-409	44
Nevada	596	140	366-825	95
New Hampshire[1]	744	156	487-1001	63
New Jersey	675	85	536-815	52
New Mexico	302	101	136-469	66
New York	541	60	442-641	45
North Carolina	618	90	469-766	36
North Dakota	315	28	269-360	56
Ohio	324	75	200-448	33
Oklahoma	582	109	403-762	47
Oregon	433	41	365-501	59
Pennsylvania	415	52	331-500	49
Rhode Island	701	179	406-996	47
South Carolina	588	114	400-776	34
South Dakota	504	79	374-634	83
Tennessee	508	59	411-605	32
Texas	556	79	425-686	53
Utah	259	56	167-352	45
Vermont	475	48	397-554	39
Virginia	532	57	438-626	33
Washington[1]	496	115	306-686	62
West Virginia	372	42	303-441	36
Wisconsin	318	38	255-381	31
Wyoming	337	76	211-462	72

[1]Mean is based on a reduced equation.

[2]Mean is not reported because the sample size is less than 50.

was negative. This negative sign is not in accordance with the assumption of positive marginal utility and suggests the unlikely premise that individuals receive disutility from bagging another deer.

Net economic values per year for deer hunting, average number of deer bagged per person per year, and marginal values associated with bagging another deer per year are presented, state-by-state, in Table 7. Most states have limits on the number of deer that can be bagged. Many states have a limit of one deer per hunter per year. The average number of deer bagged reported in Table 7 may be larger than that limit since the analysis includes residents' out-of-state deer hunts.

The marginal value of bagging an additional deer is highest in Delaware, $409. Kentucky and Maryland also have relatively high marginal values for bagging an additional deer, $329 and $316, respectively. States that have low marginal values for bagging an additional deer include Alaska ($7), Oklahoma ($19), Colorado ($22), and South Carolina ($25). The average marginal value across all states is $111. Lower marginal values are expected for states where hunters averaged a higher number of deer bagged. For example, in South Carolina, deer hunters bagged more than 2 deer, on average, and the marginal value for an additional deer is $25. Conversely, in New Hampshire, where the bag rate for deer is only 0.20, the marginal value of bagging an additional deer is $171.

TABLE 7.

Marginal Values for Bagging an Additional Deer by State

State	*Net Economic Value Per Year*	*Average Number Deer Bagged*	*Marginal Value*
Alabama	705	1.3	69.84
Alaska	512	1.8	6.93
Arizona[1,2]	558	0.4	
Arkansas	663	0.6	213.55
California[3]		0.6	
Colorado	335	0.4	22.50
Connecticut	374	0.9	118.21
Delaware	549	0.5	409.32
Florida	628	1.3	254.62
Georgia	647	1.1	56.37
Hawaii[3]	191	1.9	
Idaho[1,2]	252	0.5	
Illinois	535	0.7	38.23
Indiana	592	0.8	298.50
Iowa	168	0.7	100.11
Kansas[1,2]	338	0.8	
Kentucky	657	0.8	328.84
Louisiana	659	1.5	111.83
Maine	271	0.2	83.84
Maryland	768	1.0	315.57
Massachusetts	560	0.4	64.68
Michigan	513	0.6	239.27
Minnesota	333	0.7	136.58
Mississippi	695	1.6	136.03
Missouri	464	0.6	276.26
Montana	254	1.1	109.67
Nebraska	296	0.6	139.51
Nevada	596	0.6	142.10
New Hampshire[1]	744	0.2	171.15
New Jersey	675	1.2	178.63
New Mexico	302	0.3	250.58
New York	541	0.6	114.82
North Carolina	618	1.3	137.18
North Dakota	315	0.9	81.08
Ohio	324	0.5	110.11
Oklahoma	582	0.5	18.75
Oregon	433	0.4	114.08
Pennsylvania	415	0.6	87.52
Rhode Island	701	0.5	162.06
South Carolina	588	2.3	24.60
South Dakota	504	1.2	68.56
Tennessee	508	1.3	79.95
Texas	556	1.0	147.84
Utah	259	0.4	179.59
Vermont	475	0.3	121.52
Virginia	532	1.1	73.22
Washington[1,2]	497	0.4	
West Virginia	372	1.0	83.41
Wisconsin	318	0.9	70.14
Wyoming	337	0.9	73.20

[1]Mean and marginal value are based on a reduced equation.
[2]Marginal value is not available because a reduced equation was used.
[3]Mean and marginal value are not reported because the sample size is less than 50.

Wildlife observation

State-by-state estimates of net economic value per year with ninety percent confidence intervals for wildlife watching are presented in Table 8. The last column of Table 8 contains computed net economic values per day for wildlife watching. Data for wildlife watching were collected in all 50 states. Wildlife watching is defined as any trip at least one mile from home taken for the primary purpose of observing, photographing, or feeding wildlife. National and state reports from the 1991 Survey refer to wildlife watching as a nonresidential, nonconsumptive activity.

Estimates of net economic value per year range from $763 in Indiana to $106 in North Dakota. Other states with high annual values include Alaska at $655 and Arkansas at $558. Iowa, West Virginia, and Maryland with $136, $171, and $182, respectively, have low net economic values per year. The average net economic value across all states is $278. Sample sizes for the States range from 68 in South Carolina to 291 in Alaska (Appendix E, Table E-4).

Results for Indiana are based on a reduced equation that includes only the bid variable. The full equation was not significant (Chi-squared = 4.25, df = 5, p = 0.51). Results shown for Nevada are based on a reduced equation that includes all of the independent variables except "private." Private was dropped because none of the respondents participated on private land only.

TABLE 8.

Net Economic Value for Wildlife Watching

	Net Economic Value Per Year			
State	*Mean*	*Standard Error of the Mean*	*Ninety Percent Confidence Interval*	*Net Economic Value Per Day*
Alabama	363	57	286-457	37
Alaska	655	128	444-866	49
Arizona	419	69	305-533	34
Arkansas	558	164	289-827	67
California	405	61	305-506	29
Colorado	259	61	160-359	23
Connecticut	366	100	201-531	27
Delaware	236	61	135-337	23
Florida	367	53	279-455	39
Georgia	357	69	243-470	27
Hawaii	332	36	274-391	28
Idaho	229	53	142-317	22
Illinois	350	106	176-525	32
Indiana[1]	763	315	245-1281	71
Iowa	136	47	58-213	12
Kansas[2]				
Kentucky	252	68	139-364	24
Louisiana[3]				
Maine	243	50	161-325	21
Maryland[4]	182	124	−21-386	14
Massachusetts	291	40	225-356	23
Michigan	328	48	250-407	29
Minnesota	316	43	245-386	22
Mississippi	392	112	208-576	30
Missouri	293	61	193-393	29
Montana	225	55	135-316	21
Nebraska	275	35	217-333	34
Nevada[1]	526	81	392-660	45
New Hampshire	423	65	317-530	36
New Jersey	441	70	327-555	59
New Mexico	525	104	353-697	50
New York	283	43	213-354	28
North Carolina	358	90	210-506	28
North Dakota[4]	106	86	−35-247	10
Ohio	261	55	170-352	23
Oklahoma[2]				
Oregon	331	36	271-390	27
Pennsylvania	367	52	282-453	26
Rhode Island	206	99	43-369	17
South Carolina	333	127	124-542	25
South Dakota	303	55	213-394	21
Tennesse	242	59	145-340	21
Texas	400	55	309-491	31
Utah	272	44	200-344	29
Vermont	259	53	171-346	16
Virginia	386	95	230-542	41
Washington	450	85	311-590	28
West Virginia[4]	171	104	0-342	12
Wisconsin	308	51	224-391	27
Wyoming	303	53	215-390	28

[1]Mean is based on a reduced equation.
[2]Mean is not reported because the estimated mean is negative and not statistically significantly different from zero.
[3]Mean is not reported because the equation is not significant.
[4]Ninety percent confidence interval includes zero.

Results are not reported for Louisiana because the equation was not a significant predictor of responses to the contingent-valuation question (Chi-square = 5.44, df = 5, p = 0.36). A reduced equation was used to test for significance with bid being the only independent variable, but neither the equation nor the bid coefficient were significant.

Results for Kansas and Oklahoma are not reported because the estimated net economic values per year are not statistically significantly different from zero (the 90 percent confidence interval includes zero) and are negative. Net economic values per year for Maryland, North Dakota, and West Virginia also are not statistically significantly different from zero but are reported since they are positive. Caution should be used in interpreting these results.

Marginal values are not presented for wildlife watching as they are for fishing and hunting. This is because there are no quality variables in the equation for wildlife watching as there are in the fishing and hunting equations (e.g. number of fish caught, number of deer bagged). Because wildlife watching includes many different activities and species, quality variables could not be put into the equation.

V. Using the Value Estimates

Three types of values have been reported, mean net economic values per year per participant, net economic values per day of participation, and marginal net economic values based on harvesting an additional bass, trout or deer. Each of these values has a slightly different use and interpretation in conducting benefit and cost calculations of wildlife management and policy decisions.

Mean net economic values per year per participant can be thought of as "all or nothing values." Take bass fishing in Alabama as an example, with a mean value of $515 (Table 2). The $515 represents the mean value to a bass angler in Alabama given the current resource condition and bass fishing regulations. This is an estimate of the net economic value portrayed in Figure 1. If the State chose for some reason to prohibit bass fishing, $515 is an estimate of the average loss to an angler who fishes for bass. Thus, while mean net economic values per year per participant are interesting in terms of characterizing the current value of the resource and in calculating losses for a catastrophic change in the resource, they are not applicable for most management and public policy decisions faced by resource managers.

Management and policy decisions (actions) generally increase or decrease participation rates, or increase or decrease harvest rates, resulting in marginal changes in resource availability. Let us continue with the Alabama example. Assume an environmental pollution accident results in the closure of a lake to fishing for a whole season. If a fishery manager knows the number of days of fishing that occur on the lake over the whole season, 1200 for example, it is possible to develop a rough estimate of the fishery losses from the accident. This estimate is accomplished by multiplying the net economic value per day (Table 2) by the days of participation, $38,400 ($32× 1200). As previously noted, net economic value per day is computed by dividing mean net economic value per year by the number of days of participation (Appendix E). Two caveats apply to this estimate of losses. If anglers shift their fishing effort to another lake, then $38,400 is an overestimate of the losses. It is necessary to compute the difference in bass fishing values between the original lake before contamination and the value(s) anglers place on bass fishing at the lake(s) to which they switch. The second caveat relates to whether the accident diminishes fishing quality after the lake has been reopened to fishing, perhaps due to a reduction in the biomass of the fish stock. In this case the $38,400 is an underestimate of the loss and it is necessary to estimate the reduction in value due to the change in the quality of the fishery. This is an application where the marginal values can play a role.

Let us assume that bass fishing on the lake is closed for one year, the anglers do not switch to another lake and the catch rate is reduced by 10 percent next year when the fishery is reopened. The fishery returns to normal in the third year. The loss in the first year is the $38,400. Assume 300 anglers fish the lake each year. The loss in the second year is $804 ($0.10 \times 57 \times 0.47 \times 300$). Referring to Figure 2, the 10 percent reduction would shift the demand curve to the left, portraying a loss in the net economic value. In this example the loss per angler is $2.68 ($0.10 \times 57 \times 0.47$). This loss is computed by multiplying the 10 percent reduction in catch rates by the average catch rate (57 bass per year per angler) by the marginal value of a bass ($0.47 per fish per angler) by the 300 anglers (Table 3). The total loss is $39,204.

Although unrealistic in its simplicity, the example does aid in the understanding of how to use the value estimates. Similar examples could be developed for management actions that improve bass fishing, and can be applied to trout fishing and deer hunting. We do not report marginal values for wildlife watching. The key issues that must be understood are:

- Each of the different values estimates have slightly different interpretations and uses.
- If an action changes participation, it is necessary to consider the extent to which participants substitute to another site to fish or hunt. Failure to consider substitution will result in overestimation of resource losses and resource benefits.
- Using per participant value estimates to compute losses or benefits requires additional information, particularly of resource conditions and participation rates.

Thus, the value estimates reported here must be used with caution in order to avoid misuse of this information, which would result in incorrect estimates of aggregate costs or aggregate benefits

VI. Concluding Comments

Net economic values per year for bass fishing and trout fishing are reported for selected states, while deer hunting and wildlife watching values are reported for nearly all 50 states. These net economic values represent the values above and beyond what participants actually spend to participate in an activity. This value information can be used to assess the current value of participation in these activities. Marginal values can be used to compute benefits (costs) of increasing (decreasing) the availability of selected wildlife resources. Marginal values provide a starting point for resource managers evaluating changes in resource availability, whether it be a planned improvement or an unforeseen change.

References

Bishop, Richard C. 1984. "Economic Values Defined." In *Valuing Wildlife: Economic and Social Perspectives*, D.F. Decker and G.R. Goff (eds), Westview Press, Boulder, CO.

Bishop, Richard C., Thomas A. Heberlein, and Mary Jo Kealy. 1983. "Contingent Valuation of Environmental Assets: Comparisons With A Simulated Market." *Natural Resources Journal* 23:619-633.

Boyle, Kevin J. 1990. "Design of Contingent-Valuation Questions for the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Final Report." Report to U.S. Fish and Wildlife Service.

Boyle, Kevin J., and Richard C. Bishop. 1988. "Welfare Measurements Using Contingent Valuation: A Comparison of Techniques." *American Journal of Agricultural Economics* 70(February):20-28.

Cameron, Trudy Ann, and Michell D. James. 1987. "Efficient Estimation Methods for Use with Closed-Ended Contingent Valuation Survey Data." *Review of Economics and Statistics* 69(May):269-276.

Cameron, Trudy Ann. 1988. "A New Paradigm for Valuing Non-Market Goods Using Referendum Data: Maximum Likelihood Estimation by Censored Logistic Regression." *Journal of Environmental Economics and Management* 15(September):355-379.

Cameron, Trudy Ann. 1991. "Interval Estimates of Non-Market Resource Values From Referendum Contingent Valuation Surveys." *Land Economics* 67(November):413-421

Cooper, Joseph. 1994. "A Comparison of Approaches to Calculating Confidence Intervals for Benefit Measures from Dichotomous Choice Contingent Valuations Surveys." *Land Economics* 70(February):111-122.

Duffield, John W., and David A. Patterson. 1991. "Inference and Optimal Design for a Welfare Measure in Dichotomous Choice Contingent Valuation." *Land Economics* 67(May):225-239.

Freeman, A. Myrick. 1993. *The Measurement of Environmental and Resource Values: Theory and Methods*. Resources for the Future, Washington, DC.

Greene, William, H. 1992. *Limdep Version 6.0: User's Manual and Reference Guide*. Bellport, New York. Econometric Software, Inc.

Hanemann, W. Michael. 1984. "Welfare Evaluations in Contingent Valuation Experiments with Discrete Response Data." *American Journal of Agriculture Economics* 66(August):332-341.

Hanemann, W. Michael. 1989. "Welfare Evaluations in Contingent Valuation Experiments with Discrete Response Data: Reply." *American Journal of Agriculture Economics* 71(November):1056-1061.

Johnston, J. 1984. *Econometric Methods.* Third Edition. McGraw-Hill, Inc.

Judge, G., W. Griffiths, R. Hill, H. Lutkepohl, and T. Lee. 1985. *The Theory and Practice of Econometrics.* Second Edition. John Wiley and Sons, Inc

Loomis, John B., George L. Peterson, and Cindy S. Dorg. 1984. "A Field Guide to Wildlife Economic Analysis." *Transactions of the Fourty-ninth North American and Natural Resources Conference*: 315-324.

McCollum, Daniel W., George L. Peterson, and Cindy S. Swanson. 1992. "A Managers Guide to the Valuation of Nonmarket Resources: What Do You Really Want to Know?" In *Valuing Wildlife Resources in Alaska,* G.L Peterson, C.S. Swanson, D.W. McCollum, and M.H. Thomas, (eds), Westview Press, Boulder, CO.

McConnell, K.E. 1990. "Models for Referendum Data: The Structure of Discrete Choice Models for Contingent Valuation." *Journal of Environmental Economics and Management* 18(January):19-34.

Mitchell, Robert C., and Richard J. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method.* Washington, D.C. Resources for the Future.

Park, Timothy, John B. Loomis, and Michael Creel. 1991. "Confidence Intervals for Evaluating Benefits Estimates from Dichotomous Choice Contingent Valuation Studies." *Land Economics* 67(February):64-73.

U.S. Fish and Wildlife Service. 1993. *1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* 4401 N. Fairfax Drive, Room 140, Arlington, VA 22203.

Appendix A

Contingent-Valuation Sections from the 1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for Fishing (Bass and Trout), Deer Hunting, and Wildlife Watching

Part F — ECONOMIC EVALUATION (BASS/TROUT) — Continued

INTRODUCTION

FIELD REPRESENTATIVE: Refer to preprinted label on the cover page. If bass is preprinted, say "small mouth or large mouth bass" for items 48a – 48g below. If trout is preprinted, say "trout" for items 48a – 48g below.

In the next few questions, I will ask about ALL of your trips taken during 1991 to PRIMARILY fish for (SMALLMOUTH OR LARGEMOUTH BASS/TROUT).

48a. Sometimes you may take a (bass/trout) fishing trip where you are away from your home for one night or several nights. Other times you may take a (bass/trout) fishing trip where you leave from and return to your home on the same day. In total, how many trips did you take to fish PRIMARILY for (smallmouth or largemouth bass/trout) during 1991?	1745 _____ Trips taken *(If none, skip to Introduction, page 43)*
b. About how many (bass/trout) did you catch during 1991? We are asking for (bass/trout) CAUGHT and we ARE NOT asking for how many (bass/trout) you KEPT.	1746 _____ Bass/Trout
c. About what was the average length in inches of the (bass/trout) you caught during 1991?	1747 _____ Inches
d. Some (bass/trout) fishing trips cost more than others. For example, on long (bass/trout) fishing trips you may spend money for food, travel expenses, and lodging. On a short (bass/trout) fishing trip, where you may only fish for a few hours, you may only spend money for gas. About how much did an average trip cost during 1991 where you fished PRIMARILY for (bass/trout)?	1748 $ _____ .00 Cost per average trip 0 ☐ None
FIELD REPRESENTATIVE: Multiply the number of trips taken (item 48a) by the cost per trip (item 48d). Enter the result here. →	$ _____ .00 Total cost (= trips taken x cost per trip)
e. Since you took *(Number in 48a)* **trips and the average trip cost was $** *(Entry in 48d)*, **this means that you spent about $** *(Entry in FR instruction above)* **in total for all of your trips during 1991 to fish PRIMARILY for (bass/trout). Would you say that this total cost is about right?**	1749 1 ☐ Yes — *Skip to item 48g* 2 ☐ No
f. About how much would you say is the total cost of your *(Entry in 48a)* **trips to fish PRIMARILY for (bass/trout) during 1991?**	1750 $ _____ .00 Estimated total cost
g. Fishing expenses change over time. For example, gas prices rose dramatically during the 1970's, fell somewhat during the early 1980's, and rose again in the late 1980's. Would you have taken any trips to fish PRIMARILY for (bass/trout) during 1991 if your total (bass/trout) fishing costs were *(insert number preprinted on label)* **dollars more than the amount you just reported?**	1751 1 ☐ Yes 2 ☐ No

Part E — ECONOMIC EVALUATION (DEER)

CHECK ITEM T Did respondent report hunting deer in a previous interview?	0780	1☐ Yes — *Skip to Introduction* 2☐ No
CHECK ITEM U *Refer to item 7f, on page 5.* Did respondent report hunting deer during this interview? *(Is code "1" for deer entered anywhere in columns labeled 7f?)*	0781	1☐ Yes 2☐ No — *Skip to Part A, Fishing Participation, page 21*

INTRODUCTION **In the next few questions, I will ask about ALL of your trips taken during 1991 PRIMARILY to hunt deer.**

24a. Sometimes you may take a deer hunting trip where you are away from your home for one night or several nights. Other times, you may take a deer hunting trip where you leave from and return to your home on the same day. In total, how many trips did you take PRIMARILY to hunt deer during 1991?	0782	_______ Trips taken *(If none, skip to Check Item V, page 21)*
b. Did you bag a deer in 1991?	0783	1☐ Yes 2☐ No — *Skip to Item 25a, page 20*
c. Some people hunt for deer in more than one state and some states allow hunters to bag more than one deer. How many deer did you bag during 1991?	0784	_______ Deer
d. Did you bag a buck in 1991?	0785	1☐ Yes 2☐ No
25a. Some deer hunting trips cost more than others. For example, on long deer hunting trips you may spend money for food, travel expenses, and lodging. On a short deer hunting trip, where you may only hunt for a few hours, you may only spend money for gas. About how much did an average trip cost during 1991 when you went PRIMARILY to hunt deer?	0786	$ _______ .00 Cost per average trip 0☐ None
Field Representative: Multiply the number of trips taken (item 24a) by the cost per trip (item 25a). Enter the result here. →		$ _______ .00 Total cost (= trips taken X cost per trip)
25b. Since you took *(number in 24a)* **trips and the average trip cost was $** *(entry in 25a)*, **this means that you spent about $** *(entry in FR instruction above)* **in total for ALL of your trips taken during 1991 PRIMARILY to hunt deer. Would you say that this total cost is about right?**	0787	1☐ Yes — *Skip to Item 25d* 2☐ No
c. About how much would you say is the total cost of your *(number in 24a)* **trips taken during 1991 PRIMARILY to hunt deer?**	0788	$ _______ .00 Estimated total cost
d. Hunting expenses change over time. For example, gas prices rose dramatically in the 1970's, fell somewhat in the early 1980's, and rose again in the late 1980's. Would you have taken any trips PRIMARILY to hunt deer during 1991 if your total deer hunting costs were *(insert number preprinted on label)* **dollars more than the amount you just reported?**	0789	1☐ Yes 2☐ No

NOTES

Section VI ECONOMIC EVALUATION AND OTHER ACTIVITIES

CHECK ITEM C1

Respondent previously took one or more trips or outings in the United States of at least one mile for the primary purpose of observing, photographing, or feeding wildlife.

315
1 ☐ Yes — *Go to Introduction*
2 ☐ No

CHECK ITEM C2

Refer to item 1a on page 3.

Did the sample person take a trip or outing in the U.S.?

316
1 ☐ Yes
2 ☐ No — *Skip to Field Representative Check Item 1 below*

INTRODUCTION

Finally, I would like to ask you some questions about all your trips taken for the primary purpose of observing, photographing or feeding wildlife during the entire calendar year of 1991.

21a. *FIELD REPRESENTATIVE: Refer to item 3a on page 4, and add the total number of trips taken in State 1, State 2, and State 3. Enter this number on the second line (2) labeled "U.S. trips taken during this interview period." Add line numbers (1) and (2) and enter the total on the third line (3) labeled " TOTAL U.S. TRIPS TAKEN DURING 1991."*

317 (1) ________ Previous U.S. trips taken

318 (2) + ________ U.S. trips taken during this interview period

319 (3) ________ TOTAL U.S. TRIPS TAKEN DURING 1991

If zero (0) TOTAL U.S. TRIPS TAKEN DURING 1991, *skip to Field Representative Check Item 1*

In total you took *(Number entered in 21a (3))* **trip(s) during 1991 primarily to observe, photograph, or feed wildlife. Each of these trips may have cost you money for gasoline and other transportation costs, food, lodging, film and developing, guide fees, equipment rental, and other expenses. About how much did an average trip cost where your PRIMARY PURPOSE was to observe, photograph, or feed wildlife?**

320
$ ________ . 00 Cost per average trip

0 ☐ None

FIELD REPRESENTATIVE: Multiply the TOTAL U.S. TRIPS TAKEN DURING 1991 by the cost per average trip and enter the result.

b. Since you took *(Number entered in 21a (3))* **trip(s) and the average trip cost was $** *(Cost per average trip)*, **this means that you spent about $** *(Total cost)* **in total for (all of) your trip(s) during 1991 where your PRIMARY PURPOSE was to observe, photograph, or feed wildlife. Would you say that this total cost is about right?**

________ × ________ = $ ________ . 00
Total U.S. trips × Cost per average trip = Total cost

321
1 ☐ Yes — *Skip to 21d*
2 ☐ No

c. About how much would you say is the total cost of your *(Number entered in 21a (3))* **trip(s) during 1991 where the PRIMARY PURPOSE was to observe, photograph, or feed wildlife?**

322
$ ________ . 00 Total estimated cost

d. The cost of taking trips to observe, photograph, or feed wildlife changes over time. For example, the cost of gasoline rose dramatically in the 1970's, fell somewhat in the early 1980's, and rose again in the late 1980's. Would you have taken any trips during 1991 for the PRIMARY PURPOSE of observing, photographing, or feeding wildlife if the total cost of (all of) your trip(s) was *(Insert number preprinted on label)* **dollars more than the amount you just reported?**

323
1 ☐ Yes
2 ☐ No

Appendix B

Dollar Stimuli for the Contingent-Valuation Questions

TABLE B-1.

Dollar Stimuli and Percent of Sample for Bass Fishing for the United States

Dollar Stimuli	*Percent of Sample*
6	1.7
14	1.8
29	2.3
46	3.0
69	5.0
112	7.6
173	11.6
260	19.1
462	33.0
924	14.8

TABLE B-2.

Dollar Stimuli and Percent of Sample for Trout Fishing for the United States

Dollar Stimuli	*Percent of Sample*
6	1.4
15	1.5
30	2.6
48	2.4
75	5.4
112	7.5
175	12.0
263	17.0
419	32.7
870	17.6

TABLE B-3.

Dollar Stimuli and Percent of Sample for Deer Hunting for the United States

Dollar Stimuli	*Percent of Sample*
9	1.9
27	2.0
45	3.1
69	3.6
99	5.2
139	7.3
202	10.4
289	18.9
491	31.9
953	15.7

TABLE B-4.

Dollar Stimuli and Percent of Sample for Wildlife Watching for the United States

Dollar Stimuli	*Percent of Sample*
3	1.3
10	1.6
17	1.5
29	1.8
46	3.5
70	6.4
116	10.0
181	18.2
347	37.3
823	18.4

Appendix C

Estimation Procedures and Standard Error Calculation for Net Economic Values

The procedures used to estimate the net economic values and standard errors that are presented in the main body of this report are described in this appendix. This discussion is divided into four sections: 1) estimation of net economic values (willingness to pay); 2) estimation of the probit coefficients; 3) confidence interval estimation; and 4) an example.

Estimation of the Net Economic Values

The net economic values presented in this report are derived using the censored normal probit approach (Cameron, 1988; 1991). Estimates of net economic values using this approach are identical to those derived using Hanemann's linear random utility model (Hanemann, 1984; 1989). A comparison of these two approaches is made in McConnell (1990).

The censored normal regression model assumes that WTP can be represented as

[1] $WTP_i = x_i'ß + u_i,$

where WTP_i is the respondent's true unobserved dependent variable and the disturbance term u_i is identically and independently distributed normally with mean 0 and dispersion parameter ß. Because the censored normal approach allows WTP to be modelled as a linear function of the explanatory variables, $ß_i$ can be interpreted as the change in WTP for a unit change in x_i, which is an interpretation that cannot be made of conventional probit coefficients. Cameron (1991) details how the ß coefficient vector (which excludes the bid coefficient) can be calculated from a conventional logit regression (which includes the bid vector as an explanatory variable). Taking the expected value of WTP in Equation (1) yields

[2] $E(WTP|\mathbf{x}_0) = \mathbf{x}_0'ß.$

For this report, Gauss programs developed by Cooper were used to estimate the ß's.

Probit Estimation of the Coefficients

The coefficients described is section III of this report are estimated using a maximum likelihood estimation routine. The log-likelihood function is

[3] $$\ln L = \sum_{i=1}^{N} \{y_i \ln[F(x_i'\gamma^*)] + (1-y_i)\ln[1-F(x_i'\gamma^*)]\}$$

where y_i, i = 1,…,N, is the dependent dummy variable that is equal to 1 for a yes response and 0 for a no response, γ^* is the conventional probit coefficient vector, and the normal cumulative density function $F(x_i'\gamma^*)$ is the probability that $y_i = 1$ (Judge et al., 1985).

The data were adjusted by sampling weights to account for the fact that the survey sampled some regions at higher rates than others. Not doing so could lead to biased coefficient estimates. Multiplying the data by the weights gives greater weight to the observations from the regions with the lower probability of being selected and decreases the weight to the observations from the regions with higher probability of being selected. For estimation, the weights are multiplied by the sample size and divided by the sum of the weights so that the sum of the weights across the observations is the sample size (Greene, 1992). Performing weighted estimation without scaling the weight variable in this manner can result in very low standard errors, and thus, very high t-statistics for the estimated coefficients (Greene, 1992).

Confidence Interval Estimation

To tell us if the benefit measures are statistically different from zero as well as to allow statistical comparisons between the estimated benefit measures, it is necessary to construct confidence intervals around the benefit measures. In this paper, confidence intervals around the welfare benefit estimate are constructed using an analytic method (Cameron, 1991). Since WTP Equation (2) is linear, it is a simple matter to construct an interval estimate for E(WTP) (e.g., *see* Johnston, p. 196). Cameron's (1991) procedure is used to transform the conventional probit coefficient vector $\hat{\gamma}^*$ into the ß vector (essentially by dividing the explanatory variable coefficients by the negative of the bid coefficient) and the covariance matrix for $\hat{\gamma}^*$ into the covariance matrix $\Sigma_{ß}$. Given $\Sigma_{ß}$ and Equation (1) and appealing to the central limit theorem, a $(1-\theta) \times 100$ percent confidence interval around $E(WTP|x_0)$ is

$$[5] \quad CI_{\theta}[E(WTP|x_0)] = x_0'ß \pm t_{\frac{1-\theta}{2}}\sqrt{x_0\Sigma_{ß}x_0}.$$

Other methods for constructing confidence intervals are described in Cooper (1994).

Example: Bass Fishing in Alabama

The estimation results for bass fishing in Alabama will be used as the example for this discussion. Table C-1 shows the conventional probit coefficient results (taken from Appendix D, Table D-1) and the variable means.

TABLE C-1.

Statistics for Bass Fishing in Alabama.

Variable Name	*Coefficient Estimate*	*Variable Mean*
Constant (γ_1)	1.00838	1
#Bass (γ_2)	0.00071	57.30
Avg Length (γ_3)	−0.02269	11.73
Bid (γ_4)	−0.00152	–

The censored probit coefficients are $ß_1 = -(1.00838) \div (-0.00152) = 663.41$, $ß_2 = -(0.00071) \div (-0.00152) = 0.47$, $ß_3 = -(0.02269) \div (-0.00152) = -14.95$. Using the expression in Equation (2), the net economic value is calculated as $E(WTP) = ß_1 \times x_1 + ß_2 \times x_2 + ß_3 \times x_3 = 663.41 \times 1 + 0.47 \times 57.3 - 14.95 \times 11.73 = \$515$. The coefficients $ß_1$, $ß_2$, $ß_3$ represent the marginal change in E(WTP) for a unit change in the value of their respective variables.[1] For example, a one fish increase in the respondents bass catch per year will increase the respondent's annual WTP for bass fishing by $0.47.

Finally, a standard error of $88 was calculated using the confidence interval approach described above. For the 90% confidence interval presented in the fourth column of Table 2, this value was multiplied by the t-statistic value 1.645 that corresponds to the 5% (10% ÷ 2) level of significance and subtracting (adding) the product to the $515 mean produces the lower (upper) bound.

[1] Note that the results in Table D-1, show that the coefficient on average length of fish is not significantly different from zero for Alabama. So for practical purposes, the marginal value of an additional inch is zero. However, we have left this coefficient here just for a demonstration of how the marginal values are calculated.

Appendix D

Probit Equation Results

TABLE D-1.

Probit Equation Results for Bass Fishing

State	Constant	Bid	# Bass	Ave Length	n	Chi-squared	% Correct Predictions
	Explanatory Variables						
Alabama	1.00838 (0.4645)	−0.00152 (0.0004)	0.00071 (0.0012)	−0.02269 (0.0373)	116	15.30	66
Arkansas	−0.63583 (0.4830)	−0.00136 (0.0004)	0.00342 (0.0014)	0.11910 (0.0379)	153	27.96	69
Delaware	0.49895 (0.5518)	−0.00096 (0.0006)	0.00346 (0.0044)	−0.01863 (0.0352)	56	2.76	64
Florida	−0.11540 (0.3813)	−0.00173 (0.0004)	0.00511 (0.0021)	0.05715 (0.0288)	180	36.38	68
Georgia	1.50021 (0.4312)	−0.00076 (0.0004)	0.00200 (0.0014)	−0.07302 (0.0248)	139	13.62	65
Illinois	−0.02292 (0.4999)	−0.00193 (0.0007)	0.01740 (0.0047)	0.02255 (0.0300)	105	29.12	73
Indiana	0.42932 (0.4838)	−0.00173 (0.0004)	0.00420 (0.0019)	0.02069 (0.0359)	177	33.60	68
Iowa	−0.37538 (0.5257)	−0.00170 (0.0005)	0.00435 (0.0024)	0.02702 (0.0412)	110	18.05	72
Kansas	−0.06348 (0.4403)	−0.00169 (0.0005)	0.00101 (0.0008)	0.02799 (0.0343)	137	16.83	65
Kentucky	0.42453 (0.4492)	−0.00134 (0.0004)	0.00029 (0.0008)	0.01551 (0.0374)	144	13.18	64
Louisiana	0.53201 (0.4945)	−0.00126 (0.0004)	0.00737 (0.0014)	−0.03783 (0.0358)	197	45.91	72
Maryland	−0.60110 (0.6610)	−0.00142 (0.0006)	0.00947 (0.0047)	0.07693 (0.0528)	73	11.53	73
Michigan	−0.31416 (0.5470)	−0.00094 (0.0004)	0.01491 (0.0045)	0.01147 (0.0397)	122	16.84	62
Minnesota	0.44338 (0.5736)	−0.00237 (0.0007)	0.01787 (0.0077)	−0.00903 (0.0533)	73	26.12	81
Mississippi	−0.03645 (0.5507)	−0.00216 (0.0006)	0.00462 (0.0021)	0.06173 (0.0438)	115	26.78	72
Missouri	0.56051 (0.4067)	−0.00161 (0.0003)	0.00183 (0.0008)	0.00058 (0.0297)	221	29.26	61
Nebraska	0.37684 (0.5742)	−0.00200 (0.0006)	0.00402 (0.0025)	0.01311 (0.0433)	91	19.53	70
New Jersey	0.08875 (0.5958)	−0.00209 (0.0008)	0.01000 (0.0040)	0.04273 (0.0482)	78	17.46	72
North Carolina	0.30964 (0.4747)	−0.00135 (0.0004)	0.00375 (0.0018)	−0.00915 (0.0335)	117	15.95	67
Ohio	0.17404 (0.3989)	−0.00141 (0.0004)	0.00169 (0.0010)	0.02291 (0.0309)	159	19.04	60
Oklahoma	−0.25601 (0.3947)	−0.00134 (0.0004)	0.00348 (0.0013)	0.03555 (0.0279)	206	28.14	66
South Carolina	0.33713 (0.5034)	−0.00099 (0.0005)	0.00540 (0.0024)	−0.00306 (0.0321)	93	11.93	58
Tennessee	0.57643 (0.3792)	−0.00147 (0.0004)	0.00213 (0.0009)	0.01199 (0.0290)	166	19.86	65
Texas	−0.64488 (0.5083)	−0.00178 (0.0005)	0.00616 (0.0021)	0.08543 (0.0379)	165	41.79	69
Virginia	1.14359 (0.4501)	−0.00134 (0.0004)	0.00158 (0.0011)	−0.04560 (0.0377)	128	14.32	62
West Virginia	−0.06973 (0.5049)	−0.00230 (0.0006)	0.00505 (0.0025)	0.03971 (0.0408)	111	28.64	73
Wisconsin	−0.41322 (0.6332)	−0.00122 (0.0005)	0.00150 (0.0012)	0.03393 (0.0447)	100	9.07	65

TABLE D-2.

Probit Equation Results for Trout Fishing

State	*Constant*	*Bid*	*# Trout*	*Ave Length*	*n*	*Chi-squared*	*% Correct Predictions*
	Explanatory Variables						
Alaska	0.17873 (0.4004)	−0.00193 (0.0004)	0.00228 (0.0011)	0.03801 (0.0309)	180	36.45	67
Arizona	−0.74123 (0.6009)	−0.00161 (0.0006)	0.00430 (0.0034)	0.12740 (0.0514)	79	14.86	72
California	−0.55045 (0.3806)	−0.00055 (0.0004)	0.01470 (0.0052)	0.06107 (0.0288)	187	22.30	65
Colorado	0.28224 (0.3523)	−0.00187 (0.0003)	0.00133 (0.0010)	0.02837 (0.0288)	256	42.01	64
Connecticut	0.99294 (0.3775)	−0.00185 (0.0004)	0.01373 (0.0043)	−0.06456 (0.0284)	140	36.12	71
Hawaii	0.96819 (1.4175)	−0.00299 (0.0019)	0.14658 (0.0704)	−0.11646 (0.1330)	22	13.29	82
Idaho	−0.54461 (0.3002)	−0.00187 (0.0004)	0.00188 (0.0012)	0.09076 (0.0234)	233	42.05	67
Maine	0.46233 (0.3747)	−0.00208 (0.0005)	0.00344 (0.0016)	−0.01408 (0.0333)	182	26.41	66
Massachusetts	−0.44908 (0.4502)	−0.00129 (0.0005)	0.00466 (0.0019)	0.02579 (0.0408)	115	12.01	60
Montana	−0.40830 (0.3297)	−0.00157 (0.0004)	0.00307 (0.0008)	0.05321 (0.0249)	220	36.41	70
Nevada	0.83725 (0.4521)	−0.00235 (0.0005)	0.00560 (0.0040)	−0.00194 (0.0333)	137	31.19	68
New Hampshire	−0.67455 (0.4670)	−0.00179 (0.0004)	0.00360 (0.0020)	0.10950 (0.0416)	158	30.41	72
New Mexico	0.14680 (0.1994)	−0.00090 (0.0004)	0.00234 (0.0015)	na	131	6.92	60
New York	−0.08519 (0.3739)	−0.00146 (0.0005)	0.00455 (0.0028)	0.06669 (0.0281)	130	19.11	69
North Dakota	−2.14995 (1.3699)	−0.00296 (0.0022)	0.00704 (0.0133)	0.19809 (0.1215)	16	4.25	75
Oregon	0.14455 (0.3907)	−0.00217 (0.0004)	0.00300 (0.0012)	0.04929 (0.0337)	220	39.74	64
Pennsylvania	0.35745 (0.5091)	−0.00280 (0.0006)	0.00257 (0.0015)	0.02070 (0.0465)	151	28.55	64
Rhode Island	0.23498 (0.6576)	−0.00016 (0.0006)	−0.00076 (0.0023)	−0.01539 (0.0512)	69	0.33	58
SouthDakota	−0.04250 (0.9286)	−0.00448 (0.0016)	0.01128 (0.0052)	0.04734 (0.0824)	43	15.86	81
Utah	−0.36753 (0.4056)	−0.00131 (0.0004)	0.00387 (0.0015)	0.04611 (0.0318)	207	27.90	62
Vermont	0.14316 (0.3424)	−0.00167 (0.0004)	0.00222 (0.0014)	0.01975 (0.0291)	157	20.82	72
Washington	0.11417 (0.3270)	−0.00131 (0.0004)	0.00474 (0.0016)	0.01129 (0.0284)	193	22.73	65
Wyoming	−0.47826 (0.3749)	−0.00154 (0.0004)	0.00502 (0.0018)	0.06240 (0.0289)	195	33.13	68

TABLE D-3.

Probit Equation Results for Deer Hunting

	Explanatory Variables						
State	*Constant*	*Bid*	*# Deer Bagged*	*Hunt Other Big Game*	*n*	*Chi-squared*	*% Correct Predictions*
Alabama	0.86488 (0.2175)	−0.00153 (0.0004)	0.10673 (0.0649)	0.33292 (0.2594)	150	19.65	68
Alaska	1.48714 (0.4636)	−0.00327 (0.0008)	0.02264 (0.1038)	0.33482 (0.4363)	52	21.57	79
Arizona	0.85033 (0.2452)	−0.00145 (0.0006)	na	na	63	6.09	70
Arkansas	0.79011 (0.1823)	−0.00149 (0.0003)	0.31849 (0.1233)	0.15649 (0.2544)	207	27.02	69
California	0.73075 (0.4414)	−0.00068 (0.0007)	−0.35384 (0.2949)	1.27717 (0.5517)	46	8.05	72
Colorado	0.27287 (0.2886)	−0.00149 (0.0005)	0.03357 (0.2390)	0.29912 (0.3158)	90	11.61	74
Connecticut	0.42657 (0.3790)	−0.00230 (0.0011)	0.27232 (0.1519)	1.41660 (0.7381)	51	13.87	75
Delaware	1.13221 (0.3449)	−0.00313 (0.0008)	1.28156 (0.4085)	−0.35469 (0.7443)	68	29.21	76
Florida	0.59044 (0.3252)	−0.00188 (0.0006)	0.47953 (0.1567)	0.06429 (0.3160)	94	27.23	74
Georgia	0.78116 (0.2155)	−0.00134 (0.0004)	0.07555 (0.0875)	0.05576 (0.2827)	145	10.14	67
Hawaii	2.95244 (2.1166)	−0.01545 (0.0085)	na	na	13	12.29	92
Idaho	0.28945 (0.1587)	−0.00115 (0.0003)	na	na	210	12.52	65
Illinois	1.00801 (0.2555)	−0.00181 (0.0005)	0.06902 (0.1635)	−0.97875 (0.4683)	109	20.27	66
Indiana	0.24333 (0.1972)	−0.00075 (0.0004)	0.22317 (0.1207)	0.51825 (0.3915)	161	10.22	61
Iowa	0.10987 (0.2344)	−0.00166 (0.0004)	0.16587 (0.1523)	0.46119 (0.3453)	144	20.32	72
Kansas	0.61830 (0.2596)	−0.00185 (0.0006)	na	na	78	10.81	60
Kentucky	0.50575 (0.2126)	−0.00126 (0.0004)	0.41436 (0.1427)	0.26509 (0.3697)	153	18.01	67
Louisiana	0.60293 (0.1959)	−0.00120 (0.0004)	0.13401 (0.0733)	0.04413 (0.3155)	170	17.56	69
Maine	0.32159 (0.1709)	−0.00159 (0.0004)	0.13347 (0.2313)	0.85462 (0.3318)	196	25.99	68
Maryland	0.51097 (0.2476)	−0.00115 (0.0005)	0.36235 (0.1561)	0.27313 (0.4209)	85	10.02	62
Massachusetts	0.71612 (0.2729)	−0.00146 (0.0005)	0.09462 (0.2117)	0.41863 (0.4021)	91	10.80	62
Michigan	0.53920 (0.1505)	−0.00159 (0.0003)	0.38156 (0.1126)	0.93543 (0.4000)	312	62.70	66
Minnesota	0.37270 (0.1785)	−0.00193 (0.0004)	0.26309 (0.1199)	1.57918 (0.5859)	240	58.20	71
Mississippi	0.75051 (0.1669)	−0.00147 (0.0003)	0.20032 (0.0576)	−0.06741 (0.2465)	217	36.49	72
Missouri	0.33675 (0.1532)	−0.00137 (0.0003)	0.37808 (0.1184)	0.38888 (0.1823)	272	39.32	64

TABLE D-3 CONTINUED.

Probit Equation Results for Deer Hunting

State	*Constant*	*Bid*	*# Deer Bagged*	*Hunt Other Big Game*	*n*	*Chi-squared*	*% Correct Predictions*
	Explanatory Variables						
Montana	−0.23684	−0.00186	0.20445	0.78214	255	59.25	68
	(0.2008)	(0.0003)	(0.1080)	(0.1816)			
Nebraska	0.26140	−0.00209	0.29113	0.99620	96	24.56	75
	(0.2495)	(0.0005)	(0.2378)	(0.3980)			
Nevada	0.49800	−0.00195	0.27777	2.07798	60	22.07	68
	(0.4468)	(0.0008)	(0.3468)	(0.7565)			
New Hampshire	0.94210	−0.00133	0.22714	na	135	9.58	73
	(0.2048)	(0.0005)	(0.2690)				
New Jersey	1.71760	−0.00304	0.54391	−1.56714	77	29.32	78
	(0.4112)	(0.0008)	(0.2087)	(0.6204)			
New Mexico	0.28991	−0.00151	0.37903	0.20544	84	10.11	63
	(0.2765)	(0.0005)	(0.3126)	(0.3115)			
New York	0.71911	−0.00167	0.19147	0.31876	208	29.16	66
	(0.1747)	(0.0003)	(0.1241)	(0.2129)			
North Carolina	0.64166	−0.00147	0.20137	0.19331	154	24.66	68
	(0.2081)	(0.0004)	(0.0717)	(0.3375)			
North Dakota	0.75519	−0.00343	0.27809	0.88652	234	88.00	74
	(0.2145)	(0.0005)	(0.1721)	(0.3622)			
Ohio	0.26255	−0.00145	0.15966	1.44163	179	31.83	64
	(0.2008)	(0.0004)	(0.1531)	(0.4606)			
Oklahoma	0.73881	−0.00140	0.02632	0.28663	110	13.52	69
	(0.2121)	(0.0004)	(0.1600)	(0.3137)			
Oregon	1.09308	−0.00260	0.29610	−0.19396	170	43.13	74
	(0.2266)	(0.0005)	(0.2016)	(0.2133)			
Pennsylvania	0.38487	−0.00163	0.14268	0.53779	253	48.70	67
	(0.1750)	(0.0003)	(0.1087)	(0.1779)			
Rhode Island	1.18709	−0.00194	0.31493	0.20133	62	7.30	71
	(0.3287)	(0.0008)	(0.2566)	(0.5282)			
South Carolina	0.67506	−0.00130	0.03187	0.10323	107	9.64	69
	(0.2418)	(0.0005)	(0.0308)	(0.3053)			
South Dakota	0.58069	−0.00144	0.09889	0.27482	155	17.46	70
	(0.2058)	(0.0004)	(0.1159)	(0.3286)			
Tennessee	0.68759	−0.00185	0.14786	0.63697	165	38.38	75
	(0.1995)	(0.0004)	(0.0665)	(0.3162)			
Texas	0.42535	−0.00141	0.20881	0.60039	187	30.25	68
	(0.1797)	(0.0003)	(0.0958)	(0.2262)			
Utah	0.28682	−0.00183	0.32782	0.31957	186	30.96	66
	(0.1761)	(0.0004)	(0.1940)	(0.2292)			
Vermont	0.89139	−0.00213	0.25889	0.23227	200	32.77	66
	(0.1770)	(0.0004)	(0.1767)	(0.2322)			
Virginia	0.67805	−0.00192	0.14039	0.38457	194	33.16	71
	(0.2121)	(0.0004)	(0.0812)	(0.1948)			
Washington	0.54861	−0.00111	na	na	109	7.23	58
	(0.2103)	(0.0004)					
WestVirginia	0.38536	−0.00193	0.16117	0.53614	279	53.69	66
	(0.1546)	(0.0003)	(0.0792)	(0.1762)			
Wisconsin	0.43848	−0.00194	0.13601	0.62330	358	71.03	68
	(0.1409)	(0.0003)	(0.0712)	(0.2417)			
Wyoming	0.34725	−0.00150	0.10951	0.11614	130	15.66	66
	(0.2509)	(0.0004)	(0.1551)	(0.2297)			

TABLE D-4.

Probit Equation Results for Wildlife Watching

State	*Constant*	*Bid*	*Private*	*Public*	*Photo*	*Fish*	*n*	*Chi-squared*	*% Correct Predictions*
	Explanatory Variables								
Alabama	0.76936	−0.00177	−0.47590	−0.41342	0.37329	0.04355	170	28.90	65
	(0.2941)	(0.0004)	(0.3180)	(0.2441)	(0.2192)	(0.2240)			
Alaska	0.21103	−0.00090	−0.34877	−0.26939	0.73928	0.16733	291	33.70	67
	(0.2459)	(0.0003)	(0.7674)	(0.1860)	(0.1660)	(0.1610)			
Arizona	0.84900	−0.00162	1.31712	−0.41828	0.06140	0.05061	177	20.97	67
	(0.2781)	(0.0004)	(0.8504)	(0.2168)	(0.2080)	(0.2106)			
Arkansas	0.29798	−0.00083	−.28447	−0.05768	0.43795	0.30622	152	13.99	68
	(0.2568)	(0.0004)	(0.3095)	(0.2480)	(0.2266)	(0.2312)			
California	0.71274	−0.00154	−1.04055	−0.26421	0.45793	−0.32874	203	33.44	68
	(0.2804)	(0.0004)	(0.4466)	(0.2173)	(0.2004)	(0.2041)			
Colorado	0.25801	−0.00154	−0.00537	−0.25482	0.40121	0.33942	206	25.91	65
	(0.2351)	(0.0004)	(0.5118)	(0.2033)	(0.1901)	(0.2006)			
Connecticut	0.51071	−0.00105	−1.11419	−0.66623	0.56260	0.01094	166	31.92	72
	(0.2476)	(0.0004)	(0.3957)	(0.2282)	(0.2098)	(0.2259)			
Delaware	0.40929	−0.00179	−1.62697	−0.34469	0.57814	0.31388	186	45.12	70
	(0.2582)	(0.0004)	(0.4851)	(0.2237)	(0.2065)	(0.2124)			
Florida	0.96493	−0.00188	−0.47323	−0.56820	−0.09971	0.28811	194	29.77	61
	(0.2805)	(0.0004)	(0.4724)	(0.2192)	(0.1973)	(0.1927)			
Georgia	0.83616	−0.00199	−0.06368	0.03003	−0.12728	−0.16831	92	11.35	62
	(0.3488)	(0.0006)	(0.4219)	(0.3035)	(0.2876)	(0.3101)			
Hawaii	1.06650	−0.00270	0.61865	−0.45631	−0.14382	0.23121	210	54.82	70
	(0.2785)	(0.0004)	(0.6200)	(0.2126)	(0.2032)	(0.2089)			
Idaho	0.31573	−0.00164	−0.55653	−0.20218	0.29769	0.20364	268	36.06	65
	(0.2132)	(0.0003)	(0.3376)	(0.1757)	(0.1644)	(0.1662)			
Illinois	0.26327	−0.00096	0.39577	−0.22170	0.29609	0.06459	162	14.14	67
	(0.2568)	(0.0004)	(0.3989)	(0.2212)	(0.2138)	(0.2241)			
Indiana	0.46991	−0.00063	na	na	na	na	190	2.93	59
	(0.1468)	(0.0004)							
Iowa	−0.05687	−0.00285	0.18970	−0.05506	0.34296	1.02587	185	53.17	73
	(0.3052)	(0.0006)	(0.4125)	(0.2583)	(0.2367)	(0.2418)			
Kansas	0.37950	−0.00127	−0.93623	−0.37618	0.05513	−0.25009	182	21.42	71
	(0.2457)	(0.0004)	(0.3002)	(0.2238)	(0.2211)	(0.2257)			
Kentucky	0.52710	−0.00166	0.16250	−0.34492	0.00469	−0.02955	142	20.43	61
	(0.2774)	(0.0005)	(0.2970)	(0.2584)	(0.2316)	(0.2396)			
Louisiana	0.14998	−0.00056	−0.41584	−0.04485	0.13755	0.28135	126	5.44	55
	(0.2994)	(0.0004)	(0.3264)	(0.2677)	(0.2355)	(0.2475)			
Maine	0.45189	−0.00194	−0.58137	−0.44151	0.40403	0.22805	209	41.08	64
	(0.2339)	(0.0004)	(0.2569)	(0.2110)	(0.1887)	(0.2076)			
Maryland	0.11992	−0.00103	−1.00185	−0.55958	0.69084	0.29779	153	28.18	62
	(0.3063)	(0.0005)	(0.4310)	(0.2422)	(0.2177)	(0.2241)			
Massachusetts	0.52282	−0.00235	−0.35966	−0.41815	0.50743	0.38855	223	62.27	70
	(0.2165)	(0.0004)	(0.3705)	(0.1973)	(0.1882)	(0.1939)			
Michigan	0.50798	−0.00203	−0.08240	−0.31160	0.48242	0.24964	189	35.10	65
	(0.2090)	(0.0004)	(0.2969)	(0.2125)	(0.1985)	(0.2163)			
Minnesota	0.76320	−0.00222	−0.24205	−0.22389	0.18405	0.01320	197	37.77	69
	(0.2267)	(0.0004)	(0.3376)	(0.2077)	(0.2035)	(0.2381)			
Mississippi	0.15842	−0.00095	−0.09621	−0.08072	0.81893	−0.05483	152	18.33	66
	(0.2714)	(0.0004)	(0.2744)	(0.2646)	(0.2314)	(0.2278)			
Missouri	0.29832	−0.00161	0.20732	0.02039	0.15270	0.14132	180	17.87	64
	(0.2716)	(0.0004)	(0.3305)	(0.2275)	(0.2059)	(0.2016)			

TABLE D-4 CONTINUED.

Probit Equation Results for Wildlife Watching

State	Explanatory Variables: Constant	Bid	Private	Public	Photo	Fish	n	Chi-squared	% Correct Predictions
Montana	0.03362 (0.2218)	−0.00164 (0.0004)	−0.41547 (0.3743)	−0.31654 (0.1855)	0.63901 (0.1758)	0.74011 (0.1963)	264	57.47	65
Nebraska	0.48903 (0.2384)	−0.00299 (0.0005)	−0.13662 (0.3203)	−0.34285 (0.2342)	0.98232 (0.2258)	0.38569 (0.2406)	191	76.16	73
Nevada	0.81261 (0.2595)	−0.00127 (0.0004)	na	−0.36926 (0.2050)	0.18519 (0.1856)	0.02170 (0.1916)	204	18.76	64
New Hampshire	0.97485 (0.2184)	−0.00162 (0.0004)	−0.44814 (0.2673)	−0.68789 (0.2068)	0.30619 (0.1911)	−0.40936 (0.2037)	209	34.46	68
New Jersey	0.61045 (0.2469)	−0.00169 (0.0004)	−0.25208 (0.5038)	−0.17270 (0.2154)	0.33376 (0.2080)	0.19262 (0.2179)	166	22.86	67
New Mexico	0.32940 (0.2387)	−0.00104 (0.0003)	0.30930 (0.4755)	0.01427 (0.2006)	0.40565 (0.1860)	−0.02180 (0.1914)	207	13.89	60
New York	1.02051 (0.2693)	−0.00249 (0.0005)	−0.32061 (0.3447)	−0.28990 (0.2326)	0.13006 (0.2161)	−0.53572 (0.2294)	158	33.15	68
North Carolina	−0.05688 (0.2853)	−0.00128 (0.0005)	0.29705 (0.3442)	0.35071 (0.2615)	0.57939 (0.2375)	0.07732 (0.2475)	130	14.05	58
North Dakota	0.14313 (0.2103)	−0.00144 (0.0005)	−0.04696 (0.2822)	−0.45538 (0.2252)	0.32800 (0.2116)	0.29345 (0.3012)	174	18.79	70
Ohio	0.49126 (0.2474)	−0.00179 (0.0004)	−0.59736 (0.3438)	−0.25642 (0.2181)	0.39518 (0.2017)	−0.00101 (0.2023)	192	32.33	67
Oklahoma	−0.36697 (0.3307)	−0.00058 (0.0005)	−0.22482 (0.4093)	−0.33148 (0.2586)	0.84088 (0.2391)	0.39762 (0.2349)	149	26.11	70
Oregon	0.56802 (0.2285)	−0.00259 (0.0004)	−0.43194 (0.4024)	−0.09799 (0.2042)	0.53533 (0.1942)	0.40445 (0.2024)	218	58.40	71
Pennsylvania	0.68220 (0.2457)	−0.00183 (0.0004)	−0.03122 (0.2988)	−0.42706 (0.2037)	0.43244 (0.1883)	−0.04225 (0.1953)	203	31.71	61
Rhode Island	−0.30959 (0.2726)	−0.00113 (0.0004)	−0.38637 (0.3596)	0.05379 (0.2335)	0.71803 (0.2169)	0.53246 (0.2155)	165	28.57	64
South Carolina	0.78532 (0.4291)	−0.00127 (0.0007)	−0.24243 (0.4502)	−0.86691 (0.3989)	−0.00088 (0.3626)	0.15254 (0.3696)	68	9.69	71
South Dakota	0.65756 (0.2756)	−0.00191 (0.0004)	−0.40360 (0.3167)	−0.30103 (0.2448)	0.03695 (0.2254)	0.42058 (0.2516)	162	28.72	65
Tennessee	0.42905 (0.2603)	−0.00170 (0.0004)	−0.49855 (0.3036)	−0.51057 (0.2249)	0.24740 (0.2061)	0.45894 (0.2036)	188	30.28	63
Texas	0.47588 (0.2690)	−0.00214 (0.0005)	0.11047 (0.3055)	−0.06015 (0.2573)	0.31507 (0.2361)	0.63142 (0.2353)	151	33.40	68
Utah	0.49526 (0.2406)	−0.00202 (0.0004)	0.10687 (0.4046)	0.00730 (0.1921)	−0.11854 (0.1736)	0.32472 (0.1877)	234	35.80	64
Vermont	0.70526 (0.2325)	−0.00188 (0.0004)	−0.77716 (0.2584)	−0.47978 (0.2318)	0.20998 (0.1990)	0.01836 (0.2073)	197	41.18	65
Virginia	0.55994 (0.2873)	−0.00111 (0.0004)	−0.26653 (0.3287)	−0.45343 (0.2403)	−0.07547 (0.2191)	0.47063 (0.2275)	153	14.04	59
Washington	0.72106 (0.2313)	−0.00115 (0.0003)	−1.40329 (0.5467)	−0.38629 (0.1923)	0.01443 (0.1855)	0.08300 (0.1930)	209	22.79	64
West Virginia	−0.08583 (0.2643)	−0.00114 (0.0004)	−0.02278 (0.2697)	−0.08130 (0.2654)	0.36569 (0.2226)	0.55748 (0.2418)	164	20.34	63
Wisconsin	0.72291 (0.2240)	−0.00169 (0.0003)	−0.12005 (0.2621)	−0.48169 (0.1961)	0.17366 (0.1832)	−0.13214 (0.1908)	235	35.44	67
Wyoming	0.32584 (0.2309)	−0.00159 (0.0004)	−1.04650 (0.4633)	−0.44186 (0.1725)	0.27736 (0.1738)	0.82662 (0.1835)	261	58.11	63

Appendix E

Sample Sizes and Average Days of Participation

TABLE E-1.

Sample Sizes and Average Days per Year for Bass Fishing

State	*n*	*Average Days/year*
Alabama	116	16.1
Arkansas	153	20.6
Delaware	56	15.1
Florida	180	16.7
Georgia	139	20.0
Illinois	105	13.2
Indiana	177	16.9
Iowa	110	10.7
Kansas	137	13.9
Kentucky	144	14.3
Louisiana	197	15.3
Maryland	73	11.2
Michigan	122	11.1
Minnesota	73	10.6
Mississippi	115	19.2
Missouri	221	13.3
New Jersey	78	16.3
North Carolina	117	18.5
Nebraska	91	13.0
Ohio	159	13.3
Oklahoma	206	17.1
South Carolina	93	13.5
Tennessee	166	20.3
Texas	165	15.0
Virginia	128	16.8
West Virginia	111	10.2
Wisconsin	100	13.4

TABLE E-2.

Sample Sizes and Average Days per Year for Trout Fishing

State	*n*	*Average Days/year*
Alaska	180	9.3
Arizona	79	8.7
California	187	7.3
Colorado	256	8.4
Connecticut	140	12.4
Hawaii	22	5.2
Idaho	233	10.4
Maine	182	14.1
Massachusetts	115	13.1
Montana	220	12.0
Nevada	137	9.1
New Hampshire	158	13.4
New Mexico	132	8.6
New York	130	10.3
North Dakota	16	4.5
Oregon	220	8.8
Pennsylvania	151	15.5
Rhode Island	69	17.5
South Dakota	43	9.0
Utah	207	11.1
Vermont	157	14.0
Washington	193	11.6
Wyoming	195	10.8

TABLE E-3.

Sample Sizes and Average Days per Year for Deer Hunting

State	*n*	*Average Days/year*
Alabama	150	15.6
Alaska	52	8.1
Arizona	63	6.9
Arkansas	207	13.3
California	46	10.9
Colorado	90	5.1
Connecticut	51	14.7
Delaware	68	11.0
Florida	94	15.5
Georgia	145	14.6
Hawaii	13	4.5
Idaho	210	5.6
Illinois	109	11.2
Indiana	161	15.5
Iowa	144	7.6
Kansas	78	9.6
Kentucky	153	11.3
Louisiana	170	18.3
Maine	196	10.1
Maryland	85	14.5
Massachusetts	91	9.2
Michigan	312	12.4
Minnesota	240	6.1
Mississippi	217	20.1
Missouri	272	7.6
Montana	255	7.1
Nebraska	96	6.8
Nevada	60	6.3
New Hampshire	135	11.9
New Jersey	77	13.1
New Mexico	84	4.6
New York	208	12.0
North Carolina	154	17.1
North Dakota	234	5.6
Ohio	179	9.8
Oklahoma	110	12.3
Oregon	170	7.3
Pennsylvania	253	8.5
Rhode Island	62	14.8
South Carolina	107	17.2
South Dakota	155	6.1
Tennessee	165	16.0
Texas	187	10.4
Utah	186	5.7
Vermont	200	12.3
Virginia	194	15.9
Washington	109	8.0
West Virginia	279	10.4
Wisconsin	358	10.3
Wyoming	130	4.7

TABLE E-4.

Sample Sizes and Average Days per Year for Wildlife Watching

State	*n*	*Average Days/year*
Alabama	170	9.7
Alaska	291	13.5
Arizona	177	12.2
Arkansas	152	8.3
California	203	14.1
Colorado	206	11.3
Connecticut	166	13.5
Delaware	186	10.2
Florida	194	9.3
Georgia	92	13.1
Hawaii	210	11.9
Idaho	268	10.6
Illinois	162	10.8
Indiana	190	10.7
Iowa	185	11.7
Kansas	182	8.5
Kentucky	142	10.3
Louisiana	126	8.3
Maine	209	11.5
Maryland	153	13.2
Massachusetts	223	12.6
Michigan	189	11.5
Minnesota	197	14.5
Mississippi	152	13.2
Missouri	180	10.0
Montana	264	10.5
Nebraska	191	8.0
Nevada	204	11.6
New Hampshire	209	11.8
New Jersey	166	8.9
New Mexico	207	10.5
New York	158	10.1
North Carolina	130	13.0
North Dakota	174	10.2
Ohio	192	11.4
Oklahoma	149	11.8
Oregon	218	12.4
Pennsylvania	203	13.9
Rhode Island	165	11.8
South Carolina	68	13.1
South Dakota	162	14.2
Tennessee	188	11.4
Texas	151	13.1
Utah	234	9.4
Vermont	197	16.5
Virginia	153	9.4
Washington	209	15.9
West Virginia	164	14.4
Wisconsin	235	11.3
Wyoming	261	11.0

Appendix F

Censored Probit Marginal Coefficients

TABLE F-1.

Censored Probit Marginal Coefficients for Bass Fishing

State	*# Bass*	*Ave Length*	*n*
Alabama	0.47	−14.95	116
Arkansas	2.52	87.81	153
Delaware[1]			56
Florida	2.95	32.96	180
Georgia	2.64	−96.37	139
Illinois	9.04	11.71	105
Indiana	2.43	11.95	177
Iowa	2.56	15.92	110
Kansas	0.60	16.54	137
Kentucky	0.22	11.56	144
Louisiana	5.85	−30.04	197
Maryland	6.67	54.19	73
Michigan	15.88	12.21	122
Minnesota	7.55	−3.82	73
Mississippi	2.14	28.60	115
Missouri	1.14	0.36	221
Nebraska	2.01	6.54	91
New Jersey	4.78	20.41	78
North Carolina	2.77	−6.77	117
Ohio	1.20	16.30	159
Oklahoma	2.59	26.44	206
South Carolina	5.47	−3.10	93
Tennessee	1.45	8.14	166
Texas	3.46	48.02	165
Virginia	1.18	−33.94	128
West Virginia	2.20	17.26	111
Wisconsin	1.24	27.89	100

[1]Marginal coefficients are not reported because the equation is not significant.

TABLE F-2.

Censored Probit Marginal Coefficients for Trout Fishing

State	*# Trout*	*Ave Length*	*n*
Alaska	1.18	19.65	180
Arizona	2.67	78.90	79
California	26.67	110.84	187
Colorado	0.71	15.21	256
Connecticut	7.44	−34.97	140
Hawaii[1]			22
Idaho	1.00	48.59	233
Maine	1.65	−6.76	182
Massachusetts	3.60	19.96	115
Montana	1.96	33.93	220
Nevada	2.38	−0.83	137
New Hampshire	2.01	61.28	158
New Mexico[2]	2.61		132
New York	3.11	45.63	130
North Dakota[1]			16
Oregon	1.38	22.68	220
Pennsylvania	0.92	7.38	151
Rhode Island[3]			69
South Dakota[1]			43
Utah	2.97	35.31	207
Vermont	1.33	11.83	157
Washington	3.63	8.64	193
Wyoming	3.26	40.60	195

[1]Marginal coefficients are not reported because the sample size is less than 50.

[2]Marginal coefficient is based on a reduced equation.

[3]Marginal coefficients are not reported because the equation is not significant.

TABLE F-3.

Censored Probit Marginal Coefficients for Deer Hunting

State	*NUMBAG*	*HUNT OBG*	*n*
Alabama	69.84	217.85	150
Alaska	6.93	102.44	52
Arizona[1]			63
Arkansas	213.55	104.93	207
California[2]			46
Colorado	22.50	200.48	90
Connecticut	118.21	614.92	51
Delaware	409.32	−113.29	68
Florida	254.62	34.14	94
Georgia	56.37	41.61	145
Hawaii[2]			13
Idaho[1]			210
Illinois	38.23	−542.18	109
Indiana	298.50	693.18	161
Iowa	100.11	278.34	144
Kansas[1]			78
Kentucky	328.84	210.39	153
Louisiana	111.83	36.83	170
Maine	83.84	536.86	196
Maryland	315.57	237.87	85
Massachusetts	64.68	286.18	91
Michigan	239.27	586.60	312
Minnesota	136.58	819.82	240
Mississippi	136.03	−45.78	217
Missouri	276.26	284.15	272
Montana	109.67	419.54	255
Nebraska	139.51	477.38	96
Nevada	142.10	1063.02	60
New Hampshire[3]	171.15		135
New Jersey	178.63	−514.68	77
New Mexico	250.58	135.82	84
New York	114.82	191.16	208
North Carolina	137.18	131.70	154
North Dakota	81.08	258.48	234
Ohio	110.11	994.23	179
Oklahoma	18.75	204.18	110
Oregon	114.08	−74.73	170
Pennsylvania	87.52	329.87	253
Rhode Island	162.06	103.61	62
South Carolina	24.60	79.68	107
South Dakota	68.56	190.53	155
Tennessee	79.95	344.42	165
Texas	147.84	425.07	187
Utah	179.59	175.08	186
Vermont	121.52	109.02	200
Virginia	73.22	200.57	194
Washington[1]			109
West Virginia	83.41	277.48	279
Wisconsin	70.14	321.45	358
Wyoming	73.20	77.63	130

[1]Marginal coefficients are not available because a reduced equation was used.
[2]Marginal coefficients are not reported because the sample size is less than 50.
[3]Marginal coefficient is based on a reduced equation.

TABLE F-4.

Censored Probit Marginal Coefficients for Wildlife Watching

State	*Private*	*Public*	*Photo*	*Fish*	*n*
Alabama	−268.33	−233.10	210.47	24.55	170
Alaska	−387.54	−299.34	821.46	185.93	291
Arizona	813.59	−258.38	37.92	31.26	177
Arkansas	−343.14	−69.58	528.27	369.38	152
California	−675.80	−171.60	297.41	−213.51	203
Colorado	−3.48	−165.00	259.79	219.78	206
Connecticut	−1059.03	−633.25	534.75	10.40	166
Delaware	−911.27	−193.06	323.81	175.81	186
Florida	−252.30	−302.93	−53.16	153.61	194
Georgia	−32.0	115.10	−63.98	−84.60	92
Hawaii	229.51	−169.28	−53.36	85.77	210
Idaho	−339.67	−123.40	181.69	124.29	268
Illinois	413.01	−231.36	309.00	67.40	162
Indiana[1]					190
Iowa	66.58	−19.33	120.37	360.07	185
Kansas	−735.69	−295.60	43.32	−196.52	182
Kentucky	97.70	−207.38	2.82	−17.77	142
Louisiana[2]					126
Maine	−300.44	−228.17	208.80	117.86	209
Maryland	−972.76	−543.34	670.79	289.15	153
Massachusetts	−153.05	−177.94	215.93	165.34	223
Michigan	−40.68	−153.81	238.14	123.23	189
Minnesota	−109.26	−101.06	83.08	5.96	197
Mississippi	−101.39	−85.07	863.02	−57.78	152
Missouri	128.59	12.65	94.71	87.65	180
Montana	−252.90	−192.68	388.97	450.51	264
Nebraska	−45.66	−114.60	328.34	128.92	191
Nevada[3]		−291.87	146.38	17.15	204
New Hamp.	−276.36	−424.21	188.82	−252.44	209
New Jersey	−148.75	−101.91	196.95	113.67	166
New Mexico	296.45	13.68	388.80	−20.89	207
New York	−128.74	−116.41	52.23	−215.12	158
North Carolina	232.85	274.91	454.17	60.61	130
North Dakota	−32.57	−315.91	227.54	203.57	174
Ohio	−333.61	−143.20	220.70	−0.57	192
Oklahoma	−386.18	−569.40	1444.42	683.02	149
Oregon	−166.69	−37.82	206.59	156.08	218
Pennsylvania	−17.06	−233.35	236.30	−23.08	203
Rhode Island	−340.58	47.41	632.94	469.36	165
South Carolina	−191.32	−684.14	−0.69	120.38	68
South Dakota	−210.91	−157.31	19.31	219.78	162
Tennessee	−292.99	−300.05	145.39	269.71	188
Texas	51.59	−28.09	147.14	294.89	151
Utah	52.96	3.62	−58.74	160.91	234
Vermont	−413.87	−255.50	111.82	9.78	197
Virginia	−239.44	−407.35	−67.80	422.79	153
Washington	−1216.73	−334.93	12.51	71.97	209
West Virginia	−19.92	−71.11	319.86	487.62	164
Wisconsin	−70.85	−284.28	102.49	−77.98	235
Wyoming	−658.98	−278.24	174.65	520.51	261

[1]Marginal coefficinets are not available because a reduced equation was used.
[2]Marginal coefficients are not reported because the equation is not significant.
[3]Marginal coefficients are not available for all variables because a reduced equation was used.