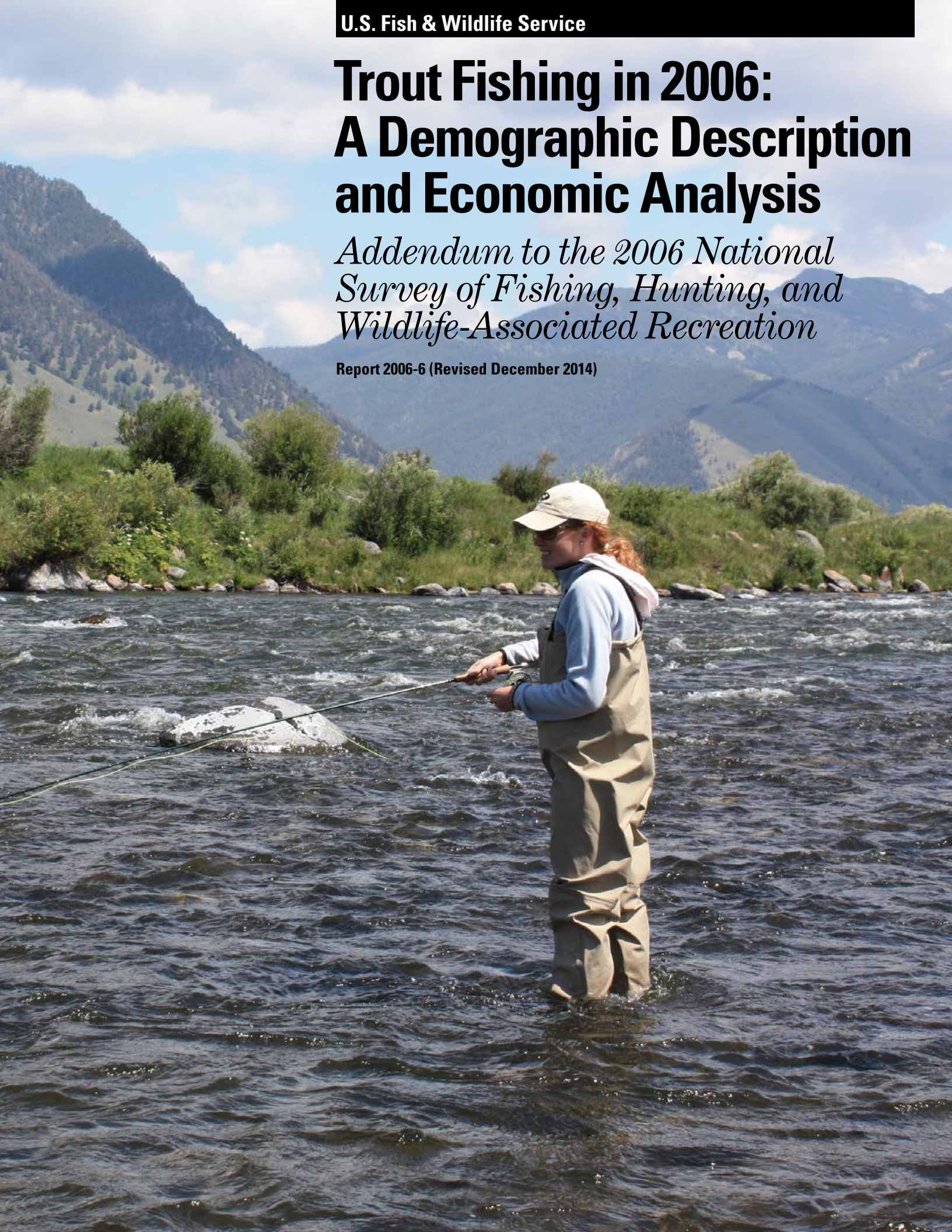


Trout Fishing in 2006: A Demographic Description and Economic Analysis

*Addendum to the 2006 National
Survey of Fishing, Hunting, and
Wildlife-Associated Recreation*

Report 2006-6 (Revised December 2014)



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This report is intended to complement the National and State Reports for the 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. The conclusions in this report are the author's and do not represent official positions of the U.S. Fish and Wildlife Service.

The author thanks Sylvia Cabrera, Richard Aiken, James Caudill, and Ted Maillett for valuable input into this report.

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Introduction

While campaigning during the primary election, President Obama made a promise to the residents of Montana to get some gear and learn the art of fly fishing when he revisited the state. In the summer of 2009, the commander in chief made good on this campaign promise by refusing to let thunderstorms and unseasonably cool weather stop him from learning how to fly fish for Montana's famed trout. President Obama's fly fishing quest received a frenzy of media attention including coverage by the New York Times, CNN, and National Public Radio.

The President's trout fishing trip is another reminder of the legacy and tradition of fishing in the U.S. For centuries trout have been prized for their beauty, fight and flavor (Razzano, 2007). As a versatile freshwater fish, trout are very particular about where they live, preferring clear, cool, well-oxygenated mountain streams, ponds, and lakes. This type of habitat is a big part of their appeal, giving anglers the opportunity to fish in some of the wildest, most scenic settings in America. As a result of their appeal and continued popularity, 6.8 million anglers fished for trout in the U.S. (excluding Great Lakes fishing) in 2006.

This report provides information on freshwater and trout anglers 16 years old and older in the United States. By understanding who these anglers are, how avid they are, where they live, and where they fish, stream restoration and habitat protection projects can be more effectively tailored. In addition to demographic information, this report includes net economic values for trout fishing, and estimates of the economic impacts for trout fishing on the U.S. economy. This type of information provides another tool for policymakers to use when making decisions about the protection of trout and their habitats.



USFWS/Carl Zitsman

All data estimates presented here came from the 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (Survey). It is the most comprehensive survey of wildlife-related recreation in the U.S. Overall, about 22,000 detailed angler interviews were completed with a response rate of 77 percent. The Survey focused on 2006 participation and expenditures by U.S. residents 16 years of age or older.

For this report, a trout angler is considered anyone who is 16 years of age or older who fished for trout at least once during the year. Trout refers to all freshwater trout, including rainbow, brown, brook, lake and so forth. The focus is on freshwater fishing that does not occur in the Great Lakes.

Geography

National Participation

As one of the most popular sport fish in the U.S., trout were sought by 6.8 million anglers in 2006. To put this number in perspective, consider in 2006 there were 6.8 million teachers in the U.S (U.S. Census Bureau, 2009). When one considers all the teachers that he or she encounters, or schools that they drive by, the total number of trout anglers is surprising.

Table 1 compares the popularity of trout fishing to other types of freshwater fishing using the number of anglers, days of fishing, and average days of fishing.

The 6.8 million trout anglers account for 27 percent of all freshwater anglers. By comparison, the most popular freshwater fish species is black bass with 10.0 million anglers (40 percent), followed by 7.5 million (30 percent) panfish anglers, and 7.0 million (28 percent) anglers fishing for both catfish and bullheads.

Examination of the average days per angler reveals that the more active anglers appear to be fishing for the more popular fish species. Black bass and panfish, the two most popular fishing species, make up over half of all freshwater fishing days. Trout anglers collectively fished for trout a total of 75 million days with an average of 11 days per angler. It is important to keep in mind that anglers can fish for more than one species in a day. The average days per trout angler is slightly lower than expected but this may be due to a relatively short licensing period as well as terrain, accessibility, and climate of trout habitat.

Table 1. Freshwater Anglers and Days of Fishing by Type of Fish: 2006

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

<i>Type of fish</i>	<i>Anglers</i>		<i>Days of fishing</i>		<i>Average Days per Angler</i>
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	
Total, all types of fish	25,035	100	419,942	100	17
Black bass (largemouth, small mouth, etc.)	10,013	40	161,005	38	16
Panfish	7,534	30	101,569	24	13
Catfish and bullheads	6,954	28	98,190	23	14
Trout	6,750	27	75,485	18	11
Crappie	6,210	25	90,732	22	15
White bass, striped bass, and striped bass hybrids	4,751	19	65,211	16	14
Anything ¹	4,000	16	35,507	8	9
Walleye	2,672	11	39,117	9	15
Northern pike, pickerel muskie, muskie hybrids	1,788	7	24,762	6	14
Another type of freshwater fish	1,640	7	22,328	5	14
Salmon	937	4	8,643	2	9
Steelhead	434	2	4,307	1	10
Sauger	244	1	2,875	1	12

¹ Respondent fished for no specific species and identified "Anything" from a list of categories of fish.

Note: The two percent columns indicate 1) the share of total anglers and 2) the days of fishing that are attributable to each species. Since anglers can fish for more than one species, the sum of the number of anglers by species is larger than the total number of anglers.

One goal of the 2006 Survey was to capture data comparable with previous years. Figure 1 and Figure 2 show the trend in freshwater and trout fishing participation from 1996 to 2006.

As demonstrated in both figures, the number of freshwater and trout anglers 16 years and older in the U.S. has decreased. The number of trout anglers has decreased from around 9 million anglers in 1996 to 6.8 million in 2006. Diminished trout populations due to whirling disease and habitat destruction may have contributed to some of the decline in angler participation. As for freshwater anglers, their numbers have declined from 29 million anglers in 1996 to 25 million in 2006. Between 2001 and 2006 participation declined by 3 million freshwater anglers. What's causing this trend? Some explanations include demographic changes in the U.S., difficulties with access, and personal time constraints as factors. Although Figures 1 and 2 appear to show a grim picture for the future of freshwater and trout fishing, there are other ways to measure fishing activity. Table 2 describes not only the number of freshwater and trout anglers, but also includes the days of fishing from 1996 to 2006 and an average day per angler.

If activity is measured by the average fishing days per angler, then angling has remained constant. Even though freshwater and trout anglers are not increasing in participation, they are spending more time fishing per person. One explanation for the decrease in angler participation but the consistency in average fishing days per angler may be related to the demographic characteristics (such as an aging population) of freshwater and trout anglers.

Figure 1. Freshwater Anglers: 1996–2006

(Population 16 years of age or older. Excludes Great Lakes Fishing)

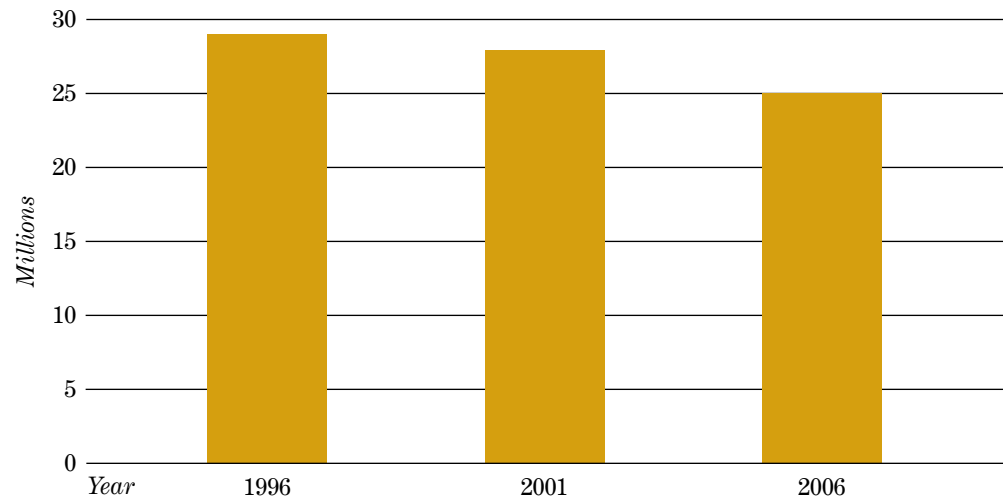


Figure 2. Trout Anglers: 1996–2006

(Population 16 years of age or older. Excludes Great Lakes Fishing)

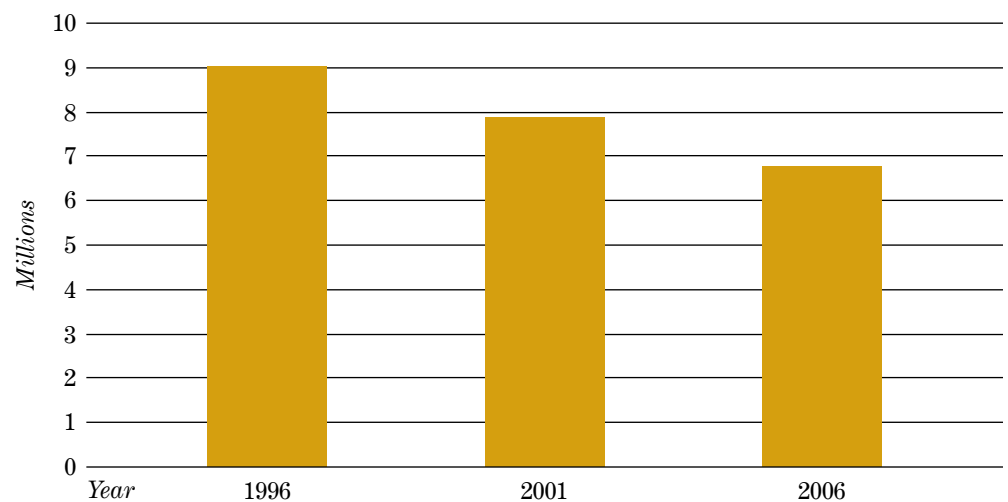


Table 2. Trout Anglers and Days of Fishing by Year

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

Year	Anglers			Days of fishing			Average Days	
	Freshwater	Trout	Percent of freshwater	Freshwater	Trout	Percent of freshwater	Freshwater	Trout
1996	28,921	8,974	31	485,474	93,566	19	17	10
2001	27,913	7,819	28	443,247	83,325	19	16	11
2006	25,035	6,750	27	419,942	75,485	18	17	11

Note: Between each of the five year intervals, there is no difference at the 0.05 level of significance for these columns except for freshwater anglers between 2001 and 2006. This means that for 95 percent of all possible samples, the estimates are not different.

Regional Participation

Freshwater and trout anglers are located throughout the United States. Table 3 presents the distribution of all freshwater and trout anglers by geographic region according to the nine U.S. Census Bureau divisions.

The South Atlantic and East North Central regions have the highest proportion of freshwater anglers in the U.S. with 19 percent and 18 percent respectively. As for trout anglers, the Mountain and Pacific have the highest participation with roughly 1.6 million (23 percent) anglers fishing in each region. These two regions encompass almost 50 percent of the landmass in the U.S. and contain some of wildest trout streams. With only 2 percent of all trout anglers fishing in the East South Central, this region has the lowest number of trout anglers compared to the other eight regions. Freshwater fish like black bass and catfish occupy these anglers' time.

Like any type of freshwater angling, trout fishing can be enjoyed by anyone willing to learn when and where to fish as well as the right gear to use. Figure 3 presents a map of the nine U.S. Census Bureau divisions along with their respective percentage of freshwater anglers who seek trout.

Nationally, 27 percent of all freshwater anglers fished for trout in 2006. Regionally, the percent of freshwater anglers seeking trout varied widely depending on where an angler lived. The range in freshwater anglers seeking trout hit a high of 78 percent in the Mountain Region and a low of 6 percent in the East South Central. Lack of suitable habitat and an abundance of other freshwater fish are key factors for why freshwater anglers in the East South Central don't pursue trout.

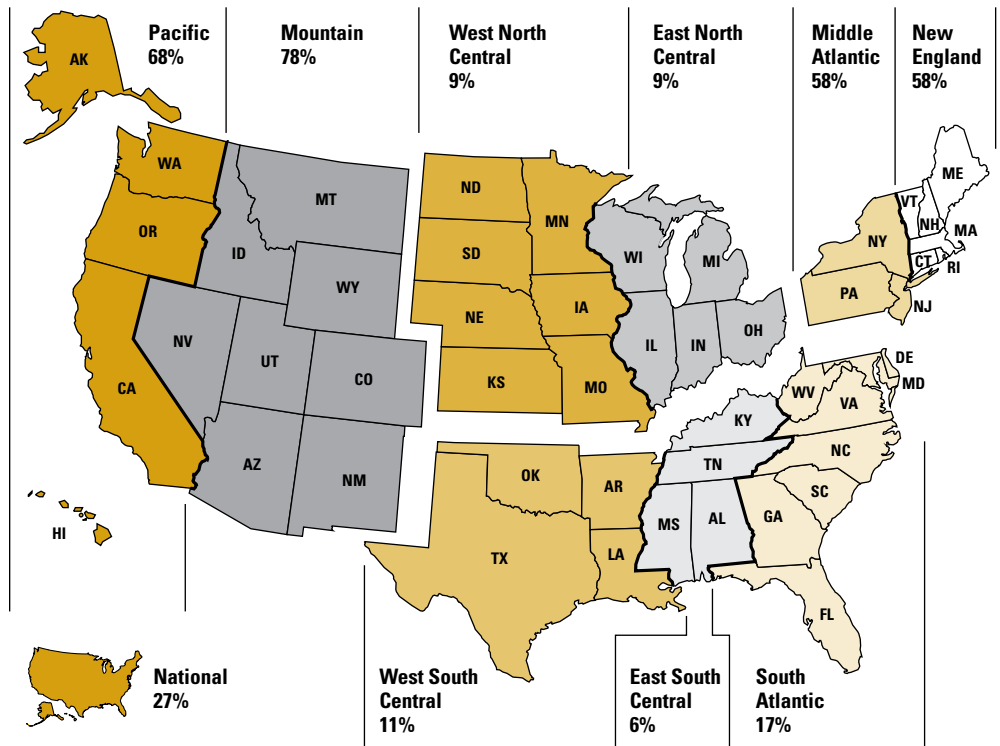
Table 3. Freshwater and Trout Anglers by Region

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

Census Regions	All Freshwater Anglers		Trout Anglers		Percent of Freshwater
	Number	Percent	Number	Percent	
U.S. Total	25,035	100	6,750	100	27
New England	935	4	539	8	58
Middle Atlantic	1,770	7	1,033	15	58
East North Central	4,515	18	420	6	9
West North Central	3,244	13	304	5	9
South Atlantic	4,660	19	792	12	17
East South Central	2,313	9	140	2	6
West South Central	3,251	13	358	5	11
Mountain	2,028	8	1,583	23	78
Pacific	2,318	9	1,580	23	68

Figure 3. Percent of Freshwater Anglers Who Seek Trout by Region*

(Population 16 years of age or older. Excludes Great Lakes Fishing)



* The nine U.S. Census Bureau divisions.

State Participation

Freshwater and trout anglers can be broken down further to show the differences between states. Table 4 outlines the number of freshwater and trout anglers by state where fishing occurred. Additionally, the table also provides the percent of all freshwater anglers who sought trout.

Texas has the most freshwater anglers but trout is clearly not the freshwater fish these anglers are after (only nine percent of anglers participated). This may be due to unsuitable trout habitat in Texas. States in the Mountain and Pacific regions like Washington, Oregon, and Utah have a lot of trout anglers. Yet, it's California who leads the states with 871 thousand trout anglers while Pennsylvania and Colorado are close seconds with around 600 thousand trout anglers. As shown in column 1 of Table 4, Colorado has an estimated 660 thousand freshwater anglers (age 16 years or older) and over 90 percent of them seek trout! This makes Colorado the state with the highest participation rate, followed by Wyoming (88 percent) and Utah (87 percent). Minnesota has the lowest reportable participation rate with only two percent of its freshwater anglers fishing for trout.

Table 4. Freshwater and Trout Anglers by State Where Fishing Occurred

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

State	Freshwater Total		Total Trout	
	Number	Percent of freshwater	Number	Percent of freshwater
US Total	25,035		6,750	27
Alaska	191		66	35
Alabama	714		...	...
Arkansas	655		143	22
Arizona	422		209	49
California	1,224		871	71
Colorado	660		608	92
Connecticut	204		130	63
Delaware	58		*14	*24
Florida	1,417		*70	*5
Georgia	1,025		140	14
Hawaii	22		...	...
Iowa	438		*34	*8
Idaho	350		258	74
Illinois	777		...	...
Indiana	677		...	...
Kansas	404		*18	*4
Kentucky	721		*38	*5
Louisiana	549		*72	*13
Massachusetts	292		156	53
Maryland	364		77	21
Maine	303		179	59
Michigan	1,192		*157	*13
Minnesota	1,381		*27	*2
Missouri	1,076		156	15
Mississippi	508		...	...
Montana	291		236	81
North Carolina	884		257	29
North Dakota	106		...	...
Nebraska	198		*22	*11
New Hampshire	198		89	45
New Jersey	243		77	32
New Mexico	248		184	74
Nevada	142		106	75
New York	741		391	53
Ohio	982		*62	*6
Oklahoma	611		...	...
Oregon	491		320	65
Pennsylvania	914		610	67
Rhode Island	50		14	28
South Carolina	612		*21	*3
South Dakota	135		*18	*13
Tennessee	871		95	11
Texas	1,860		*160	*9
Utah	375		328	87
Virginia	622		138	22
Vermont	114		60	53
Washington	538		337	63
Wisconsin	1,253		*90	*7
West Virginia	376		177	47
Wyoming	203		179	88

* Estimate based on sample size of 10–29

... Sample size less than 10.

It's important to know how many freshwater and trout anglers reside in a state but what if a state has a lot of trout anglers who rarely go fishing? In other words, Table 4 tells us nothing about the popularity of trout fishing or how active trout anglers are. Is a trout angler in California more active than a trout angler in Montana? To help answer this question, Table 5 presents the number of days spent freshwater and trout fishing.

The share of all days that anglers spent fishing for trout in a specific state is also reported in the last column of Table 5. At 83 percent, Wyoming has the highest percent of freshwater fishing days spent fishing for trout. This is followed closely by Colorado with 82 percent and Utah with 79 percent. As we've seen, these states also contain the highest participation rates.

Table 5. Freshwater and Trout Fishing Days by State Where Fishing Occurred
(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

State	Freshwater Total		Total Trout	
	Number	Number	Percent of freshwater days	
US Total	419,942	75,485		18
Alaska	1,826	486		27
Alabama	12,987	...		...
Arkansas	10,812	960		9
Arizona	4,156	1,067		26
California	12,307	8,273		67
Colorado	6,374	5,205		82
Connecticut	4,354	2,061		47
Delaware	1,133	*98		*9
Florida	24,512	*703		*3
Georgia	15,646	1,719		11
Hawaii	67	...		...
Iowa	6,215	*215		*3
Idaho	4,301	2,671		62
Illinois	15,631	...		...
Indiana	8,289	...		...
Kansas	5,314	*63		*1
Kentucky	9,231	*336		*4
Louisiana	8,743	*881		*10
Massachusetts	5,345	2,158		40
Maryland	4,799	1,036		22
Maine	4,272	2,318		54
Michigan	19,677	*1,051		*5
Minnesota	24,041	*103		(Z)
Missouri	16,569	1,177		7
Mississippi	7,095	...		...
Montana	2,927	2,100		72
North Carolina	13,923	4,203		30
North Dakota	953			
Nebraska	3,096	*146		*5
New Hampshire	2,733	1,191		44
New Jersey	3,646	872		24
New Mexico	2,596	1,781		69
Nevada	1,526	914		60
New York	10,994	5,438		49
Ohio	12,827	*473		*4
Oklahoma	10,580	...		...
Oregon	7,053	3,239		46
Pennsylvania	14,456	6,090		42
Rhode Island	541	131		24
South Carolina	10,658	*349		*3
South Dakota	1,697	*215		*13
Tennessee	15,103	989		7
Texas	27,074	*1,403		*5
Utah	3,822	3,003		79
Virginia	6,417	676		11
Vermont	1,665	572		34
Washington	7,524	3,622		48
Wisconsin	16,216	*690		*4
West Virginia	6,885	2,555		37
Wyoming	1,691	1,408		83

* Estimate based on sample size of 10–29.

... Sample size less than 10.

(Z) Less than 0.5 percent

Another piece of information that can be used to help answer the question about who is more active (a California vs. a Montana trout angler) is the average days of trout fishing by state where fishing occurred. This information is presented for both freshwater and trout anglers in Table 6.

If we use average days as the criteria for how active anglers are, it's a tie between California and Montana with each state's anglers averaging nine days of trout fishing. Remember that these days do not represent fishing for trout exclusively; the anglers could have sought more than one species of fish on a day of fishing.

Table 6. Average Days Freshwater and Trout Fishing by State Where Fishing Occurred
(Population 16 years of age or older. Excludes Great Lakes Fishing)

<i>State</i>	<i>Average Days Freshwater</i>	<i>Average Days Trout</i>
US Total	17	11
Alaska	10	7
Alabama	18	...
Arkansas	17	7
Arizona	10	5
California	10	9
Colorado	10	9
Connecticut	21	16
Delaware	20	*7
Florida	17	10
Georgia	15	*12
Hawaii	3	...
Iowa	14	*6
Idaho	12	10
Illinois	20	...
Indiana	12	...
Kansas	13	*4
Kentucky	13	*9
Louisiana	16	*12
Massachusetts	18	14
Maryland	13	13
Maine	14	13
Michigan	17	*7
Minnesota	17	*4
Missouri	15	8
Mississippi	14	...
Montana	10	9
North Carolina	16	16
North Dakota	9	...
Nebraska	16	*7
New Hampshire	14	13
New Jersey	15	11
New Mexico	10	10
Nevada	11	9
New York	15	14
Ohio	13	*8
Oklahoma	17	...
Oregon	14	10
Pennsylvania	16	10
Rhode Island	11	9
South Carolina	17	*17
South Dakota	13	*12
Tennessee	17	10
Texas	15	*9
Utah	10	9
Virginia	10	5
Vermont	15	10
Washington	14	11
Wisconsin	13	*8
West Virginia	18	14
Wyoming	8	8

* Estimate based on sample size of 10–29.

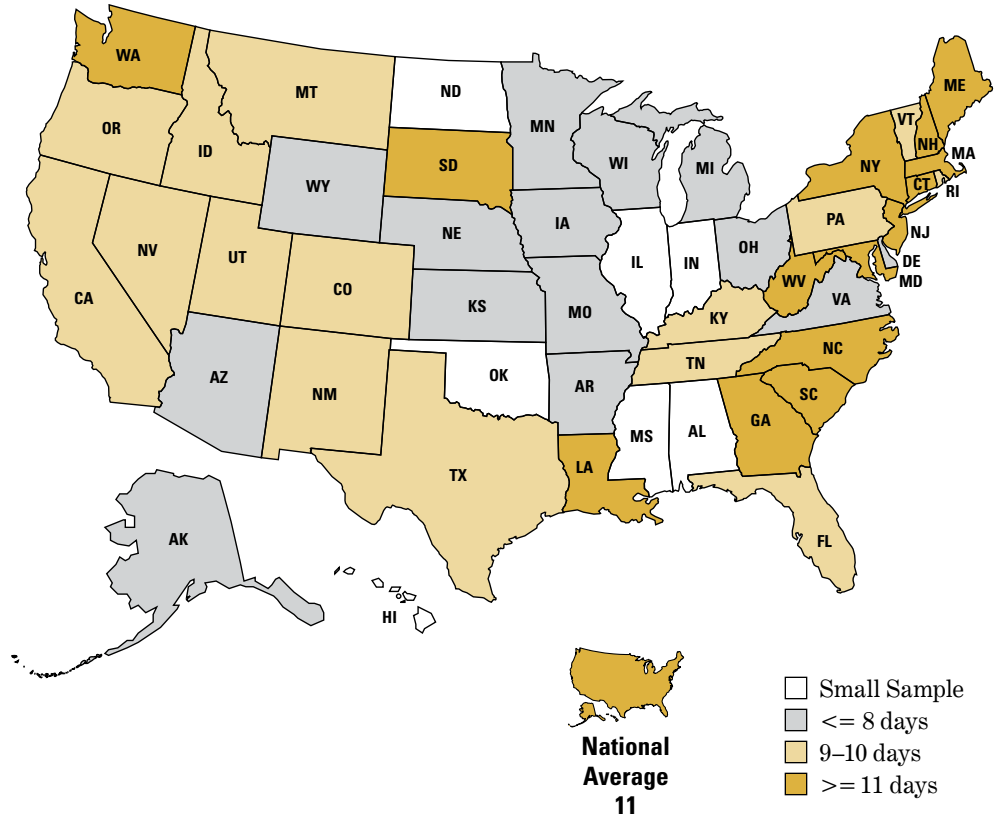
... Sample size less than 10.

The average number of days spent trout fishing is another way to judge how actively freshwater anglers seek trout. The average number of days from Table 6 is presented graphically in Figure 4. The heavily shaded states have an average number of trout fishing days greater than or equal to 11. States with an average of nine or ten days are moderately shaded. Grey represents states with an average of eight days or less. The blank States contain a sample size of less than 10 which made their results not reliable enough to include in the figure.

It is interesting to note that some states with high levels of participation had less than average days of participation. For instance, Wyoming reported a low average for days freshwater anglers sought trout (eight days) yet ranked second in participation of freshwater anglers seeking trout (88 percent). One explanation may be that anglers in some states with high participation are not as avid and therefore the number of days they fish for trout is lower. This would lower the average for the state. Some states such as South Dakota and Louisiana have high average days but low levels of angler participation. This implies that although some states have relatively fewer trout anglers, their anglers are more avid about trout fishing.

Trout anglers enjoy fishing throughout the U.S., ranging in participation from 23 percent in the Mountain and Pacific regions to 2 percent in the East South Central region. These anglers come from Maine, with 179 thousand anglers, to California, with 871 thousand anglers, and every state in between (as well as Alaska and Hawaii). Now that we know the geography of trout fishing, the next question to ask is: what characteristics describe a typical trout angler?

Figure 4. Average Days Freshwater Anglers Seek Trout
(Population 16 years of age or older. Excludes Great Lakes Fishing)



Demographics

In North America, there are about a dozen different varieties of trout found coast to coast with different populations requiring different environmental conditions. Just like the different varieties of trout, there is variation in the characteristics that make up a trout angler. The following section examines the socioeconomic characteristics of the U.S. population and all freshwater and trout anglers (excluding Great Lakes) 16 years of age and older by gender, age, education and income. Tables 7 through 10 show the proportion of the U.S. population that participates in freshwater fishing (for example, Table 8 illustrates that in 2006, 14 percent of the U.S. population 35 to 44 years old were freshwater anglers). The columns labeled "Percent" in Tables 7 through 10 provide the percent of participants in each activity by category (for example, Table 8 reveals that 25 percent of

both freshwater and trout anglers are between the ages of 35 and 44 years old). Because of the relatively large sample sizes for national estimates, differences in characteristics that are 3 percent or larger are usually significant at the 95 percent confidence level.

Gender

Fishing continues to be a male dominated sport. Females make up a quarter (25 percent) of all freshwater anglers and even fewer trout anglers (21 percent). This is disproportionately lower than the U.S. population where women are the majority at 52 percent (Table 7).

While many women 16 years of age and older participated in freshwater fishing (6.3 million), this comprised only five percent of the female population in the U.S. In comparison, 17 percent of the male population 16 years of age and older

participated in freshwater fishing. Female freshwater anglers participated in trout fishing at a rate of 22 percent while male freshwater anglers participated at a rate of 28 percent.

Age

Trout fishing is popular at any age (16 years or older). At least 21 percent of freshwater anglers in every age category fished for trout (Table 8). However, about half of all trout anglers (49 percent) are between the ages of 35 to 54 years old.

Comparing trout anglers to the U.S. population reveals that trout anglers are younger than the general population. The percent of trout anglers 65 and older (10 percent) is less than the U.S. population (17 percent), while freshwater anglers are even more youthful with only nine percent 65 years or older.

Table 7. Gender Distribution of U.S. Population, Freshwater Anglers, and Trout Anglers

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

Gender	U.S. Total		All Freshwater Anglers		Percent of U.S. Population	Trout Anglers		Percent of Freshwater Anglers
	Number	Percent	Number	Percent		Number	Percent	
U.S. Total	229,245	100	25,035	100	11	6,750	100	27
Male	110,273	48	18,723	75	17	5,330	79	28
Female	118,972	52	6,312	25	5	1,420	21	22

Table 8. Age Distribution of U.S. Population, Freshwater Anglers, and Trout Anglers

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

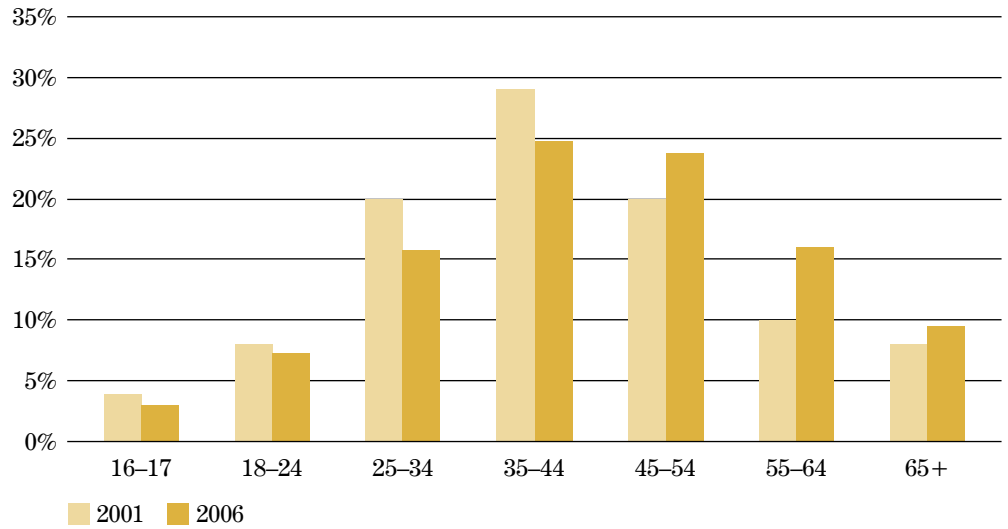
Age	U.S. Population		All Freshwater Anglers		Percent of U.S. Population	Trout Anglers		Percent of Freshwater Anglers
	Number	Percent	Number	Percent		Number	Percent	
U.S. Total	229,245	100	25,035	100	11	6,750	100	27
16-17	8,272	4	981	4	12	202	3	21
18-24	23,292	10	2,133	9	9	489	7	23
25-34	37,468	16	4,119	16	11	1,068	16	26
35-44	45,112	20	6,184	25	14	1,666	25	27
45-54	44,209	19	5,515	22	12	1,605	24	29
55-64	32,867	14	3,730	15	11	1,077	16	29
65+	38,024	17	2,373	9	6	643	10	27

Though trout fishing is predominately made up of a middle-aged generation, the trend is moving toward older participants. Figure 5 compares the age of trout anglers, freshwater anglers, and the U.S. population in 2001 and in 2006.

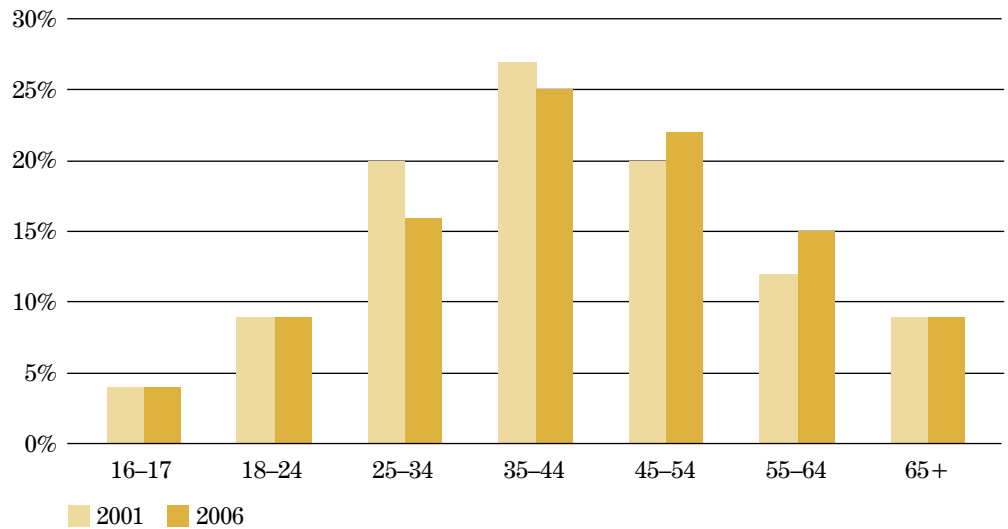
The number of trout anglers 25 to 44 years old decreased from 49 percent of all trout anglers in 2001 to 41 percent in 2006. The number of freshwater anglers 25 to 44 years old also decreased from 47 percent in 2001 to 41 percent in 2006. As for the U.S. population in 2001, 38 percent was 25 to 44 years old; in 2006 it dropped to 36 percent. In contrast, the percent of 55-to 64-year olds increased in all three populations. It is appropriate to assume that the aging of the U.S. population, freshwater anglers, and trout anglers is related to the aging of the “Baby Boom” generation. This trend provides another explanation about why the average days spent trout fishing has remained constant between 1996 and 2006, while the total number of anglers fishing for trout has decreased. With an increase in age, anglers may have more leisure time to spend fishing for trout.

Figure 5. Age Trends for Trout Anglers, Freshwater Anglers, and the U.S. Population

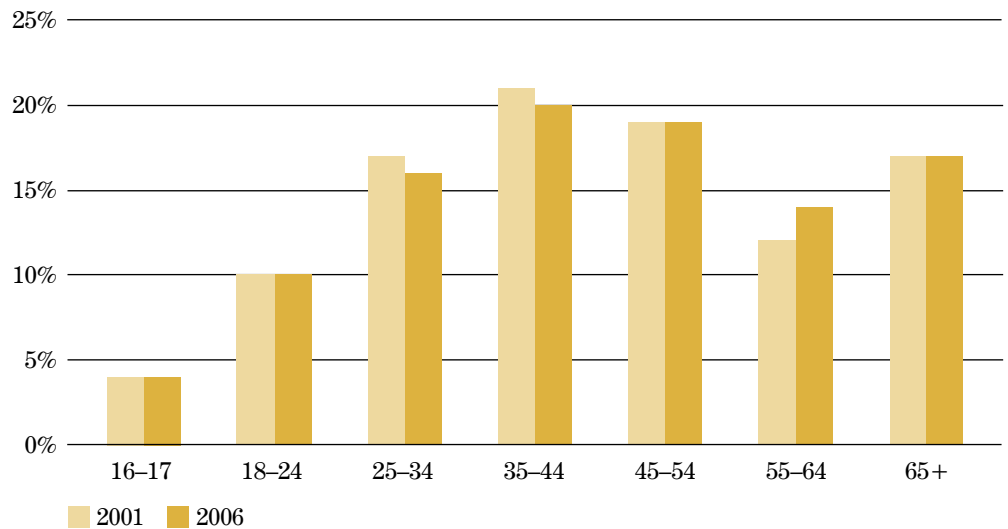
Percent of Trout Anglers, by Age



Percent of Freshwater Anglers, by Age



Percent of U.S. Population, by Age



Education

People with all types of educational backgrounds participate in freshwater and trout fishing. Overall, trout anglers tend to complete more years of education than freshwater anglers and the U.S. population.

Table 9 illustrates that 15 percent of the U.S. population 16 years and older had not completed high school, compared to only 10 percent of both freshwater and trout anglers in 2006. As for advanced degrees, 13 percent of trout anglers earned graduate degrees compared to only 10 percent of all freshwater anglers and the U.S. population. It's safe to say that trout anglers are among the most educated anglers.

Freshwater anglers' participation in trout fishing increased as their years of education increased; from 20 percent for anglers with less than 12 years of education to 36 percent for anglers with 5 or more years of college.

Income

Generally, income is used as a measure of the money one earns from working and as the saying goes; "*a bad day of fishing is better than a good day of work.*" The income distribution for the U.S. population, freshwater anglers, and trout anglers is given in Table 10.

In 2006, the median household income for the U.S. was slightly over \$48,000, while that of trout anglers was over \$50,000 (DeNava-Walt et. al., 2007). Trout anglers also had more advanced degrees than the U.S. population. Generally, we expect to find a positive correlation between education and income. Table 10 supports this claim. Twenty-four percent of trout angler households earned more than \$100,000, compared with only 17 percent of households in the U.S.

The last column in Table 10 reports that about a quarter of freshwater anglers sought trout. Freshwater anglers from households earning between \$35,000

and \$39,999 a year participated in trout fishing at the lowest rate of 18 percent. Freshwater anglers from households earning more than \$100,000 had the highest participation rate, 35 percent.

Trout fishing is a male dominated sport with females representing less than a quarter of all anglers. Trout anglers comprise all age groups and are well educated. In addition, trout anglers are more likely to come from households making more than \$50,000 a year; the U.S. median income. Now that we know the geography and demographics of trout anglers, another question to ask is how much do trout anglers enjoy trout fishing? In other words, how valuable is trout fishing to these anglers? There are multiple ways to interpret how someone values a recreational activity like trout fishing and for this report, two measures of economic importance are examined.

Table 9. Educational Distribution of U.S. Population, Freshwater Anglers, and Trout Anglers

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

Education	U.S. Population		All Freshwater Anglers			Trout Anglers		Percent of Freshwater Anglers
	Number	Percent	Number	Percent	Percent of U.S. Population	Number	Percent	
U.S. Total	229,245	100	25,035	100	11	6,750	100	27
0-11 years	34,621	15	3,503	14	10	701	10	20
12 years	78,073	34	8,723	35	11	2,238	33	26
1-3 years of college	53,019	23	6,340	25	12	1,621	24	26
4 years of college	39,506	17	4,065	16	10	1,323	20	33
5 years or more of college	24,025	10	2,403	10	10	866	13	36

Table 10. Income Distribution of U.S. Population, Freshwater Anglers, and Trout Anglers

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

Household Income	U.S. Population		All Freshwater Anglers			Trout Anglers		Percent of Freshwater Anglers
	Number	Percent	Number	Percent	Percent of U.S. Population	Number	Percent	
U.S. Total	229,245	100	25,035	100	11	6,750	100	27
Under \$10,000	10,673	6	621	3	6	166	3	27
\$10-\$19,999	15,373	9	1,242	6	8	269	5	22
\$20-\$24,999	11,374	7	1,192	5	10	280	5	23
\$25-\$29,999	10,524	6	1,169	5	11	322	5	28
\$30-\$34,999	11,161	7	1,373	6	12	362	6	26
\$35-\$39,999	10,349	6	1,350	6	13	241	4	18
\$40-\$49,999	17,699	10	2,313	11	13	621	10	27
\$50-\$74,999	33,434	20	5,136	24	15	1,343	23	26
\$75-\$99,999	21,519	13	3,287	15	15	951	16	29
\$100,000 or More	29,159	17	4,005	18	14	1,408	24	35

Note: Detail does not add up to total because unreported incomes were deleted

Measures of Economic Importance

Expenditures and net economic values are two widely used but distinctly different measures of economic importance of wildlife-related recreation. For example, as President Obama prepared for his fly fishing expedition, he might have spent money to purchase the gear and equipment. Lodging accommodations might have been another expense. The money spent would ripple through Montana's economy, supporting local salaries and wages in the state. Purchases made solely for one trip might seem insignificant, but when multiplied by the 6.8 million trout anglers over the course of the year, the economic effect in the U.S. becomes apparent. These purchases supply money for salaries and jobs which in turn generate more sales and more jobs and tax revenue. This is the **economic output** or impact of trout anglers' expenditures and one of two economic measures presented in this paper.

Economic impact numbers are useful indicators of the importance of trout fishing to local, regional, and national economies. They measure the new dollars brought into the economy by non-residents or from the sale of goods made locally and exported. However, they do not measure the economic benefit to either the individual participant or, when aggregated, to society because, theoretically, money not spent on trout fishing would be spent on other activities. Money used in purchases is just transferred from one group to another. Nevertheless, from the perspective of a given community or region, out-of-region residents spending money for trout fishing represents real economic wealth.

Expenditures and Economic Impacts

This section examines spending by anglers for freshwater fishing in 2006. It does not include spending on saltwater or Great Lakes fishing. Spending is examined by type of angler not by type of fish pursued. One must participate in freshwater and trout fishing to be considered as a spender. The categories are not mutually exclusive. All trout



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anglers are freshwater anglers and some freshwater anglers are trout anglers.

Expenditures by freshwater and trout anglers are presented in Table 11. In 2006, spending by freshwater anglers totaled \$24.6 billion while trout anglers spent \$3.5 billion. Dividing these expenditure totals by the number of freshwater and trout anglers results in averages of \$982 and \$522 respectively.

As a reminder, most fishing equipment is used for multiple types of fishing. Therefore, to properly allocate the equipment expenditures to trout fishing, the expenditures were multiplied by the ratio of days that the freshwater angler

fished for trout in 2006 to the number of days of all freshwater fishing (e.g., if a freshwater angler fished for trout 30 percent of the time, then 30 percent of his total freshwater fishing equipment expenditures were allocated to his trout fishing activities).

For trip costs, freshwater anglers average higher spending than trout anglers. This is consistent throughout all categories, but especially so for boating costs and bait. Freshwater anglers average higher spending in nearly every category for equipment expenditures.

However, trout anglers average higher spending on boots and waders. Freshwater anglers average higher spending on special equipment which includes items like boats, canoes, and campers.

Though it's interesting to know how much trout anglers spent, what about the ripple effect on the U.S. economy from their spending? This question can be answered by using economic multipliers to determine how powerful of an economic force trout fishing is for the U.S. economy.

The \$3.5 billion spent by trout anglers in 2006 had an overall economic impact of \$9.9 billion (Table 12). The economic impact of the 6.8 million trout anglers also produced \$1.3 billion in tax revenues and supported over 80 thousand jobs nationwide. For details on the economic impact estimation methods see Appendix A.

Table 11. Expenditures by Freshwater and Trout Anglers

(Population 16 years of age or older. Numbers in the thousands. Excludes Great Lakes Fishing)

<i>Expenditure Item</i>	<i>All Freshwater (Thousands of dollars)</i>	<i>Average per Freshwater Angler (dollars)</i>	<i>Trout Anglers (Thousands of dollars)</i>	<i>Average per Trout Angler (dollars)</i>
Total, all items	24,581,671	982	3,523,675	522
Trip-Related Expenditures				
Total trip-related	11,521,818	460	1,915,367	284
Food and lodging, total	4,235,176	169	824,332	122
Food	3,038,376	121	583,670	86
Lodging	1,196,800	48	240,662	36
Transportation, total	3,667,944	147	667,362	99
Public	281,318	11	80,803	12
Private	3,386,626	135	586,559	87
Other trip costs, total	3,618,698	145	423,673	63
Guide fees, pack trip or package fees	272,634	11	74,522	11
Public land use fees	140,129	6	29,906	4
Private land use fees	67,391	3	14,560	2
Equipment rental	209,491	8	36,999	5
Boating costs ¹	1,798,118	72	125,215	19
Heating and cooking fuel	95,458	4	18,474	3
Bait	785,113	31	90,426	13
Ice	250,365	10	33,571	5
Equipment Expenses				
Fishing equipment	3,361,439	134	499,913	74
Rods, reels, poles and rodmaking components	1,447,041	58	225,986	33
Lines and leaders	349,449	14	59,529	9
Artificial lures, flies, baits and dressing	648,870	26	95,581	14
Hooks, sinkers, and swivels	257,959	10	38,809	6
Tackle boxes	89,756	4	13,424	2
Creels, stringers, fish bags and landing gear	60,014	2	9,064	1
Minnow traps, seines, and bait containers	37,016	1	3,598	1
Depth and fish finders, and other electronics	259,122	10	16,410	2
Ice fishing equipment	81,329	3	7,558	1
Other fishing equipment	130,885	5	29,954	4
Auxiliary equipment	600,558	24	135,921	20
Camping equipment	337,021	13	63,103	9
Binoculars, spotting scopes	26,365	1	5,711	1
Special fishing and hunting clothing, boots, foul weather gear	174,772	7	59,040	9
Processing and taxidermy costs	32,581	1	*3,022	*(W)
Other	29,820	1	5,045	1
Special equipment²	9,097,856	363	972,474	144

* Estimate based on a sample size of 10–29

(W) Less than 0.5 dollar

¹ Boating costs include launching, mooring, storage, maintenance, insurance, pumpout fees, and fuel

² Special equipment includes boats, campers, cabins, trail bikes, etc.

Table 12. Economic Impact of Trout Anglers

(Population 16 years of age or older. Excludes Great Lakes Fishing)

Retail Sales (expenditures)	\$3,523,675,000
Economic Output or Ripple Effect	\$9,938,943,000
Salaries, Wages and Business Earnings	\$2,990,951,000
Jobs	80,175
Federal Tax Revenues	\$707,423,000
State and Local Tax Revenues	\$591,537,000

Even though trout fishing may not appear to be a major force driving the U.S. economy, on a local level these economic impacts can be a savior to a small town's commerce. Towns like Roscoe, New York, and Cotter, Arkansas attract thousands of trout anglers a year who, in turn, pour hundreds of thousands of dollars into local economies.

Net Economic Values

An important economic concept is trout fishing's economic benefit to individuals and society: the amount that people are willing to pay over and above what they actually spend to trout fish. This is known as **net economic value**, or consumer surplus, and is an appropriate measure of the economic benefits to individuals from participation in freshwater fishing (Johnston et al., 2006).

Net economic value is measured as participants' "willingness to pay" for trout fishing over and 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 6.

A demand curve for a representative trout angler is shown in the figure. An individual trout angler's demand curve gives the number of trips the angler would take per year for each different cost per trip. The downward sloping demand curve represents marginal willingness to pay per trip and indicates that each additional trip is valued less by the angler than the previous trip. All other factors equal, the lower the cost per trip (vertical axis) the more trips the angler will take (horizontal axis). The cost of a trout fishing trip serves as an implicit price for trout fishing since a market price generally does not exist for this type of activity. At \$60 per trip, the trout angler would choose not to fish, but if trout fishing were free, the angler would take 16 fishing trips.

At a cost per trip of \$20 the trout angler takes 10 trips, with a total willingness to pay of \$375 (area *acde* in Figure 6). Total willingness to pay is the total value the trout angler places on participation. The trout angler will not take more than 10 trips because the cost per trip (\$20) exceeds what he would pay for an additional trip. For each trip between zero and 10, however, the trout angler would actually have been willing to pay more than \$20 (the demand curve, showing marginal willingness to pay, lies above \$20).

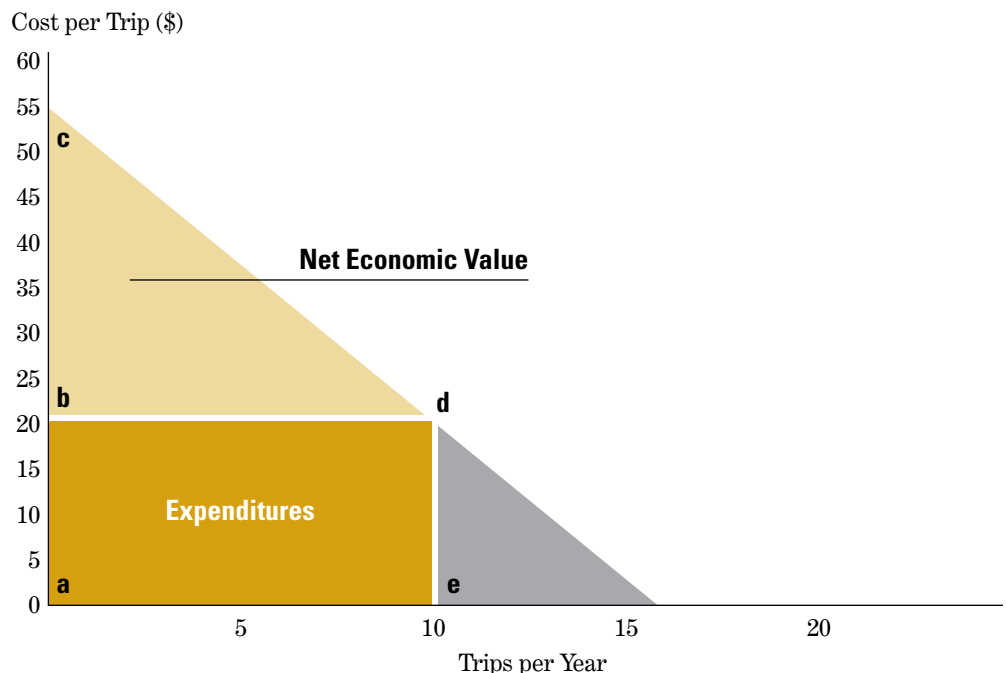
The difference between what the trout angler is willing to pay and what is actually paid is **net economic value**. Therefore, for this example, the net economic value is \$175 [(((\$55-\$20) × 10 ÷ 2) (triangle *bcd* in Figure 6)] and angler expenditures are \$200 [(\$20 × 10) (rectangle *abde* in Figure 6)]. Thus, the trout anglers' total willingness to pay (\$375) is composed of net economic value (\$175) and total expenditures (\$200).

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 the 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 economic measure of an individual's satisfaction after all costs of participation have been paid. Summing the net economic values of all individuals who participate in an activity derives the value to society. For example, assume that there are 100 trout anglers who fish at a particular stream and all have demand curves identical to that of our typical trout angler presented in Figure 6. The total value of this stream to society is \$17,500 [175×100].

Contingent valuation is a recreational valuation technique used by Federal and State agencies for the past three decades (Bateman and Willis, 1999). In order to estimate the net economic values using contingent valuation, information about a trout angler's net willingness to pay for trout fishing is required. The National Survey captures this key information by first asking trout anglers about trips taken in 2006, then asking anglers to consider expenses, and finally at what

Figure 6. Individual Trout Angler's Demand Curve for Fishing Trips



cost per trip they would not have gone at all because it was too expensive. Please see Appendix B for the survey methodology and detailed questions.

As shown in Table 13, the net economic value for a typical trout angler in his or her resident state is \$337 per year or \$56 per fishing day. Trout anglers who travel outside their resident state to fish have a different demand curve and have a net economic value of \$475 per year or \$135 per fishing day. The net economic value of trout fishing is much higher for out-of-staters versus those who reside in the state where the activity occurred. This is expected since those who live out of state generally have to spend more money and time to reach their trout fishing destinations. One exception is California, where the net economic values per year are similar between both residents and non-residents. This may have been caused by resident anglers traveling far distances within California to find suitable trout fishing locations.

The net economic values in Table 13 can be used to evaluate management actions that would have an impact on trout fishing. For example, the impact of dam

construction, dam removal, and other human activities along trout streams can affect trout angler participation rates. Also, dams can negatively influence trout fishing by creating physical barriers to spawning areas or increasing water temperatures. Let's assume that in 2006 the state of Maine proposed a policy action to remove an old dam from a trout stream to improve its water quality to *blue ribbon* status. If a fishery manager knows the number of days Maine residents go trout fishing on a *blue ribbon* trout stream with no dams over the whole season, 1,000 days for example, it is possible to develop an estimate of the fishery gains from the dam removal. This estimate is accomplished by multiplying the net economic value per fishing day (\$30 from Table 13) by the days of participation, resulting in \$30,000 (\$30 x 1,000). If the fishery manager had data on the number of in-state and out-of-state anglers then the numbers could be adjusted to reflect their appropriate values.

There are two important caveats to remember when using these value estimates. First, if trout anglers can shift their fishing to another location then the

values are an overestimate and second, if a loss of trout fishing habitat causes an overall degradation in trout populations and the quality of the fishing experiences also declines, then the values are an under-estimate. The key issues to avoid misuse are:

Each of the different value estimates has slightly different interpretations and uses. Using the median values represents a more conservative approach.

If an action changes participation, it is necessary to consider the extent to which participants substitute another site to fish. Failure to consider substitution will result in overestimation of the resource.

Using per participant value estimates to compute losses or benefits requires additional information, particularly on resource conditions and participation rates.

Table 13. Trout Fishing Net Economic Values

(Population 16 years of age or older. Excludes Great Lakes Fishing. Dollar values for 2006.)

State	State Resident				Out-of-Stater			
	Day		Year		Day		Year	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Aggregate	56	23	337	130	135	50	475	200
Alaska	56	25	334	112	...	...	...	...
Arizona	87	33	475	200	...	...	...	...
California	78	35	305	175	50	45	305	175
Colorado	52	22	296	140	151	100	566	350
Connecticut	43	15	278	75	...	...	...	...
Idaho	48	22	315	110	63	50	246	100
Maine	30	15	247	76	157	62	949	250
Montana	38	17	348	120	128	77	491	400
Nevada	50	28	335	180	...	...	...	...
New Hampshire	38	15	284	75	<<<	<<<	<<<	<<<
New Jersey	<<<	<<<	361	75	...	...	...	...
New Mexico	42	25	271	100	...	...	...	...
New York	49	13	256	113	74	21	206	75
Oregon	58	20	319	125	112	56	630	210
Pennsylvania	43	16	306	75	96	18	297	60
Utah	61	26	558	150	111	58	340	200
Vermont	29	17	305	188	...	...	...	...
Washington	49	25	410	112	...	...	...	...
Wyoming	50	25	446	135	76	60	341	150

... Sample size less than 10

<<< 95% confidence interval includes zero.

Summary

Nationally, trout fishing ranks fourth in popularity for freshwater fishing. In 2006, 6.8 million anglers in the U.S. pursued trout nearly 75 million days. Though participation in trout fishing is down from 1996 to 2006, on average the 11 days anglers spend fishing has remained constant. The states with the largest number of trout anglers were California, Pennsylvania, and Colorado. Participation rates varied widely among states, from over 80 percent of freshwater anglers in Wyoming, Utah, and Colorado seeking trout, to less than 10 percent of freshwater anglers in Texas, Ohio, and Kentucky fishing for trout. This variation in angler participation can be attributed to differences in trout stream habitat and angler preferences.

Males are the majority when it comes to both freshwater and trout anglers. They comprise 75 percent of all freshwater anglers and 79 percent of all trout anglers. As for household income, almost a quarter of trout anglers earn \$100,000 or more. Trout anglers are among the most educated anglers: 13 percent earned graduate degrees compared to 10 percent of all freshwater anglers and the U.S. population. Trout fishing is popular among all age groups, but about half of trout anglers are 35 to 54 years old.

In 2006, trout anglers spent \$2.5 billion on trip-related expenses (food, lodging, guide fees etc.), \$696 million on equipment expenses (lures and leaders etc.) and \$211 million on auxiliary equipment such as boots and waders. Special equipment such as yearly payments for boats and cabins purchased primarily for fishing totaled \$1.4 billion in 2006.



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The spending by trout anglers rippled through the U.S. economy generating \$13.6 billion in economic output and supported over 100 thousand jobs. From an economic perspective, trout anglers have a high value for their fishing experience. Resident anglers value trout fishing at around \$56 per fishing day while *out-of-staters* regard trout fishing as a prized experience, with a value of \$135 per fishing day. These values can be

used by resource managers and others to evaluate management actions that would have an impact on trout fishing. Accordingly, in the years ahead it will be important to monitor changes in trout populations and their habitats as well as participation rates of trout fishing. The 2011 Survey will aid this conservation effort by providing trend information on trout fishing and trout anglers.

References

- Aiken, R. 2009. "Net Economic Values of Wildlife-Related Recreation in 2006." Addendum to the 2006 National Survey of Hunting, Fishing and Wildlife-Associated Recreation. U.S. Fish and Wildlife Service.
- Bateman, I.J. and K.G. Willis. 1999. *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the U.S., E.U., and Developing Countries*. Oxford University Press, New York. Pg. 613.
- DeNavas-Walt, C., B. D. Proctor, and J. Smith. 2007. "Income, Poverty, and Health Insurance Coverage in the United States: 2006." U.S. Census Bureau. Current Population Reports, P60-233. U.S. Government Printing Office. Washington, D.C. Accessed from: <<http://www.census.gov/prod/2007pubs/p60-233.pdf>> on December 10th, 2009.
- Gouras, M. 2009. "President Catches Six Trout in First Fly-Fishing Outing." Chicago Sun-Times. Accessed from <<http://www.suntimes.com/news/politics/obama/-1718833,CST-NWS-obamafish16.article>> on August 17, 2009.
- Johnston, R. J., M. H. Ranson, E. C. Helm. 2006. "What Determines Willingness to Pay per Fish? A Meta-Analysis of Recreational Fishing Values." *Marine Resource Economics*. Vol. 21: 1-32.
- Razzano, J. 2007. "Trout Fishing Anyone?" Empire State Adventures. New York State Conservationists, April 2007.
- Southwick Associates. *Sportfishing in America: An Economic Engine and Conservation Powerhouse*. Produced for the American Sportfishing Association with funding from the Multistate Conservation Grant Program, 2007.
- U.S. Census Bureau, Statistical Abstract of the United States: 2009 (129th Edition) Washington, DC. Accessed from <<http://www.census.gov/statab/www/>> on October 22, 2009.
- U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. Issued October, 2007.

Appendix A. Economic Impact Methods

The 2006 National Survey contains estimates of annual travel and equipment expenditures by trout anglers. To obtain the economic impact figures, these expenditures were used in conjunction with economic multipliers designed by Southwick Associates. The Southwick Associate multipliers were created using freshwater fishing expenditures and participation data from the 2006 National Survey. The impacts were derived using IMPLAN, an input-output (I/O) software and data system widely used for estimating the job and income effects of the interdependencies and interactions of economic sectors and consumers to estimate output, income, and employment effects. The freshwater fishing multipliers were appropriate to use as a trout fishing multiplier because of the similarities between the two fishing sectors (i.e. money spent on freshwater fishing goes into the same industrial sectors as money spent on trout fishing).



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Appendix B. Contingent Valuation Methods and 2006 Survey Questions

Respondents were asked their total number of angling trips in 2006 and average cost per trip. The respondents were then asked how much money would have been too much to pay per trip. This question was reiterated in another form in case there was a misunderstanding. Assuming a linear demand curve, annual net economic value was calculated using the difference between current cost and the maximum cost at the intercept and the number of trips taken in 2006.

The valuation sequence was posed in terms of numbers of trips and cost per trip because respondents were thought more likely to think in terms of trips. The economic values here are reported in days to facilitate their use in analysis. Outliers were deleted if respondents answered in a way that resulted in zero or negative willingness to pay. Observations were also dropped from the sample if the CV response resulted in an annual net economic value for an activity that exceeded 10 percent of an individual's household income.

In the next few questions, I will ask you about ALL your trips taken during the ENTIRE calendar year of 2006 to PRIMARILY fish for TROUT in [fill RESIDENT STATE].

How many trips lasting a single day or multiple days did you take to fish PRIMARILY for TROUT during 2006 in [fill RESIDENT STATE]?

Think about what it cost you for a TYPICAL TROUT fishing trip. Include expenses for things such as gasoline and other transportation costs, food, and lodging.

Remember to include ONLY YOUR SHARE of expenses.

How much did a TYPICAL fishing trip cost you during 2006 when you fished PRIMARILY for trout in [fill RESIDENT STATE]?



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What was the average length of your TROUT caught in [fill RESIDENT STATE] in 2006?

Still thinking about a TYPICAL TROUT fishing trip in [fill RESIDENT STATE]...

What is the cost that would have prevented you from taking even one such trip? In other words, if the trip cost was below this amount, you would have gone TROUT fishing in [fill RESIDENT STATE], but if the trip cost was above this amount, you would not have gone.

Keep in mind that the cost per trip of other kinds of fishing, hunting and recreational activities would not have changed.

So, in other words, \$[fill amount] would have been too much to pay for one TYPICAL TROUT fishing trip last year in [fill RESIDENT STATE]?

If "NO,"

How much would have been too much to pay for one TYPICAL TROUT fishing trip last year in [fill RESIDENT STATE]?

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