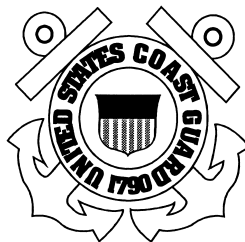


FACTORS RELATED TO BOATING PARTICIPATION IN THE UNITED STATES

A REVIEW OF THE LITERATURE



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Factors Related to Recreational Boating Participation in the United States

A Review of the Literature

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Introduction

This report represents the most salient issues related to recreational boating in the United States. These issues and the information presented herein are the result of an extensive review of the literature, including published and unpublished research reports and journal articles, as well as secondary analyses of numerous data sources, including several Responsive Management databases and data compiled by Boat US. Most graphs and charts are original work of Responsive Management; graphs and charts from other sources are referenced accordingly.

Participation

General rates. Recreational boating in the United States has increased over the past several decades. This increase has been documented not only by the boating industry and the U.S. government, but also by recreation and leisure researchers throughout the country, including Dickinson (1997), Hagler Bailly Inc. (1997), Mangione et al. (2000), Marmo (1980), National Marine Manufacturers Association (NMMA) (1996, 2000), President's Commission on Americans Outdoors (1987), Roper Starch (1998,1999), U.S. Bureau of Census (1981,1992), and the U.S. Department of Transportation (1978, 2000). Nearly one-third of American households have more than one individual who takes part in recreational boating on a regular basis (Mangione et al. 2000). The increase in boating activity has been accompanied with an increase in boat ownership, boat renting, and purchases of boating accessories (Mangione et al. 2000, NMMA 1996, 2000, Responsive Management 1999c, U.S. Department of Transportation 1978).

According to the American Recreation Coalition (1996), an estimated 76 million people are involved in boating and use 17 million boats. From a long-term perspective, the boating

group (including motor boating, canoeing, sailing, kayaking/rafting and windsurfing) 1998 participation by 40.2 million people is essentially equal to the ten-year average of 40.3 million, with a high point recorded in '96 of 45.5 million and a low of 33.7 million in '93 (National Marine Manufacturers Association, Inc. 2000b, website <http://www.nmma-medialink.com/nsga99.htm>).

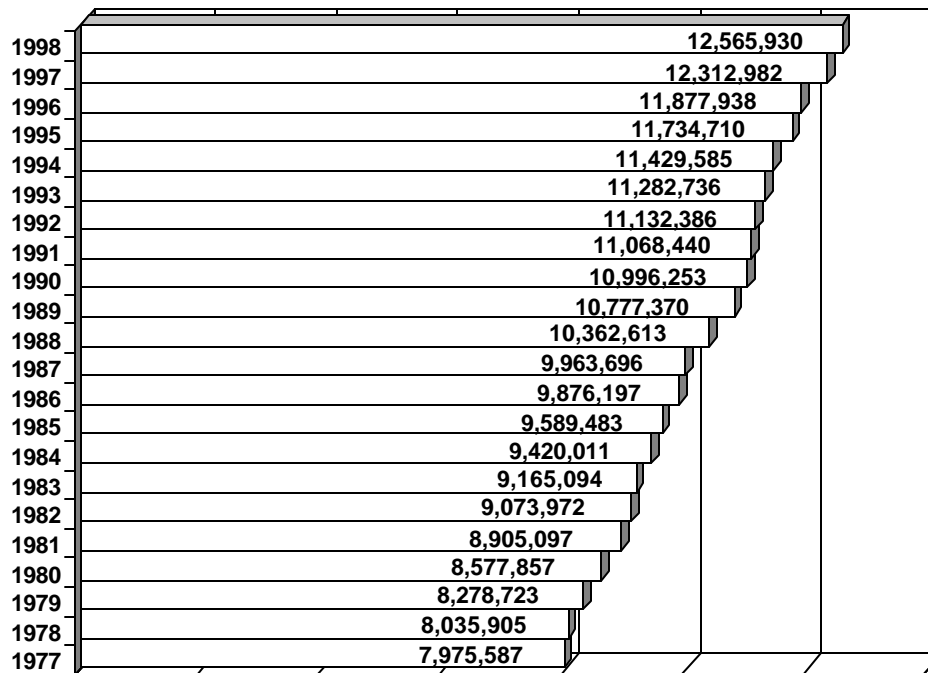
The Recreational Quality Index (RQI), used by the Recreation Roundtable, is a composite score that takes into account Americans opportunity to participate in outdoor recreation, actual participation in outdoor recreation, and satisfaction with recent local outdoor recreation and general vacation experiences (Roper Starch 1998). While the overall RQI composite has remained constant in recent years, specific areas within the composite have increased or decreased in proportion to each other. Canoeing and kayaking have shown the greatest increase of all activities from 1997 to 1998 (151 to 172). Motorboating has also increased from 128 to 149 in this same period. While other activities did not increase at the rate of boating-associated recreation, nonetheless all aspects of outdoor recreation increased.

Taken as a percentage of the population engaged in outdoor recreation, many boating and rowing activities show slight - but not statistically significant - increases in participation during the past year (Roper Starch 1999). Some examples are: motorboating (11%, up 2), canoeing/kayaking (7%, up 2), and water-skiing (6%, up 2). Personal watercraft use did not increase from 1998 to 1998, holding steady at 5%.

	1994	1995	1996	1997	1998	1999	Pt. change since 1998
	%	%	%	%	%	%	%
Motorboating	10	9	5	8	9	11	+2
Canoeing/ kayaking	6	5	4	5	5	7	+2
Personal water craft (e.g. jet skis)	NA	NA	NA	3	5	5	--
Sailing	4	3	3	3	2	3	+1
Rowing	3	2	1	2	1	1	--
Roper Starch (1999). <u>Outdoor recreation in America 1999: The family and the environment</u> . A report prepared for the Recreation Roundtable. Washington, D.C.							

Considering numbered boats only, the U.S. Department of Transportation reports an increase from about 8 million registered boats in 1977 to more than 12 million registered boats in 1998 (U.S. Department of Transportation 2000), an increase of over 50% in twenty years. The number of unregistered boats has probably increased at a similar rate, but such data is unavailable (American Red Cross 1991).

TOTAL NUMBER OF NUMBERED BOATS
U. S. Department of Transportation (2000).
Recreational Boating Statistics 1998. United States
Coast Guard. Washington, D.C. COMPTPUB
P16754.12. <http://uscgboating.org>.



The overall increase in boating has been documented with regional and local studies as well: Delaware (Falk et al. 1992), along the coastal zone in Washington State (Goodwin 1982), Oregon (Oregon State Marine Board 1995), Virginia (Virginia Department of Game and Inland Fisheries 1992), the Mississippi River (Vogel et al. 1996), Lake Erie (Wenner 1982), Illinois (Allen and Dwyer 1978), and Michigan (Stynes et al 1982). All types of recreational boating have experienced increases - some have increased remarkably.

The overall trend seems to have been an increase in demand for recreational boating and for pleasure boat ownership in the late 1990s. This trend varied across types of recreation and types of boats, but the overall trend is moving. Overall, boat ownership increased between 1998

and 1999 by slightly less than two hundred thousand boats. All other types of boats, except for personal watercraft and non-registered craft (i.e. canoes, rowboats, etc.), increased as well (NMMA 2000).

1999 Population Estimates		
National Marine Manufacturers Association (NMMA) (2000). Boating statistics. Chicago, IL. http://www.nmma.org/facts/boatingstates/99stats/population/html		
	1999	1998
People Participating in Recreational Boating	77,841,000	74,847,000
Water Skiers	11,376,000	10,314,000
All Boats Owned	16,833,900	16,653,600*
Outboard Boats Owned	8,202,100	8,180,700*
Inboard Boats Owned	1,608,600	1,596,900*
Stern-drive Boats Owned	1,695,200	1,643,000*
Personal Watercraft Owned	1,096,000	1,100,000
Sailboats Owned	1,696,000	1,669,000
Misc. Craft Owned (Canoes, rowboats, dinghies, and other craft registered by the states)	973,000	949,000
Other (Estimated canoes, rowboats, etc. not registered by the states)	1,563,000	1,524,000
Outboard Motors Owned	13,827,000	13,545,000
Inboard Engines Owned (Includes gasoline, diesel, and jet drive marine engines)	1,608,600	1,596,900
Boat Trailers Owned	7,313,700	7,170,900
Marinas, Boatyards, Yacht Clubs, Dockominiums, Parks & Other	11,500	10,320
\$22,987,128,000 spent at retail during 1999 for new and used boats, motors and engines, accessories, and other associated costs.		
12,565,981 boat registrations as of December 31, 1998 for the U.S. and territories.		
*1998 population estimates revised in 1999.		
All Contents Copyright © 1997-2000 National Marine Manufacturers Association, Inc. All Design Copyright © 1997-2000 Internet Waterway, Inc. All Rights Reserved		

Demographics. Recreational boaters mirror the national population in many demographics. According to Peyton and Gigliotti (1989) and Stamps and Stamps (1985), there appear to be no major differences between the educational levels of recreational boaters and non-boaters. Recreational boaters are more likely to be white non-Hispanic. While 25% of the U.S. population can be classified as “minority,” about 16% of recreational boaters are in this category. These differences in participation have been observed for other types of outdoor recreation as well (Washburne 1978).

Participation by minorities and females. In a recent study, Responsive Management (1999c) reported the percentage of respondents from various activity and demographic groups who had participated in boating within the past 12 months. Thirty-two percent of Caucasians participated in boating, as did 16% of Hispanic or Latino ethnicities, 13% of American Indians, and 13% of African Americans. No obvious explanation exists as to why Americans of Hispanic descent or African Americans should be participating at a rate below their relative numbers in the population, although economics may be an important reason. For those of Hispanic or Latino descent, racial intimidation is not seen as a negative factor in recreational boating. For the most part, the same holds true for African Americans; however, a small percentage of African Americans have reported issues of racial intimidation and racial bias. This may indicate an underlying factor in their lack of participation in boating. African Americans seem to have higher negativistic values toward boating. This observation needs to be tested quantitatively and qualitatively across a broader segment of the population (Responsive Management 1998b).

Responsive Management (1999c) measured boating participation by asking randomly selected nationwide respondents if they had boated more than once in the last 12 months.

Participation rates for males and females were 31% and 28% respectively. Across all types of boating - motorboat, canoe and kayak, and sailboat - participation rates were lower for females than for males. In jet ski participation, the levels were equal.

Percent of respondents in each demographic group and in each activity group who had participated in BOATING more than once within the past 12 months.			
	Boating		
Water Skiers	83%	Age: 18 to 24	34%
Waterfowl Hunters	67	Income: 40,000 to 59,999	33
Small Game Hunters	62	Caucasian	32
Angler (fished 1 time in past two years)	59	Suburban	32
Big Game Hunters	55	Educ: Graduate or Professional Degree	32
Rockclimbers	55	Age: 55 to 64	32
Snow Sport Participants	54	Region 5	32
Hunters	54	Age: 35 to 44	31
Very interested in saltwater fishing	54	Male	31
Swimmers	53	Rural	29
Wilderness Campers	52	Small City/Town	29
Target Shooters	51	Region 4	28
Mountain Bikers	50	Educ: Some College or Trade School	28
Very interested in freshwater fishing	50	Educ: No High School Diploma	28
Campground Campers	50	Female	28
Campers	48	Large City/Urban	27
RV Campers	46	Age: 45 to 54	27
Golfers	45	Income: 20,000 to 39,999	26
Hikers	42	Region 2	26
Income: 60,000 to 99,999	40	Region 6	25
Age: 12 to 17	40	Educ: High School Graduate	24
National/State Park Visitors	39	American Indian	23
Age: 25 to 34	39	Region 1	22
Income: > 100,000	38	Income: < 19,999	17
Educ: College Graduate	36	Hispanic/Latin Ethnicity	16
Wildlife/Bird Watchers	36	African American	13
Region 3	34	Age: 65 or Older	12

Percent of respondents in each demographic group and in each activity group who had participated in MOTORBOATING more than once within the past 12 months.			
	Motorboating		
Motorboaters	100%	Income: > 100,000	23%
Jet Skiers	76	Region 4	23
Water Skiers	71	Caucasian	23
Waterfowl Hunters	56	Wildlife/Bird Watchers	23
Sailboaters	53	Suburban	21
Canoe/Kayakers	51	Male	21
Small Game Hunters	48	Age: 12 to 17	21
Big Game Hunters	44	Age: 35 to 44	21
Angler (fished 1 time in past two years)	44	Rural	21
Hunters	42	Educ: Some College or Trade School	20
Very interested in saltwater fishing	42	Region 2	20
Rockclimbers	39	Age: 55 to 64	20
Target Shooters	38	Small City/Town	19
Very interested in freshwater fishing	38	Age: 45 to 54	19
Swimmers	37	Educ: Graduate or Professional Degree	19
Snow Sport Participants	37	Region 6	18
RV Campers	35	American Indian	18
Wilderness Campers	35	Female	18
Golfers	34	Income: 20,000 to 39,999	18
Campground Campers	34	Educ: High School Graduate	17
Campers	33	Large City/Urban	17
Mountain Bikers	29	Region 5	17
Income: 60,000 to 99,999	29	Educ: No High School Diploma	16
Age: 25 to 34	28	Region 1	13
National/State Park Visitors	27	Income: < 19,999	10
Hikers	27	Hispanic/Latin Ethnicity	9
Region 3	25	Age: 65 or Older	8

Percent of respondents in each demographic group and in each activity group who had participated in CANOEING more than once within the past 12 months.			
	Canoeing		
Canoe/Kayakers	100%	Age: 35 to 44	9%
Sailboaters	29	American Indian	9
Rockclimbers	27	Age: 55 to 64	9
Wilderness Campers	20	Rural	9
Snow Sport Participants	20	Educ: College Graduate	9
Motorboaters	19	Caucasian	8
Water Skiers	18	Age: 45 to 54	8
Mountain Bikers	18	Male	8
Jet Skiers	17	Educ: Some College or Trade School	8
Big Game Hunters	17	Suburban	8
Waterfowl Hunters	17	Income: 40,000 to 59,999	8
Target Shooters	17	Educ: No High School Diploma	8
Angler (fished 1 time in past two years)	17	Age: 25 to 34	8
Campground Campers	17	Large City/Urban	7
Swimmers	16	Age: 18 to 24	7
Small Game Hunters	16	Female	7
Campers	16	Small City/Town	6
Hikers	15	Region 1	6
Hunters	15	Income: 20,000 to 39,999	6
Age: 12 to 17	14	Region 4	5
Very interested in freshwater fishing	14	Region 6	5
Wildlife/Bird Watchers	12	Educ: High School Graduate	5
National/State Park Visitors	11	Income: < 19,999	4
Income: 60,000 to 99,999	11	RV Campers	4
Golfers	10	Region 2	4
Educ: Graduate or Professional Degree	10	Hispanic/Latin Ethnicity	3
Region 5	10	African American	3
Income: > 100,000	9		

Percent of respondents in each demographic group and in each activity group who had participated in JET SKIING more than once within the past 12 months.			
	Jet Skiing		
Jet Skiers	100%	Region 6	7%
Water Skiers	32	American Indian	7
Motorboaters	20	National/State Park Visitors	6
Waterfowl Hunters	17	Income: > 100,000	6
RV Campers	15	Small City/Town	6
Sailboaters	14	Caucasian	6
Small Game Hunters	14	Large City/Urban	6
Wilderness Campers	13	Region 4	5
Hunters	13	Suburban	5
Age: 12 to 17	13	Male	5
Angler (fished 1 time in past two years)	13	Income: 40,000 to 59,999	5
Rockclimbers	12	Hispanic/Latin Ethnicity	5
Big Game Hunters	12	Female	5
Very interested in saltwater fishing	12	Wildlife/Bird Watchers	5
Mountain Bikers	12	Educ: College Graduate	5
Golfers	12	Income: 20,000 to 39,999	5
Canoe/Kayakers	12	Educ: High School Graduate	5
Campground Campers	12	Educ: Some College or Trade School	5
Swimmers	11	Region 3	5
Snow Sport Participants	11	Rural	4
Age: 18 to 24	11	Age: 35 to 44	4
Campers	11	Region 1	4
Target Shooters	10	Educ: Graduate or Professional Degree	4
Very interested in freshwater fishing	10	Region 5	4
Region 2	9	Income: < 19,999	4
Age: 25 to 34	8	Age: 45 to 54	3
Income: 60,000 to 99,999	8	Age: 55 to 64	3
		African American	2

Percent of respondents in each demographic group and in each activity group who had participated in SAILING more than once within the past 12 months.			
	Sailing		
Sailboaters	100%	Large City/Urban	5%
Canoe/Kayakers	18	Male	5
Jet Skiers	13	Caucasian	5
Rockclimbers	12	Region 3	5
Motorboaters	12	Target Shooters	5
Income: > 100,000	12	Hunters	5
Wilderness Campers	12	Small City/Town	5
Water Skiers	11	Region 1	5
Educ: Graduate or Professional Degree	10	Age: 45 to 54	5
Mountain Bikers	10	Small Game Hunters	4
Swimmers	9	Female	4
Snow Sport Participants	9	Income: 40,000 to 59,999	4
Golfers	8	Waterfowl Hunters	4
Very interested in saltwater fishing	8	Big Game Hunters	4
Hikers	8	Educ: No High School Diploma	4
Income: 60,000 to 99,999	8	Age: 18 to 24	4
Campers	8	Educ: Some College or Trade School	3
Angler (fished 1 time in past two years)	7	Age: 65 or Older	3
Campground Campers	7	Income: 20,000 to 39,999	3
Educ: College Graduate	7	Region 2	3
Region 5	7	Region 4	3
Wildlife/Bird Watchers	7	Rural	3
National/State Park Visitors	7	Hispanic/Latin Ethnicity	3
Age: 55 to 64	7	Age: 35 to 44	3
Age: 12 to 17	6	Region 6	3
Age: 25 to 34	6	American Indian	2
RV Campers	5	Educ: High School Graduate	2
		African American	1

The majority of boat operators are male, while the majority of passengers are female. Mangione et al. (2000) reported very high rates of male operators (88%) in all states. Connecticut and South Carolina had the largest percentage of male operators (98% each), while few states had more than 20% of operators who were female. Mangione et al. (2000) also reported that the average number of people was 2.8 on the primary boat and they found no differences in the gender of passengers.

Mangione et al. (2000) reported that females were more likely than males to rent most types of boats. Twenty-five percent of females rented canoes, as compared with 10% of males. Twenty-four percent of females rented personal watercrafts, as compared with 11% of males. Fourteen percent of females rented pontoon boat renters, as compared with 7% of males. Slightly higher percentages of females also rented open motorboats, kayaks, rowboats, and inflatable boats females.

Initiation into boating as a child occurs more for males, whereas for females initiation occurs more as adults (NMMA 1996, Yoesting and Burkhead 1973). For males and females, the introduction remains a familial one. For males, it with their fathers, but for females it was often with their husbands or other males in the family. While most females do not report that sexual intimidation was a factor in their participation in boating, some report mild instances such as males offering unwanted assistance (Responsive Management 1998b).

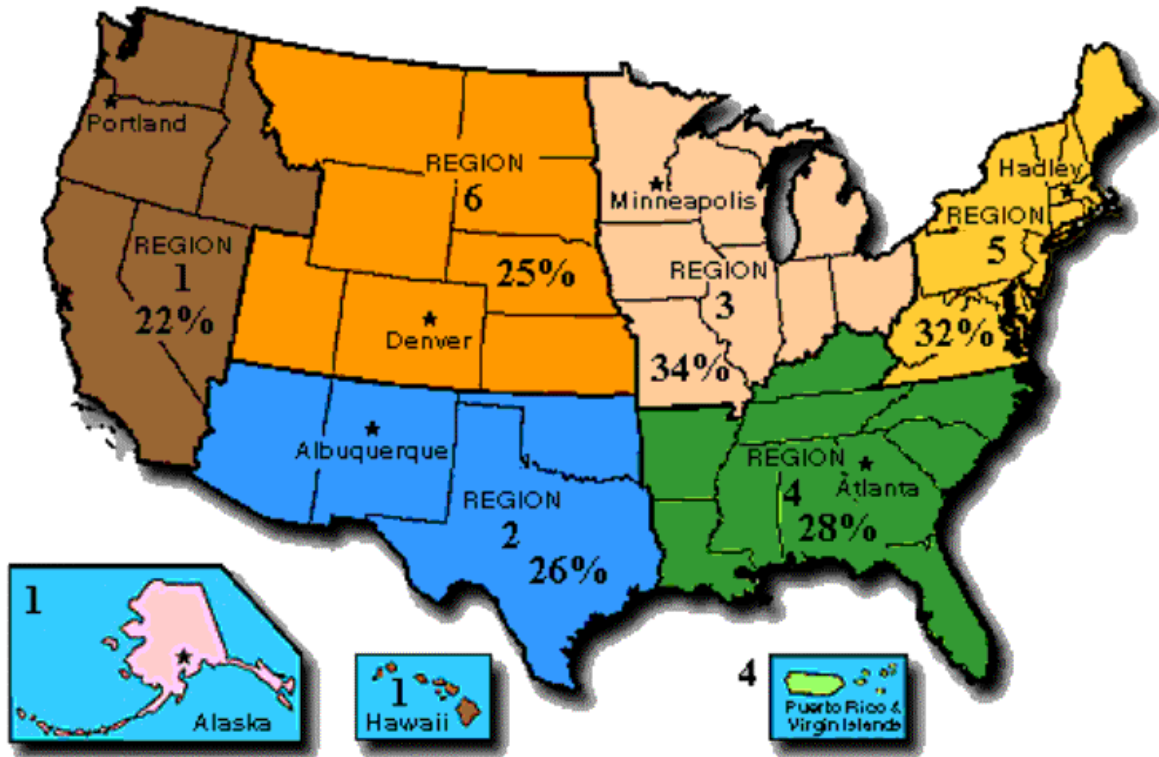
Explanations for the underlying causes of differential participation rates observed in boating for females, African Americans, and Hispanics are probably due to a variety of factors, such as experience, initiation, income, and overall interest in outdoor recreation (Field and O'Leary 1972, Murdock et al. 1991, Stokes 1966, Washburne 1978, West 1984). Simple

explanations should be avoided, and efforts to increase participation should be based on valid research of local populations. Just as there is no “general” boater in the total population, there is no “general” African American, Hispanic, or female boater (Burroughs and Reef 1996, Stamps and Stamps 1985).

Income. Incomes of boating households are higher than those of non-boating households (Hagler Bailly Inc. 1997). At incomes below \$40,000 per year, there are more non-boating households than there are recreational boating households. In a Responsive Management study (1999c), yearly incomes associated with respondents who had boated more than once in the past 12 months varied considerably by type of boating. Participation rates for motorboaters, canoe and kayakers were highest for those with incomes greater than \$39,999. Participation rates for jet skiers was slightly higher for those with incomes of \$60,000 to \$99,999, and for sail boaters participation was greatest for those with incomes over \$100,000. Income appears to be a strong determinant in choosing to participate in recreational boating.

Residence. Place of residence is not a clear factor in participation in recreational boating. Responsive Management (1999c) reported no significant differences in recreational boating participation rates by area of residence: 32% of suburban residents, 29% of small town and rural residents, and 27% of large city or urban residents. In this same study, there were slight regional differences in participation rates of respondents who had participated in boating. Participation rates in U.S. Fish and Wildlife Service regions 5 (32%) and 3 (34%) were higher than participation rates in regions 1 (22%), 2 (26%), 4 (28%), and 6 (25%). In a list of the number of registered boats in each state (NMMA 2000), Michigan with 1 million registered boats was the highest of any place in the U.S. California, Florida, and Minnesota were also high

on the list. The states with the fewest number of registered boats included The District of Columbia, with the fewest, then Hawaii, Alaska, and Rhode Island. The only pattern here seems to be access to public boating and population (NMMA 2000).



Percent of Boating Residents in each USFWS Region

NUMBERING DATA BY STATE		Total Boats Numbered	
		1998	1997
TOTAL		12,565,930	12,312,982
	RANK		
Am. Samoa	56	145	126
N. Marianas	55	1,001	862
Dist. Of Columbia	54	1,811	6,621
Guam	53	3,000	3,000
Virgin Islands	52	4,106	3,535
Hawaii	51	15,290	14,704
Wyoming	50	25,828	25,304
Alaska ¹	49	26,230	25,819
Rhode Island	48	35,378	33,950
Vermont	47	38,105	38,369
Delaware	46	44,458	43,461
South Dakota	45	47,465	46,113
North Dakota	44	48,523	43,865
Montana	43	49,336	47,102
Puerto Rico	42	49,595	47,034
Nevada	41	59,404	58,053
West Virginia	40	67,382	57,135
New Mexico	39	72,456	64,613
Nebraska	38	72,649	72,333
Utah	37	76,346	74,228
Idaho	36	83,501	80,945
New Hampshire	35	92,168	95,179
Colorado	34	98,190	95,924
Kansas	33	101,306	100,641
Connecticut	32	102,630	98,494
Maine	31	117,706	124,122
Massachusetts	30	146,957	141,129
Arizona	29	158,726	155,010
Kentucky	28	162,780	160,075
Maryland	27	192,946	189,052
Oregon	26	197,634	197,315

NUMBERING DATA BY STATE		Total Boats Numbered	
		1998	1997
TOTAL		12,565,930	12,312,982
	RANK		
New Jersey	25	197,672	196,584
Arkansas	24	210,599	172,930
Iowa	23	211,972	219,888
Indiana	22	214,474	210,007
Oklahoma	21	227,826	223,979
Virginia	20	232,409	229,629
Washington	19	249,968	245,962
Alabama	18	265,592	264,436
Mississippi	17	270,868	252,767
Georgia	16	303,129	309,606
Louisiana	15	305,386	310,281
Tennessee	14	312,030	306,215
Missouri	13	326,879	321,707
North Carolina	12	334,862	328,594
Pennsylvania	11	348,727	340,394
South Carolina	10	394,842	376,201
Illinois	9	396,945	368,513
Ohio	8	407,686	399,888
New York	7	514,749	512,430
Wisconsin	6	559,321	543,034
Texas	5	625,754	615,438
Minnesota	4	780,097	768,555
Florida	3	805,581	796,662
California	2	895,132	894,347
Michigan	1	980,378	960,822
U. S. Department of Transportation (2000). Recreational Boating Statistics 1998.			
United States Coast Guard. Washington, D.C. COMPTPUB P16754.12.			
http://uscgboating.org .			

Education. Those with higher levels of education are slightly more likely to participate in recreational boating (Responsive Management 1999c). Those with graduate or professional degrees (32%) and college graduates (36%) are more likely to participate in recreational boating than those with some college (28%), high school diplomas (24%), or no high school diplomas (28%). Higher levels of education, and the incomes associated with these levels of education, are factors relevant to participation recreational boating.

Boat Ownership

In 1999, over 77 million people in the United States participated in boating, an increase of about 3 million over 1998 (NMMA 2000). Boat ownership of all types was nearly 17 million, with outboard boats being about half and the other half being about equal numbers of inboard boats, stern-drive boats, personal watercraft, and miscellaneous types of craft (canoes, rowboats, etc. not registered by the state) (NMMA 2000). In a national Responsive Management survey (1999a), motorboats made up 85% of all boating activity. Jet skiing and other personal watercraft comprised only 7% of the total recreational boating activity.

Boat operators with more than 500 hours of experience are more likely to own a boat rather than rent or borrow one (Mangione et al. 2000). In the Mangione study, they reported that 75% of boat operators own their primary boat, whereas 9% rent and 16% borrow their primary boat. Open motorboats, the most commonly used type, are more likely to be owned, whereas personal watercraft, canoes, and kayaks are more likely to be rented or borrowed. Females and boat operators with less than 100 hours of experience are more likely to rent or borrow their primary boat.

Boat ownership has steadily increased in recent years (NMMA 2000). From 1984 to 1988, boat ownership increased by 1.3 million boats and expenditure for the same period increased by more than \$5.5 trillion. Boat ownership decreased in the early 1990s, but rebounded by 1998 to almost 2 million boats above 1988 figures and \$1.2 billion above 1988 expenditures.

While the majority of boat owners own one boat, approximately 25% own two boats. The type of boat owned varies from cruiser style boats with inboard motors to small aluminum boats with outboard motors. In recent years, the trend has moved toward larger boats with inboard or stern-drive engines (NMMA 1996). In the NMMA study, boaters who had purchased cruiser style boats reported higher median incomes (\$134,000) than other types of boaters. The median incomes of those who owned runabout boats, fiberglass boats, and personal watercrafts were between \$64,000 and \$68,000, while the median income for owners of aluminum boats was \$53,000.

The total number of new boats, considered as units shipped each year, has only slightly increased since the 1970s. Domestic shipping statistics as reported in the NMMA study (2000), revealed that the number of units shipped has gradually increased from 1970 to 1998, but not without great fluctuations in this growth. In 1970, an estimated 436 thousand units were shipped. This figure rose to 729 thousand units in 1974, a record year. Since this time, there have been drastic increases and decreases in the number of units sold. One of the lowest points was in 1982 with 453 thousand units sold, while a high point occurred in 1995 with 664 thousand units sold. This number has steadily declined to 571 thousand units sold in 1998. By combining the number of units shipped and dollar value in a single trend line, the result has been a steady

increase since the 1970s. Fluctuations in the number of units shipped are more reflective of year-to-year market considerations than it is overall participation.

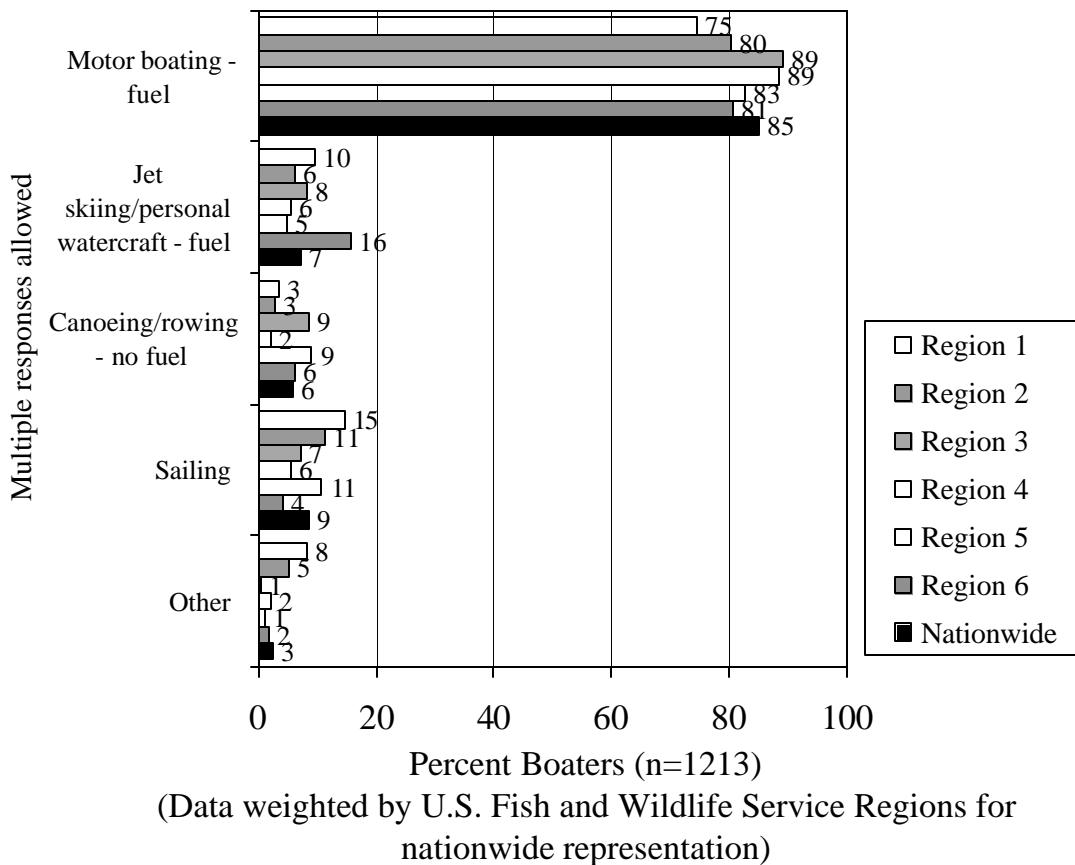
Boat owners, former owners, and potential buyers all report that the purchase of a new motorboat would be their primary choice if given the opportunity. Less than 10% report an interest in purchasing a jet ski or other personal watercraft (NMMA 1996). The NMMA study suggests the cost of acquiring a boat is not a major barrier to the boating market, other than the previously mentioned factors concerning relative income.

Among females, Hispanics, or African Americans, participation in boating or boat ownership might be related more to costs than in other demographic groups (Responsive Management 1998b). However, this needs to be verified by regional and local investigations as we suspect that there are significant variations in different populations. Mangione et al. (2000) reported that boat ownership among females is about half (25%) that of males (56%). Boating costs are probably more of a factor among less avid female boaters, African Americans, and Hispanic boaters or potential boaters, than among similarly less avid white male boaters or potential boaters (Responsive Management 1998b). In other words, females, African Americans, and Hispanics who are not avid boaters are less likely to purchase a boat due to cost factors than white non-Hispanic males with similar levels of interest and income.

Types of boats. The majority of boating is done with fueled motorboats (Responsive Management 1999a). Outboard motors and stern-drive motors in open boats account for the majority of use (NMMA 2000). Fluctuations have occurred in the types of boats used over the years, but the overall trend has been an increase in the stern-drive, in-board and personal

watercraft areas. About 47% of all numbered (registered) boats are less than 16 feet in length and 49% are between 16 and 26 feet in length (U.S. Department of Transportation 2000).

**What type of boating do you do most?
(Percent of those who had been boating in the last
two years.)**



Source: Responsive Management 1999a

Some categories of boats, such as inboard cruisers and stern-drive boats, experienced the greatest increase in units sold in the mid 1980s, but have since leveled off. Sailboats are the only category that have experienced a sustained decline going from 51 thousand units in 1970 to a high of 143 thousand units in 1974, and then declining steadily to slightly more than 19 thousand units in 1998 (NMMA 2000).

Mangione et al. (2000) reported that boaters rented or owned open motorboats more than any other boat. There were slight differences by gender. Females were slightly more likely to rent an open motorboat (28%) as to rent a canoe (25%) or a personal watercraft (24%), whereas most males rented open motorboats. While most male (56%) and female (24%) boat owners owned open motorboats, about 18% of females also owned canoes.

Personal watercraft. The increased use of jet skis and other small personal watercraft has become a management issue in National Parks (Heinrich 1996). From 1991 to 1995, personal watercraft unit sales substantially increased (NMMA 1996). In 1991, an estimated 68 thousand personal watercraft units were shipped. In 1995, 200 thousand units were shipped, but this figure declined to about 130 thousand units shipped in 1998. Current jet ski activity accounts for only about 3% of all of the recreational boaters (Hagler Bailly Inc. 1997).

Mangione et al. (2000) reported a higher proportion of female personal watercraft owners in the population (11%) than males (9%).

The total unit sale of jet skis and other personal watercraft seems to have increased in the early 1990s (NMMA 2000). However, this measure is confounded by the fact that personal watercraft are not routinely registered in all states. In fact, registration is not required for boats

of any type in some jurisdictions further complicating the issue of boat ownership totals (American Red Cross 1991).

Economic Benefits of Recreational Boating

Given the rapid and dramatic increase in recreational boating, the economic benefits to the national economy have been major (Bhat et al. 1988, Martin and Gum 1978). Several studies have documented local and regional benefits as well (Boyle and Bishop 1984, Sellar 1982, Sellar et al. 1982). Further, the demand for recreational boating seems to be increasing along with other outdoor recreation (President's Commission on Americans Outdoors 1987, Waggener and Ceperley 1978).

Recreational Boating Activity and Associated Activities

Initiation. Typically, boaters are introduced to the sport by a parent or a friend. Initiation may occur as early as the early teen years. Boaters tend to stay involved with boating for long periods and incorporate the sport into familial culture. Boaters most often tend to participate in boating with family, children, and friends. While similar initiation and practice applies to personal watercraft users, initiation into boating for this group began at a slightly younger age (NMMA 1996).

Location of recreational boating. Recreational boating occurs mostly on freshwater lakes or reservoirs with more than 70% of recreational boaters having boated in these waters. Twenty percent of boaters have boated on rivers, bays, and/or special waterways, and around 20% have boated on oceans. In terms of time spent, recreational boaters spent over half their

time on freshwater lakes, about 20% of their time on rivers, about 10% on bays and/or special waterways, and around 10% on oceans (NMMA 2000, Roper Starch 1998). Mangione et al. (2000) reported that boat operators use their primary boats on lakes (59%) and rivers, streams, and creeks (19%). Sailboats with motors were the most likely to be used in the ocean or in bays (Waldrop, 1988). Canoes and kayaks were more likely to be used on rivers and streams than on lakes (Mangione et al. 2000).

The National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Army Corps of Engineers, and Bureau of Land Management have reported increases in boating activity at very high rates (Roper Starch 1998). Between 1997 and 1998, motorboating on federally owned lands increased an average of 22%, boating on U.S. Army Corps of Engineers lands increased 26%, and boating on U.S. Fish and Wildlife Service lands increased by 25% (Roper Starch 1998).

Activity levels. Recreational boating activity has been measured in a variety of ways -- number of days spent boating per year, number of boat operators per household, number of boats owned, number of hours spent boating, number of trips per year, and distance traveled for boating trips (Tyre and James 1971). While these measures appear to be appropriate in their given context, none of them seem to hold any overall advantage over the others. Demand for and interest in boating activity seems to be a strong measure. Both active and in-active boaters expressed an interest in “more” recreational boating opportunities (Responsive Management 2000b, Roper Starch 1998).

Several studies have documented level of boating participation by the number of days and hours per day spent boating (Hagler Bailly Inc. 1997, Mangione et al. 2000, Responsive

Management 1996). In a national study conducted by Hagler Bailly Inc. (1997), they reported that recreational boaters spent 17.2 days boating between April 1996 and April 1997. The average number of hours per day spent on the water was five hours. In another national study, Mangione et al (2000) reported that operators of large boats tend to spend more days, on average, boating than operators of small boats. In the Mangione study, boat operators in 1998 spent an average of 25 days on cabin motorboats, 23 days on open motorboats, 20 days on sailboats, 17 days on pontoon boats, and 15 days on personal watercrafts. Boat operators who owned canoes or inflatable boats boated less than 10 days in 1998. In a regional study, Responsive Management (2000b) and McMullin et al. (2000) reported that over 60% of Virginia boaters have boated every year for the past 5 years and slightly less than 60% have boated five or more days per year (McMullin et al. 2000, Responsive Management 2000b). Responsive Management (1996) also reported that 84% of recreational boaters in Pennsylvania go boating every year.

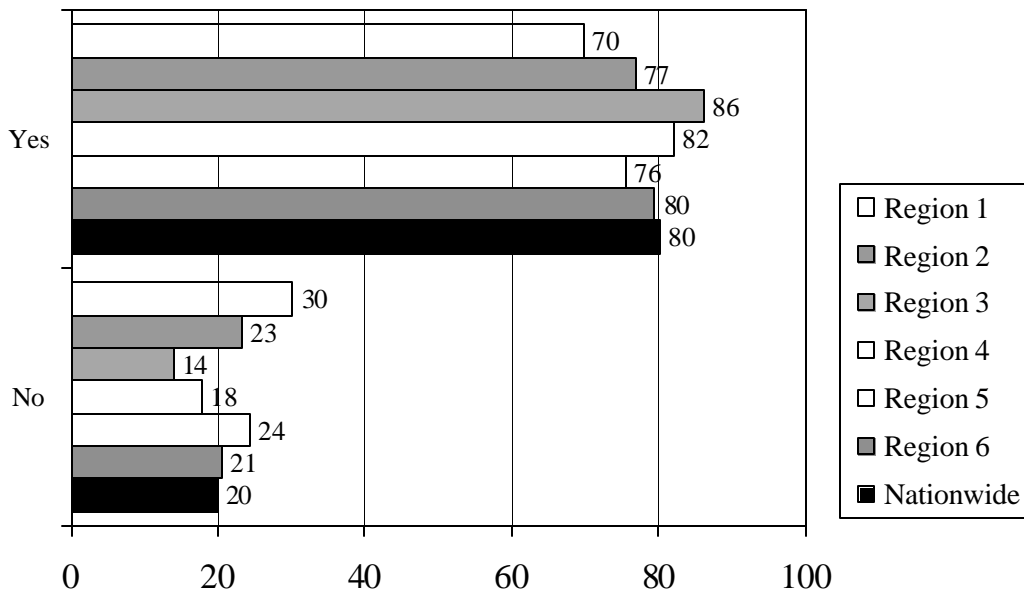
Similar to days spent boating, operators of large boats spend more hours per day on the water than those with smaller boats (Mangione et al. 2000). In the Mangione study, they reported the average numbers of hours spent per day on various types of boats: houseboats (5.00), sailboats with motors (4.59), cabin motorboats (4.55), open motorboats (4.08), pontoon boats (3.66), and canoes (3.19). Boaters spent fewer than 3 hours per day on other types of boats.

Boat renters account for a large part of boating participation. In a sample of more than 11 thousand boat renters, 24% rented open motorboats, and decreasing numbers rented other types of boats. It is interesting to note that 17% of boat renters were also boat owners (Mangione et al. 2000).

An interesting factor in the measurement of boating participation is that the number of boats owned is smaller than the number of boating operators, but greater than the number of boating households. The best conclusion here seems to be that the number of boats as compared to the whole population is steady or declining, but the number of boat operators and boats per boating household is increasing (American Red Cross 1991).

Associated activities. Several national studies have noted the association between boating and other recreational activities, namely hunting and fishing (Mangione et al. 2000, NMMA 2000, Responsive Management 1999 b,c).

Have you been fishing in the last two years?

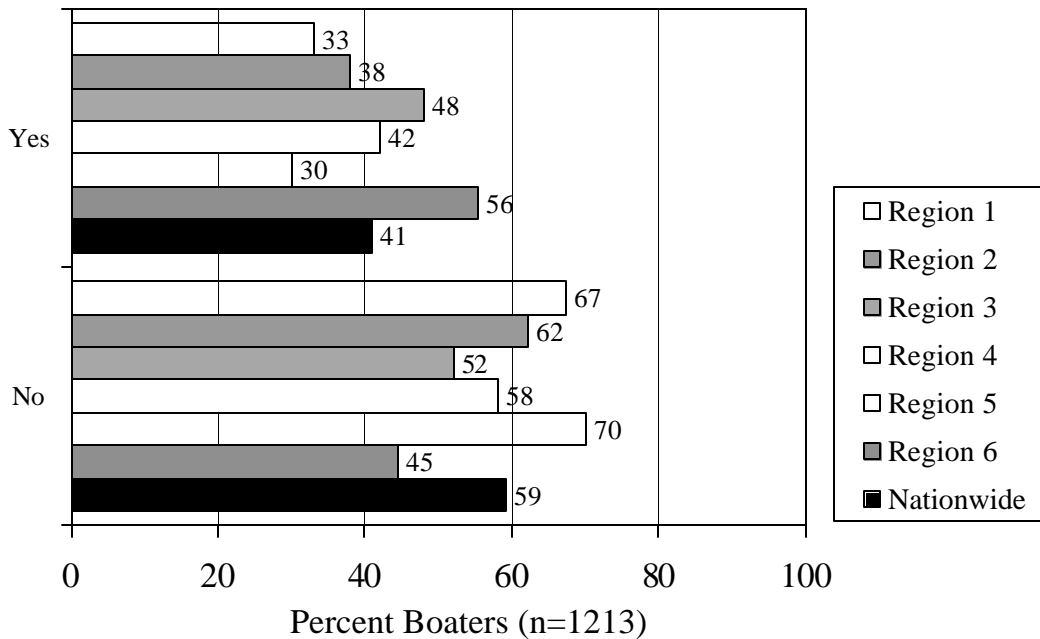


Percent Boaters (n=1213)

(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999b

Have you been hunting in the last two years?



(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999b

Mangione et al. (2000) reported that 63% of boat operators participated in recreational fishing and 52% in day cruising with their primary boat. Seventy-nine percent of recent new boat buyers also participated in fishing (NMMA 2000). Responsive Management (1999c) reported that 59% of anglers, 67% of waterfowl hunters, 62% of small game hunters, 55% of big game hunters, 54% of all hunters, and 51% of target shooters reported boating more than once in the previous 12 months. Other studies have shown that a majority of boaters go sightseeing and fishing on their boating trips (Acheson 1981, Green and Wadsworth 1967, NMMA 1996).

Percent of respondents in each activity group who had participated in each type of boating activity more than once within the past 12 months.

	Boaters	Motor Boaters	Canoeists/ Kayakers	Jet skiers	Sail boaters
Waterfowl Hunters	67	71	18	32	11
Very interested in saltwater fishing	54	34	17	12	7
Very interested in freshwater fishing	50	53	29	14	100
Target Shooters	51	51	100	12	18
Small Game Hunters	62	27	11	6	7
Hunters	54	35	4	15	5
Big Game Hunters	55	39	27	12	12
Angler (fished 1 time in past two years)	59	29	18	12	10

Source: Responsive Management 1999c

In other national studies, 79% of anglers in the United States had participated in recreational boating within the past two years (Responsive Management 1999b) and 86% of anglers in the United States are interested in fishing from a boat (Responsive Management 1999c). Regionally, 80% of Arkansas anglers fished from a boat in 1999 (Responsive Management 2000a) and in Pennsylvania, 40% of non-resident anglers, and 54% of resident anglers took part in recreational boating (Responsive Management 1996). It would be interesting to know if fishing as associated with boating has increased at a rate comparable to the increase in boating.

Among boat operators, gender difference is associated with hunting and fishing. Mangione et al. (2000) reported that 66% of male operators and 38% of female operators participated in recreational fishing from their primary boat. In this same study, very few males (5%) and no females (0%) reported hunting from their primary boat. This rate is, however,

roughly comparable to the overall population rate for hunting and fishing (Responsive Management 1995a, 1995b).

In Pennsylvania, active boaters were asked if they went boating primarily to fish, to boat, or to both fish and boat (Responsive Management 1996). Most active boaters reported that they boat primarily to fish (42%) or to fish and boat (37%).

Other associated activities. Other activities directly associated with recreational boating include swimming, water skiing, jet skiing, diving, snorkeling, and hunting. Most recreational boaters probably engage in several different activities over the course of a year, but it seems safe to say that water-related recreation and recreational boating are closely connected (Responsive Management 1999b, 1999c). Mangione et al (2000) reported that boat operators participated in such activities as water skiing (24%), swimming and diving (21%), and pleasure paddling (13%) from their primary boats. There were gender differences for participation in pleasure paddling and water-skiing with more female boat operators participating in both activities.

Involvement in boating by other types of recreationists has also been noted (Responsive Management 1999c). Participation in recreational boating was reported by rock-climbers (55%), snow sport participants (54%), wilderness campers (52%), target shooters (51%), mountain bikers (50%), campground campers (50%), campers (48%), RV campers (45%), golfers (45%), hikers (42%), national and state park visitors (39%), and wildlife/bird viewers (36%). Potential boat buyers have even higher rates of participation in outdoor recreation than current owners (NMMA 1996).

Percent of respondents in each activity group who had participated in each type of BOATING more than once within the past 12 months.									
	Boating		Motor Boating		Canoeing		Jet Skiing		Sailing
Water Skiers	83%	Water Skiers	71%	Rockclimbers	27%	RV Campers	15%	Rockclimbers	12%
Rockclimbers	55	Rockclimbers	39	Wilderness Campers	20	Wilderness Campers	13	Wilderness Campers	12
Snow Sport Participants	54	Target Shooters	38	Snow Sport Participants	20	Rockclimbers	12	Mountain Bikers	10
Swimmers	53	Swimmers	37	Mountain Bikers	18	Mountain Bikers	12	Swimmers	9
Wilderness Campers	52	Snow Sport Participants	37	Target Shooters	17	Golfers	12	Snow Sport Participants	9
Target Shooters	51	RV Campers	35	Campground Campers	17	Campground Campers	12	Golfers	8
Mountain Bikers	50	Wilderness Campers	35	Swimmers	16	Swimmers	11	Hikers	8
Campers	50	Golfers	34	Campers	16	Participants	11	Campers	8
Campers	48	Campground Campers	34	Hikers	15	Campers	11	Campground Campers	7
RV Campers	46	Campers	33	Wildlife/Bird Watchers	12	Target Shooters	10	Wildlife/Bird Watchers	7
Golfers	45	Mountain Bikers	29	National/State Park Visitors	11	Hikers	7	National/State Park Visitors	7
Hikers	42	National/State Park Visitors	29	Golfers	10	National/State Park Visitors	6	RV Campers	5
National/State Park Visitors	39	Hikers	28	RV Campers	4	Wildlife/Bird Watchers	5	Target Shooters	5
Wildlife/Bird Watchers	36	Wildlife/Bird Watchers	23						

NMMA (1996) reported that 81% of boat owners also are involved with such indoor leisure activities as watching television, reading and listening to music; and 60% of boat owners also attend movies, concerts, and the theater. Recreational boaters involved in non-water related indoor and outdoor activities are important to define as a market segment.

Participation. Two main reasons why people do not boat more often or stay involved in boating are lack of interest and time constraints, while costs associated with boating and boat ownership are less of a factor (Hagler Bailly Inc. 1997, NMMA 2000). In the Hagler Bailly,

Inc. study (1997), recreational boaters reported that they do not go boating more because they are too busy (53%) and are not interested (26%). In this same study, non-boaters reported the same reasons for not participating in boating, as well as lack of access as a factor. Former boat owners reported not having enough time (55%) and too many repairs (20%) as the main reasons they no longer participate in boating (NMMA 2000). Former boaters also reported less interest in boating due to too much boat traffic on lakes and no control of drivers (15%). In each of these studies, less than 10% of respondents directly reported cost as a factor in their decision to continue boating or to boat more often, but for former boaters the issue of too many repairs is probably a combination of both time and cost factors. These findings seem counter-intuitive and probably need further investigation.

In the NMMA study (1996), recent new boat owners reported more interest in boating than in previous years due to owning a boat (18%) or a better boat (15%) and having more time than in the past (15%). Potential buyers reported more interest due to having more time (16%), having children old enough to enjoy the sport (18%), and having more financial stability (15%).

A relatively large market of non-boaters appears to be interested in boating. Forty-two percent of non-boaters stated they would have liked to have gone boating (Hagler Bailly Inc. 1997). Thirty-three percent of Virginia residents who do not currently take part in recreational boating stated they would be interested in going boating. When these individuals were asked what types of boating activities they would be interested in, 53% stated motorboating, 24% jet skiing, 23% sailing, 16% canoeing, 7% kayaking, and 5% row boating (Responsive Management 2000b). Arkansas residents who did not currently boat also showed interest. Nineteen percent of those who did not participate in boating in Arkansas in the past two years said they were

interested in going motorboating, 12% said kayaking, 7% jet skiing, and 5% sailing (Responsive Management 2000a). This latent market also is in need of further investigation. Potential target markets to consider would be outdoor recreationists who do not currently participate in recreational boating.

Satisfactions

Overall, most boaters are satisfied with their boating experience. More than 90% of boaters in a 1997 survey reported that they were either very satisfied or somewhat satisfied (Hagler Bailly Inc. 1997). In a NMMA study (1996), boat owners rated their satisfaction with boating on a scale from 1 to 10, with ten being extremely satisfied. Seventy-four percent of first time boat owners and 77% of prior boat owners rated their satisfaction with either a 9 or a 10. In this same study, former boat owners and potential boat owners were not as “highly” satisfied as other boaters. Fifty percent of former boaters and 51% of potential boaters rated their satisfaction as 9 or 10. High satisfaction levels have also been reported in other studies (Drogin 1991, Roper Starch 2000, Whisman and Hollenhorst n.d.).

In Virginia, 94% of boaters were satisfied (63% very) with their Virginia boating experiences in the past 2 years (Responsive Management 2000b). While 47% of boaters reported that the quality of boating had remained the same or improved in the last five year, 22% reported it had declined. Most Virginia boaters (73%) reported satisfaction with boating access facilities in Virginia, with the main recommendation for changing facilities to improve or add launch ramps.

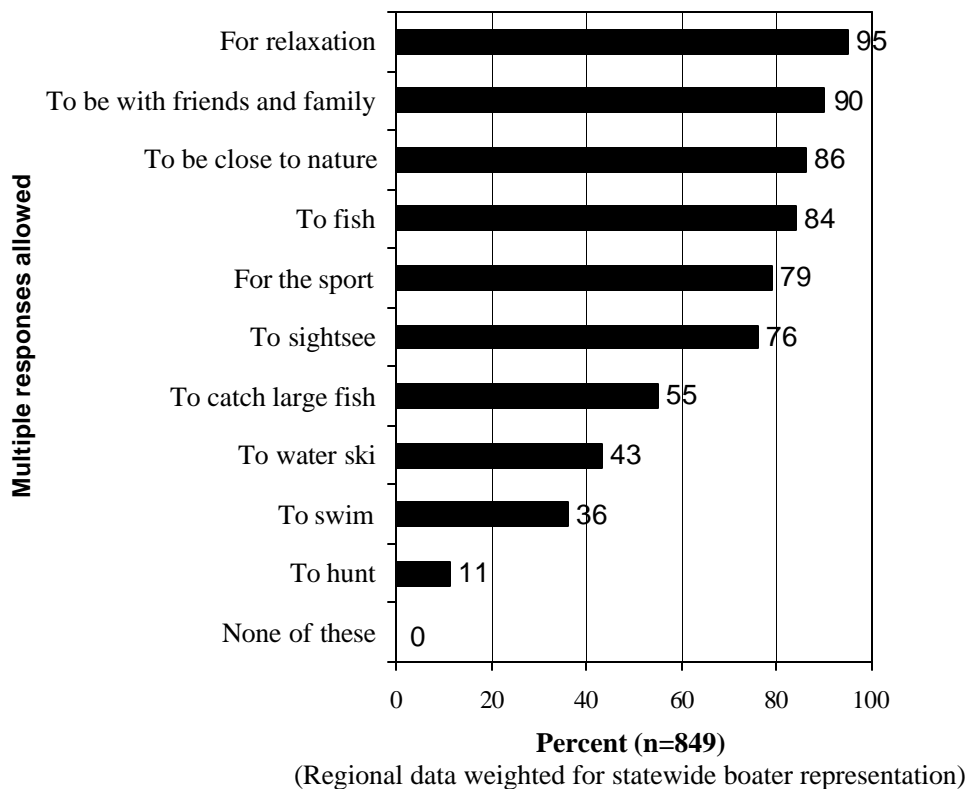
The elements of boating that motivate and satisfy boaters involve naturalistic and social elements. These elements include being out-of-doors, relaxation, being able to go fishing, and socializing with family and friends (NMMA 1996). These findings closely parallel other studies on the satisfactions of fishing and other outdoor recreation (Fedler et al. 1998, Harris 1981, Responsive Management 1995a, 1996, 1999c, 2000). Satisfactions such as competition, the challenge, and use of powerful equipment are all low on the list (NMMA 1996). This finding is interesting considering that most advertisements and promotions for boating focus on the “control” and “strength” of boating rather than on the social or naturalistic aspects. Recreational boaters’ interests are keenly different from those images presented in the media.

For females, Hispanics, and African Americans the satisfactions associated with recreational boating are not significantly different from those of other demographic segments (Responsive Management 1999c). While exposure to recreational boating is low for African Americans, for those who have been exposed there seems to be a fair amount of general satisfactions concerning their boating experiences (Responsive Management 1998b).

Benefits and motivations. If you look beyond the satisfactions and ask about the benefits of boating, issues such as stress release, relaxation, socializing with family and friends, fishing, and being outdoors and experiencing nature are important to boaters and other outdoor recreationists (Beard and Ragheb 1983). Issues such as challenge, competition, power, and control are of relatively low benefit (NMMA 1996). Since we have seen elsewhere that anglers report similar naturalistic and social benefits, it would seem that these benefits cut across many types of outdoor activities (Hawes 1979).

The main reasons Virginians own a boat are for relaxation, being with friends and family, being close to nature, and to go fishing (McMullen et al. 2000, Responsive Management 2000b). Recreational boaters in Pennsylvania rated, on a scale from 1 to 10 with 10 being very important, the importance of boating in relation to other activities in their lives. Most boaters (64%) rated boating above the median. Resident and non-resident anglers gave similar responses (Responsive Management 1996).

**What is an important reason why you boat in Virginia?
(Statewide)**



Source: Responsive Management 2000b

Motivations are another way to look at satisfactions. For boaters in Virginia, the most important reasons they go boating are for the relaxation (95%), to socialize with family and

friends (90%), to be close to nature (86%), to fish (84%), for the sport (79%), sightseeing (76%), in order to catch large fish (55%), swimming (36%), and hunting (11%) (Responsive Management 2000b).

Dissatisfactions

The main reasons for declining interest in boating appear to be centered primarily on lack of interest and time constraints, while costs, traffic on waterways/unsafe boaters, and lack of access are more minor concerns (NMMA 1996). These reasons parallel the reasons for declining participation in other areas of outdoor recreation (McGuire et al. 1989).

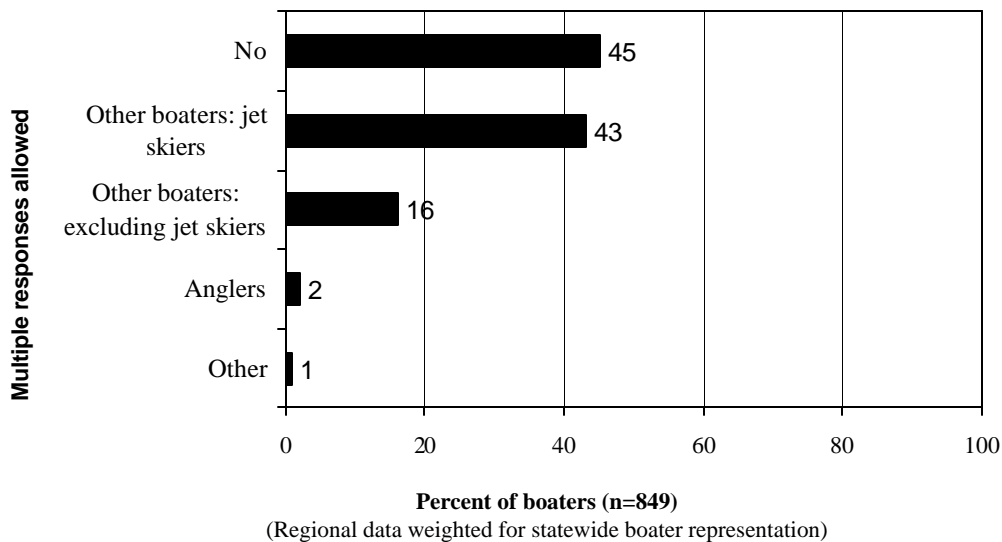
Dissatisfactions reported in specific locations have found that conflicts with commercial traffic, access, and being close to home all influence the value of boating (Vogel et al. 1996). However, these local conditions are subordinate to the larger issues of naturalistic and social values found in boating.

Jet ski interference among boaters and anglers. Boaters, other than personal watercraft users, have reported some dissatisfaction with boating due to conflicts with jet skiers (Heinrich 1996, Responsive Management 1996, 1998a, 1998b, 1999c). Given the relative low percentage of personal watercraft users among the boating population, conflicts are either very high or perceived to be very high.

Interference by jet skiers with various recreational groups can be found in a recent series of surveys conducted for the Virginia Department of Game and Inland Fisheries by Responsive Management (2000b). In this study, boaters, anglers, hunters, and wildlife viewers were each asked if they had experienced any interference from other recreationists that took away from

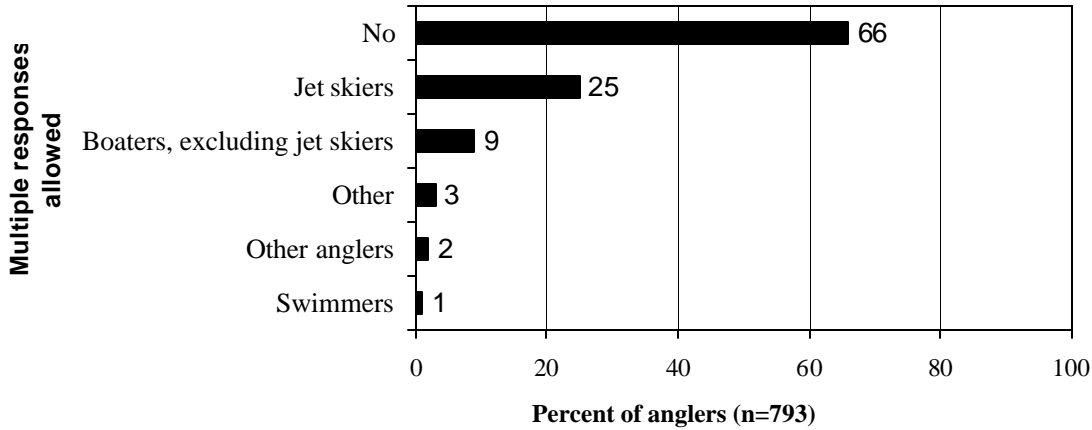
their enjoyment while pursuing their respective sports. Forty three percent of boaters experienced interference from jet skiers that took away from their boating enjoyment, while 25% of anglers also reported interference from jet skiers. Some boaters (16%) also reported interference from other boaters. Hunters and wildlife viewers did not report any interference. The fairly high levels of jet ski interference is probably why 87% of Virginia boaters support a mandatory boating safety course for jet skiers.

**While you were boating in Virginia during the past two years,
did you experience any interference by other recreationists that
took away from your enjoyment?
(Statewide)**



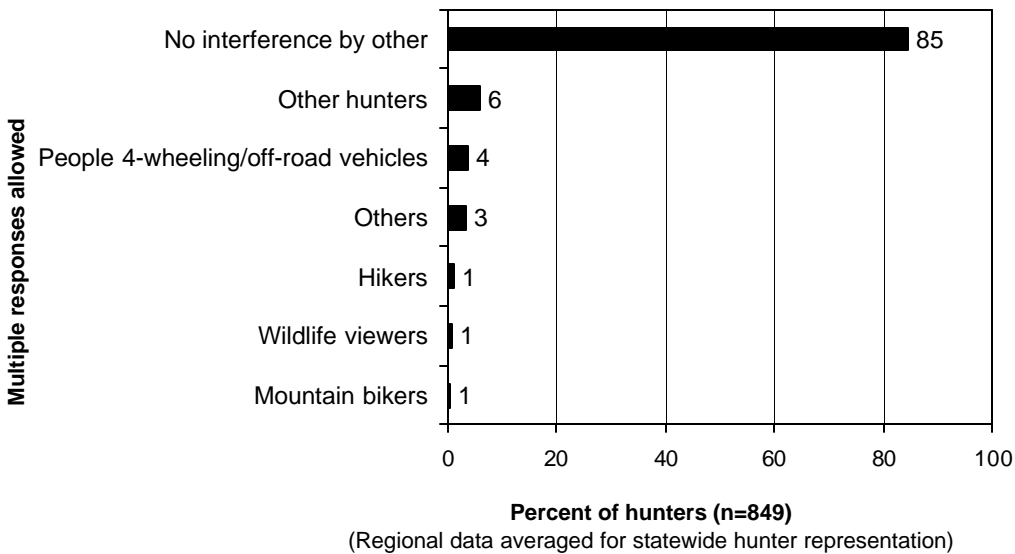
Source: Responsive Management 2000b

While you were fishing in Virginia during the past two years, did you experience any interference by other recreationists that took away from your enjoyment? (Statewide)



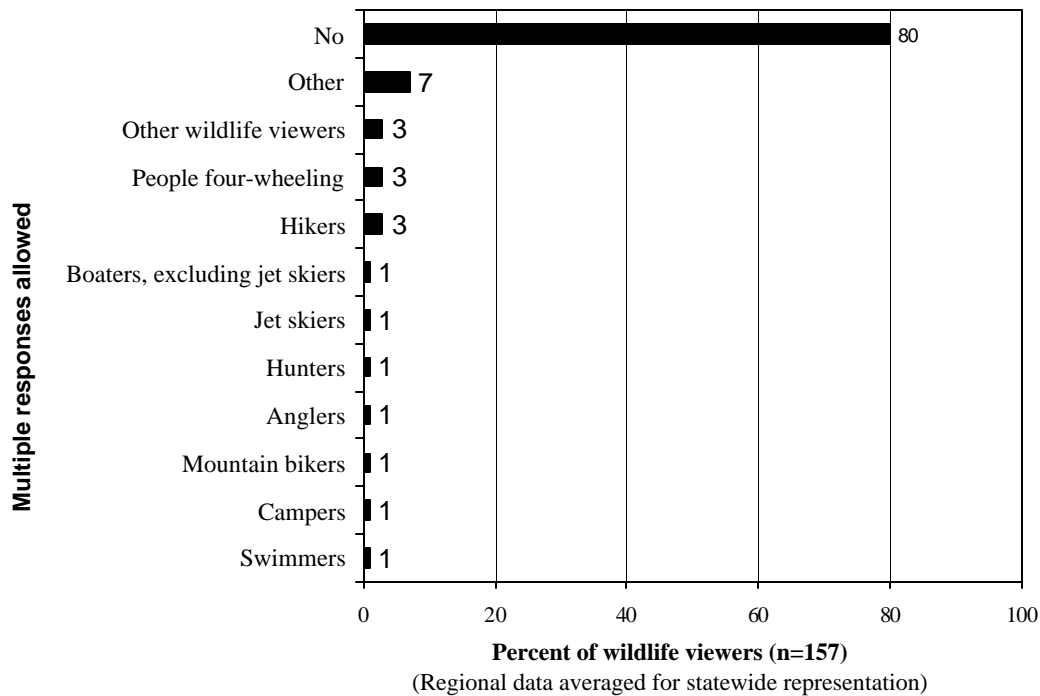
Source: Responsive Management 2000b

While you were hunting in Virginia during the past two years, did you experience any interference by other recreationists that took away from your enjoyment? (Statewide)



Source: Responsive Management 2000b

**While you were taking wildlife viewing trips in Virginia during the past two years, did you experience any interference by other recreationists that took away from your enjoyment?
(Percent of nonresidential wildlife viewers)
(Statewide)**



Source: Responsive Management 2000b

Nationwide, boaters support restricting the use of personal watercraft, especially jet skis, in certain areas. In Mangione et al. (2000), 83% of boaters agreed that the use of personal watercraft should be restricted in certain areas, while only 42% of personal watercraft operators agreed.

Interference caused by personal watercraft may account for why boaters report less interest in boating. In the NMMA study (1996), 28% of former boaters reported finding boating

less enjoyable. They reported that the main reason for boating becoming less enjoyable was due to the traffic on waterways/unsafe boaters (52%).

Agency Personnel Attitudes Toward Recreational Boating

Quantitative information on the attitudes and opinions of agency personnel toward recreational boating is lacking. State agencies charged with management of recreational boating, boating enhancement, and boat enforcement are often multi-purpose agencies, such as fish and game, or parks and outdoor recreation. Whether or not these agencies place the same importance on recreational boating is unknown. However, there is some sense that fish and wildlife agencies may place a higher value on managing recreational hunting and fishing participation than recreational boating participation.

In Virginia, some evidence exists that agency personnel charged with recreational boating management strongly support increasing boater education efforts (McMullin et al. 2000).

Access

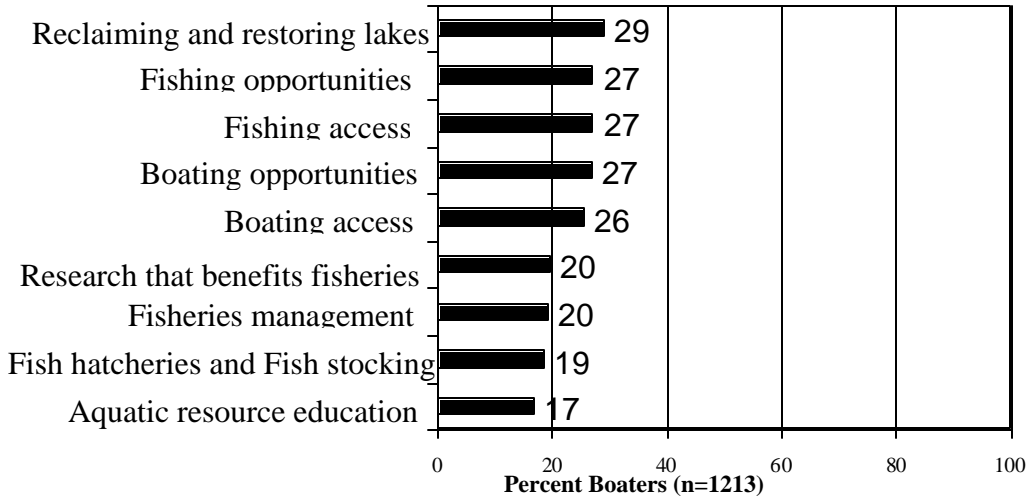
Most recreational boaters use more than one location for boating. In some states, the issue of boating access is a major policy and budgetary problem (Virginia Department of Game and Inland Fisheries 1992, Reinhardt et al. n.d.). However, boat owners do not report lack of access as a major issue in reasons for not boating more often. Less than 10% of boat owners report having difficulty finding boating access (NMMA 1996). Increased access does not appear to be among the major issues desired by recreational boaters from the boating industry (Roper Starch 1998).

In several Responsive Management studies (1996, 1998a, 2000a, 2000b), most boaters rated boating access in their state as good or excellent. For example, 40% of motorized boaters in Arkansas rated motorized boating as excellent, while 42% rated access as good. In Virginia, 27% of boaters rated access as excellent, while 46% rated access as good.

Boaters are interested in improving boating access. In a Pennsylvania study, 53% of boaters and 41% of resident anglers stated that more money should be spent on boating access (Responsive Management 1996). Twenty percent of Virginia boaters (Responsive Management 2000b) would like to have launch ramps improved or built in their state, this change was most requested by region 1 and 5 boaters, the coastal and northern areas.

Boaters are interested in receiving information about boating access. In a nationwide survey of boaters, hunters, and anglers, 26% of boaters reported interest in receiving information on boating access (Responsive Management 1999a). In Virginia, 60% of boaters would be interested in receiving information about boat ramps or boat ramp locations (Responsive Management 2000b).

Percent who were very interested in information on the following programs/topics funded under the Federal Aid in Sport Fish Restoration Program.

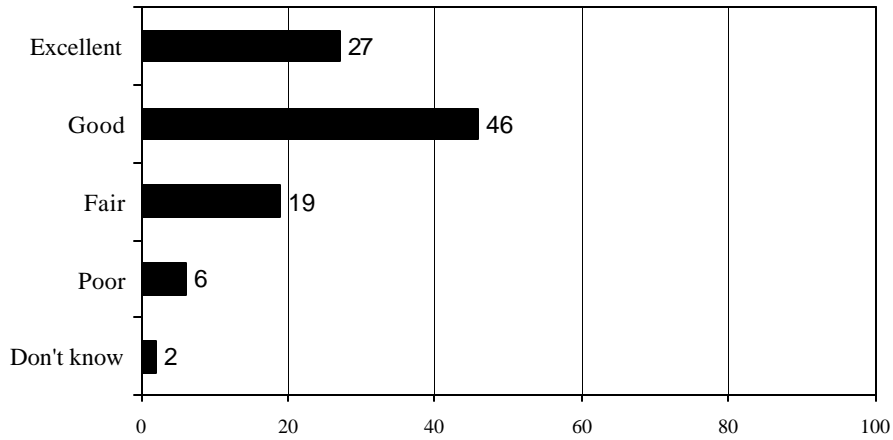


(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

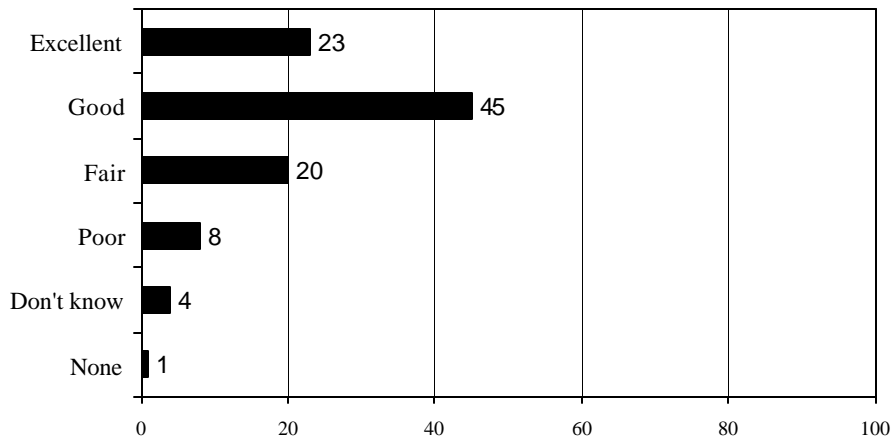
Inferentially, boating access does not rise to the level of other issues, such as reclamation and restoration of lakes, but is close. This is probably because boating access issues vary by region and by specific location. While only regional or local studies can reveal local issues of boating access, the overall boating picture is that access is not a negative factor in recreational boating.

**Overall, would you rate the boater access facilities at the area in Virginia where you boat most often as excellent, good, fair, or poor?
(Statewide)**



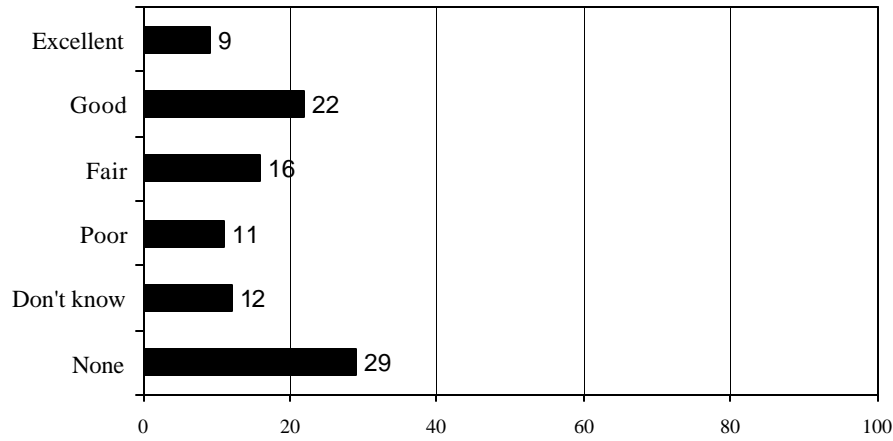
Percent of boaters (n=849)
(Regional data weighted for statewide boater representation)

**Would you rate the parking at the Virginia area where you boat most often as excellent, good, fair, or poor?
(Statewide)**



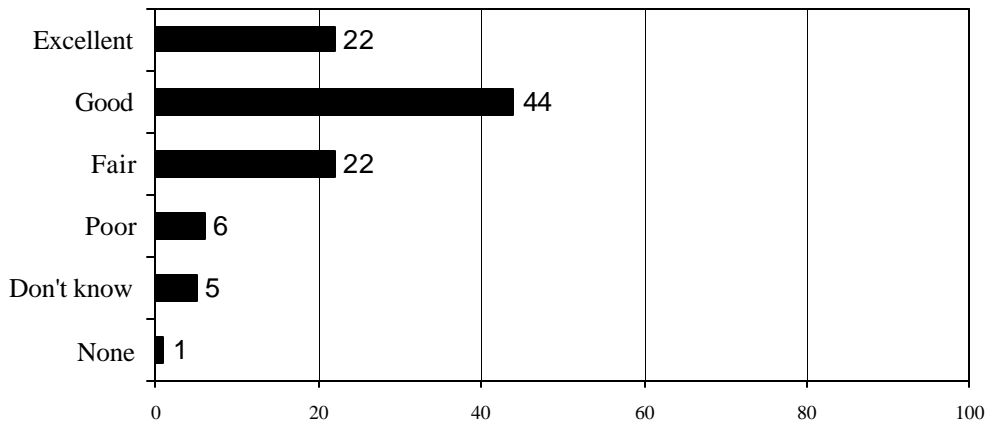
Percent of boaters (n=849)
(Regional data weighted for statewide boater representation)

**Would you rate the restrooms at the Virginia area where you boat most often as excellent, good, fair, or poor?
(Statewide)**



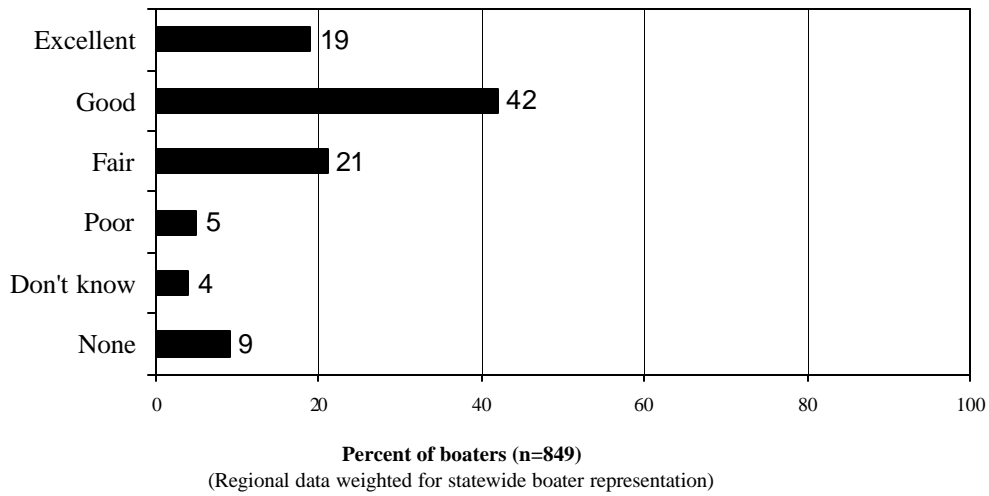
Percent of boaters (n=849)
(Regional data weighted for statewide boater representation)

**Would you rate the launch ramps at the area in Virginia where you boat most often as excellent, good, fair, poor, or are there no launch ramps at all?
(Statewide)**

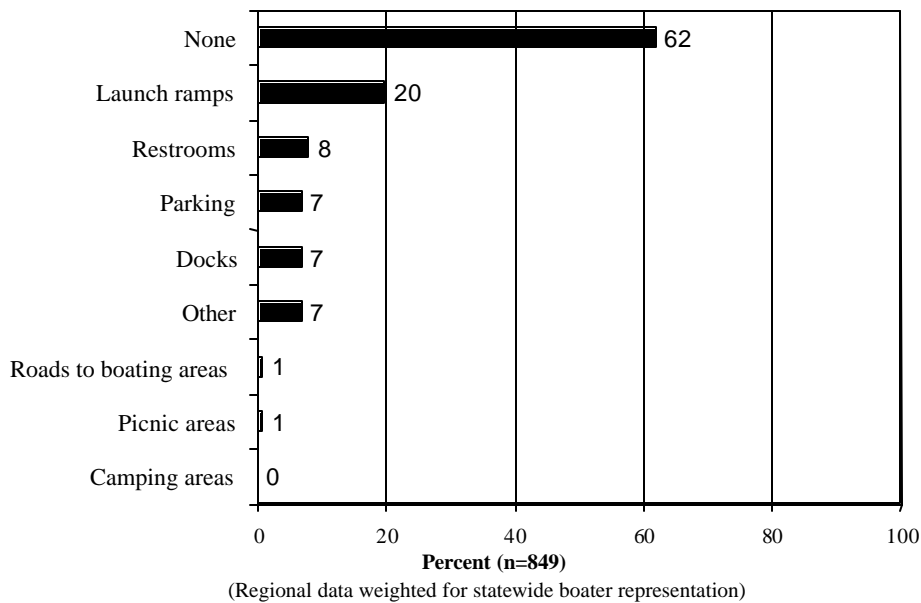


Percent of boaters (n=849)
(Regional data averaged for statewide boater representation)

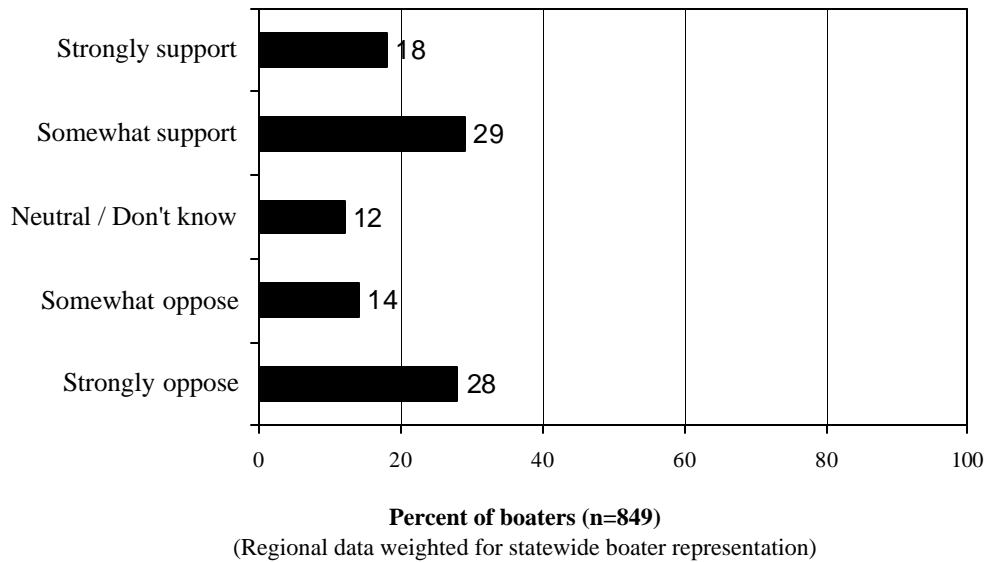
**Would you rate the docks at the Virginia area where you boat most often as excellent, good, fair, or poor?
(Statewide)**



**Are there any boater access facilities in this area of Virginia that you would like to see built or improved?
(Statewide)**



**Do you support or oppose requiring all users, such as motor-boaters, canoers, and outfitters, of Virginia Department-owned boat landings to pay a fee for their upkeep?
(Statewide)**



Source: All Virginia boaters graphs, Responsive Management 2000b

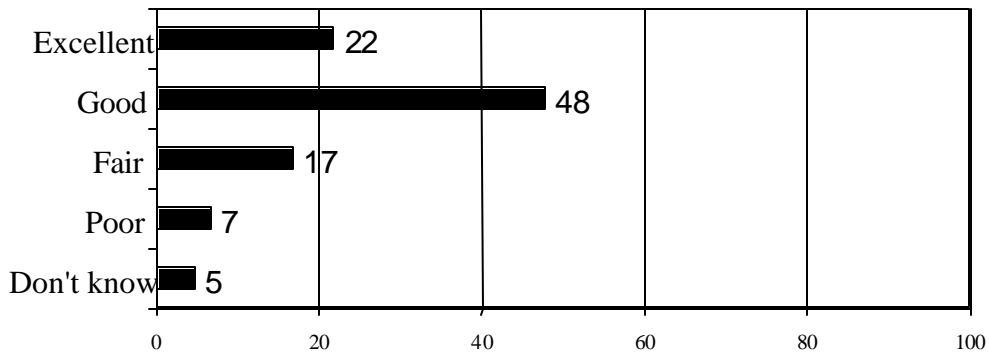
Facilities

In a national study (Hagler Bailly Inc. 1997), motorboaters provided information on the access site they used most often. Sixty-one percent of motorboat operators used more than one facility during the year. More than one-half of motorboat operators drove more than 20 miles one-way to reach their access site. Twenty percent of motorboat operators discontinued using one or more access sites citing problems associated with the facilities structure (lack of launch, port, mooring, or dock facilities). Issues related too expense, crowding, and safety were mentioned by fewer than 10% of motorboat operators.

In general, boat operators were satisfied with the boating facilities they used most often (Hagler Bailly 1997). In particular, they were most satisfied with the swimming, camping, and picnic areas, the fuel station, parking area, and restroom facilities. For boat operators, the most important features when choosing boating facilities are ease of launching facilities (23%), little congestion (18%), ample parking (16%), and restroom facilities (11%). Fewer than 10% considered issues related to cost and fishing quality as important. In Arizona, 68% of recreational boaters rated the boating facilities at the area where they boated most often as good or excellent, while 26% rated the facilities as fair or poor (Responsive Management 1998a).

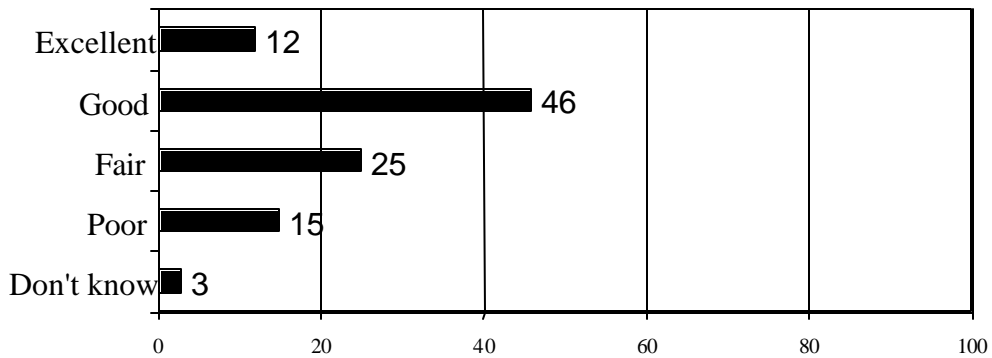
An overview of most of the aspects of recreational boating facilities can be found in SOBA (1999). This publication covers issues pertaining to boating facilities such as boating infrastructure, boat ramps, environmental impacts, economic impacts, Federal Aid, finance, design, handicap accessibility, marinas, access, maintenance, multiple use conflict, needs assessment, outreach, permits, public sector marinas, risk management, and safety.

**Would you rate the launch ramps at the area where you boat most often as excellent, good, fair, or poor?
(Arizona Boaters Statewide)**



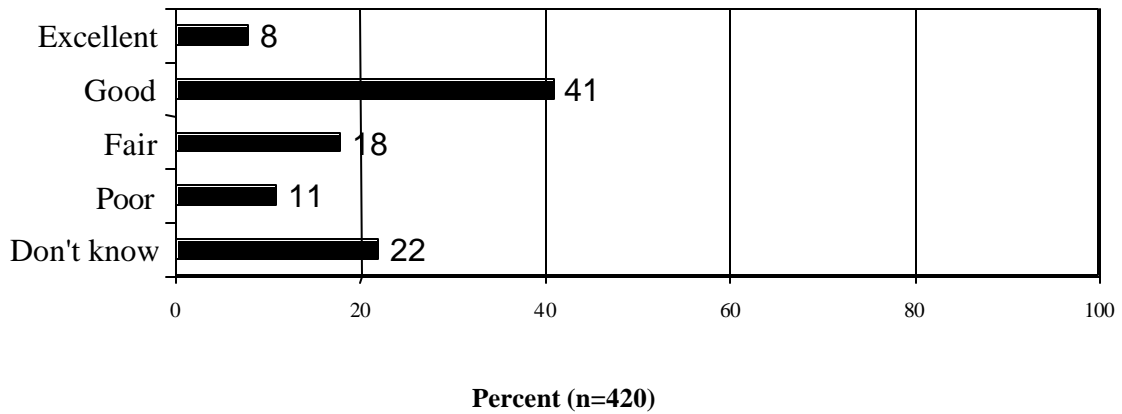
Percent (n = 420)

**Would you rate the parking at the area where you boat most often as excellent, good, fair, or poor?
(Arizona Boaters Statewide)**

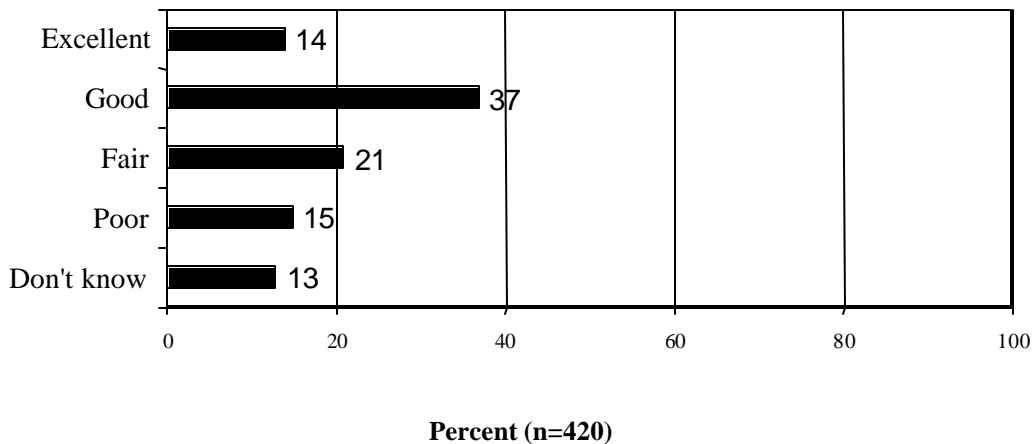


Percent (n=420)

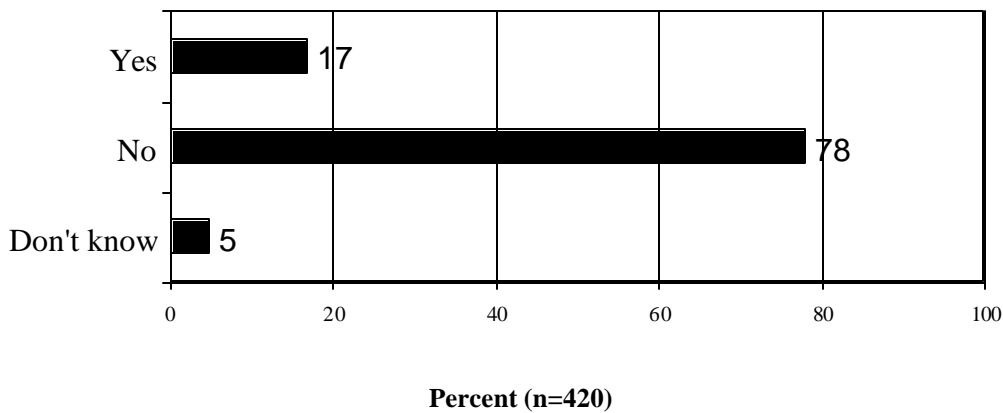
**Would you rate the courtesy docks at the area where you boat most often as excellent, good, fair, or poor?
(Arizona Boaters Statewide)**



**Would you rate the restrooms at the area where you boat most often as excellent, good, fair, or poor?
(Arizona Boaters Statewide)**



**Are there any boater facilities at the area where you boat most often, than launch ramps, parking, restrooms, and courtesy docks, that you would like to see improved?
(Arizona Boaters Statewide)**



Source: All Arizona boater graphs, Responsive Management (1998a)

Carrying Capacity

Carrying capacity is a hypothesis stated that for each body of water open to recreational boating there is some number of boaters and/or boats at which either the social, physical, or biological limits of tolerance will be reached (addressed in, Ashton 1991, Bockstael et al. 1987, Falk et al. 1992, Hodgson et al. 1976, Robertson and Regula 1994, Siderelis et al. 1995, Vogel et al. 1996). Several studies have addressed the issues of number of boaters (Shelby et al. 1983); access points, number of boaters and/or boats on the water, number of boats and/or boaters per unit of water space, physical disturbances, such as weather and marine debris (Holdnak 1992); and competition for boating space between recreational and commercial boaters (Goodwin 1982). In this study, we will analyze the social and biological aspects for the concept of carrying capacity for recreational boating.

In various studies, nearly all of the variables in a model for carrying capacity have been found to be significant (Tarrant and English 1996). These factors include such issues as the number of access points, number of boats on the water, number of people on the shore, and other factors. In some studies, these factors have been found to be significant predictors of displacement (Kuentzel and Heberlein 1992, Shelby et al. 1989, Wellman 1979) while in other studies there has been no significance found (Zapata 1981). In addition, the significance of each factor seems to vary with location.

Added to the idea of recreational carrying capacity is the concept of “multiple satisfactions”. Originally Hendee (1974), applied the concept of “multiple satisfactions” to game management, but more recently, it has been usefully applied to fisheries and other aspects of outdoor recreation (Jones 1995, Responsive Management 1995a, 1995b).

The concept of carrying capacity seems to be an extension of the multiple satisfactions theory (Powers and Lackey 1976). For any given recreational boater, any number of satisfactions and dissatisfactions influence participation and/or displacement or desertion. In all probability, no single factor dominates any given boater, or fully explains even the statistically average recreational boater, or the area used by a recreational boater. On artificial impoundments intended primarily for water skiing, boaters probably have a higher tolerance for crowding than boaters on natural waters with a high fishing value. Smaller bodies of water will probably support lower density per unit area than larger waters. The literature in this area is rich with suggestions as to what factors should be studied, but until a general model is developed, the concept of carrying capacity is probably best applied in specific situations. Whether or not a general model for recreational boating carrying capacity can be developed remains to be seen

(Vaske and Donnelly 1981, Whittaker and Shelby 1988). At this time, it appears that a good understanding of local conditions is more important than larger theoretical issues (Vogel et al. 1996).

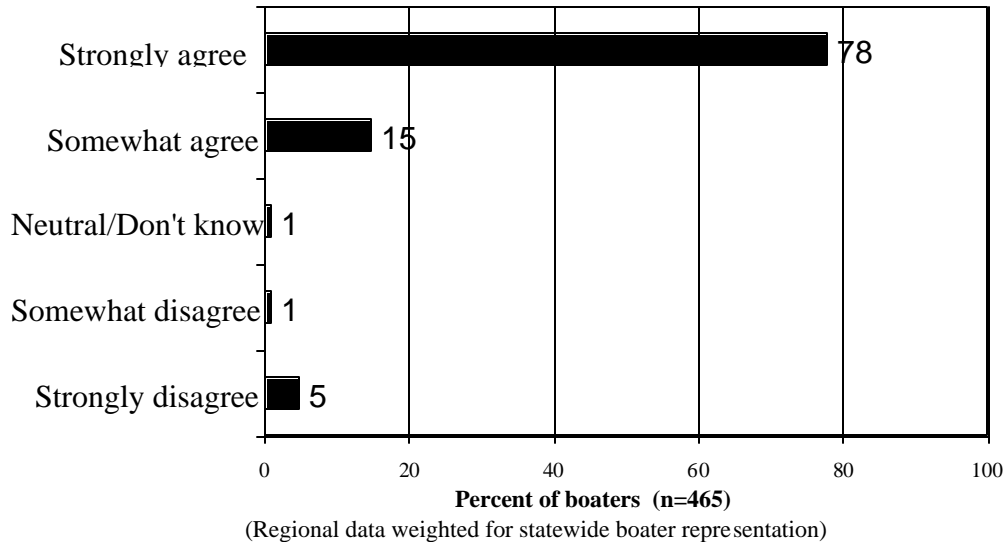
The environmental or biological carrying capacity for boating is obviously a factor of local conditions. Boating is known to have an adverse effect on manatees (Gordon 1994, Morris and Nodine 1995) and other wildlife (York 1994). In addition, boating and/or recreational boaters impact wildlife and wildlife habitat under different conditions and for different situations (York 1994). Recreational boating impact the local environment through increased turbidity, bank erosion, physical disturbance of vegetation, and direct pollution of the water with gasoline and other products (Boeckstal et al. 1987, Crawford et al. 1994, Mosich and Athington 1998, Yousef 1974, see also various references in York 1994).

Once again, the issue seems to be a local one. Some waterways, such as man-made reservoirs and impoundments can probably withstand much more physical degradation than natural waterways. In some areas, local wildlife habitat may vary due to historical conditions. In each case, the benefits of recreational boating must be weighed with the impacts and managed accordingly.

Attitudes Toward and Interactions with Law Enforcement Officers

Boaters have positive interactions with boating law enforcement officers and regard them to be professional. In Virginia, 54% of registered boaters had contact with an enforcement officer while boating, and 78% strongly agreed and 15% moderately agreed that the officer they came in contact with was professional (Responsive Management 2000b).

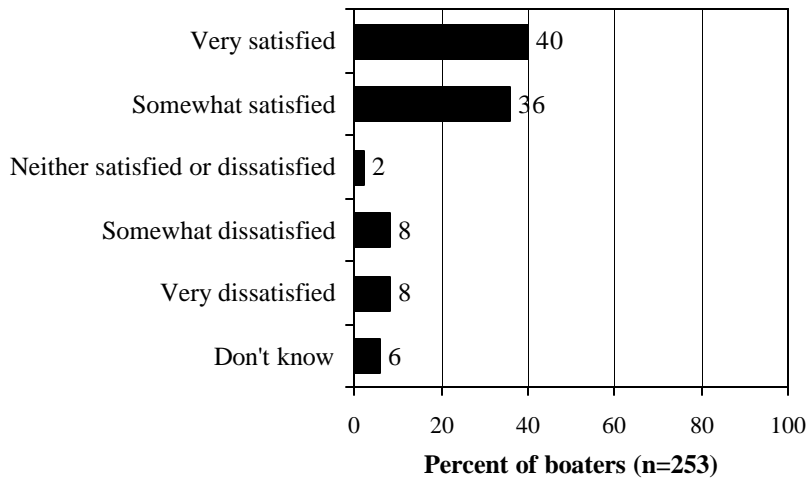
**Would you agree or disagree that the enforcement officers you
came in contact with while boating in Virginia were professional?
(Percent of Virginia boaters who had contact with an
enforcement officer within the past five years.)
(Statewide)**



Source: Responsive Management 2000b

In Pennsylvania, 76% of boaters were satisfied with the way the Pennsylvania Fish and Boat Commission enforces boating laws (Responsive Management 1996). In Virginia, 52% of boaters stated they would like to see the same amount of law enforcement officers while boating, while 36% stated they would like to see more. In Arizona, 51% of boaters have had contact with a marine law enforcement officer, of these 93% reported that the officer was courteous, and 79% reported that the officer was helpful. On the other hand, 42% did feel the officer was looking for “something wrong” (Responsive Management 1998a).

**Are you satisfied or dissatisfied with the way the Commission enforces boating laws?
(Pennsylvania boaters)**



Source: Responsive Management 1996

Awareness of Funding

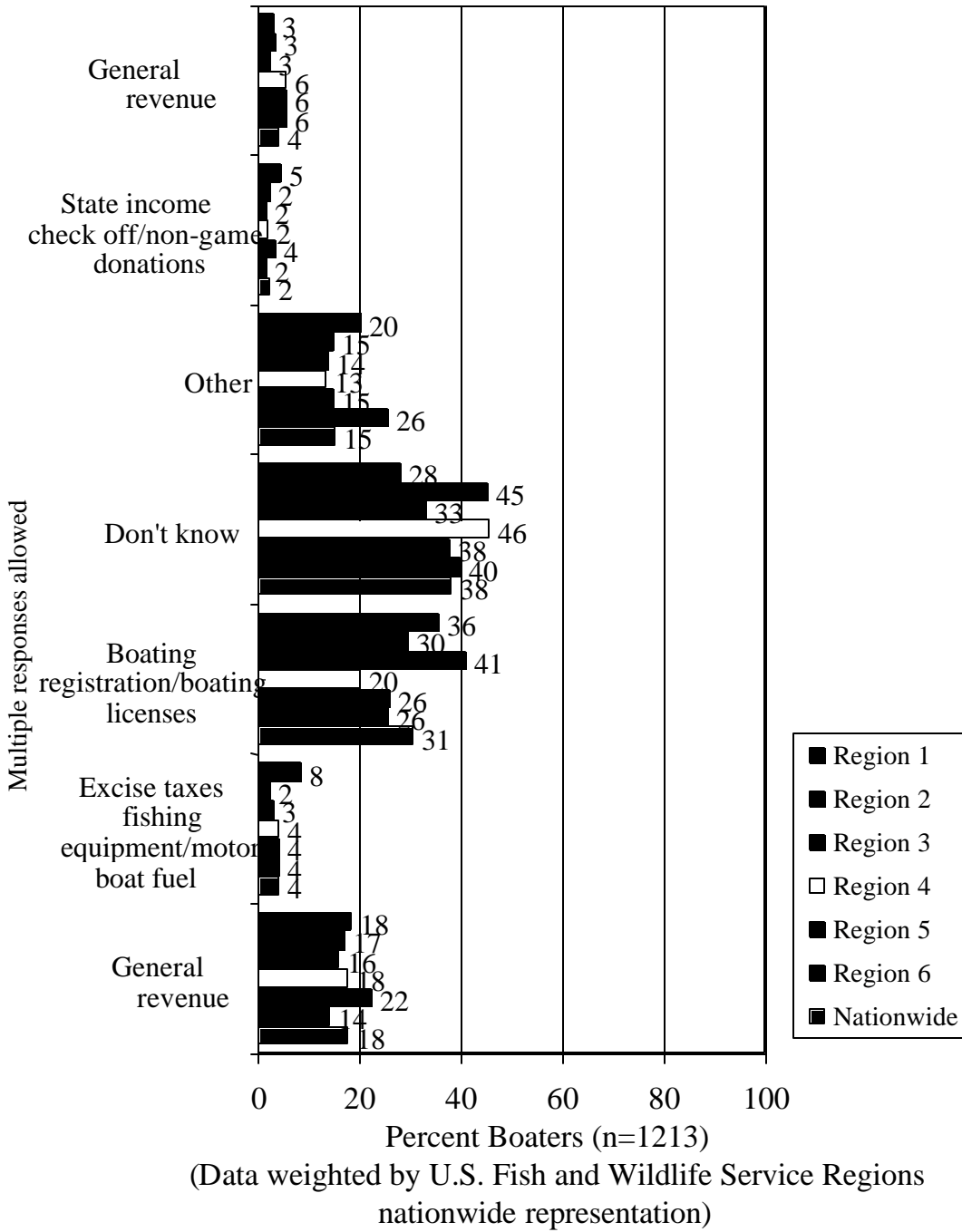
The Federal Aid in Sport Fish Restoration program is a manufacturers' excise tax on fishing rods and reels, creels, artificial baits and lures, trolling motors, flasher-type fish finders, as well as a tax on motorboat fuel. Funds derived from the excise taxes have contributed to successful fisheries restoration programs and enhancement of recreational boating in the United States. The program is an example of a user-pay/user-benefit tax system. The excise taxes are collected from manufacturers and the expense is passed on to anglers and boaters when they purchase the taxed items. These dedicated funds are distributed to state fish and wildlife and boating agencies by grants from the U. S. Fish and Wildlife Service and the U.S. Coast Gaurd. Funds are committed to fish and boating projects, including habitat acquisition, management and

research, sportfishing restoration projects, and the construction of boat landings and piers (Responsive Management 1999a).

In a qualitative study, a high level of awareness of the Federal Aid programs was found among boating industry representatives. Approval for the Federal Aid program is also nearly universal. Industry representatives are most aware of the specific program that they are involved with, i.e., Pittman-Robertson or Dingell-Johnson; however, there is also widespread awareness of programs in which they are not involved (Responsive Management 1998c).

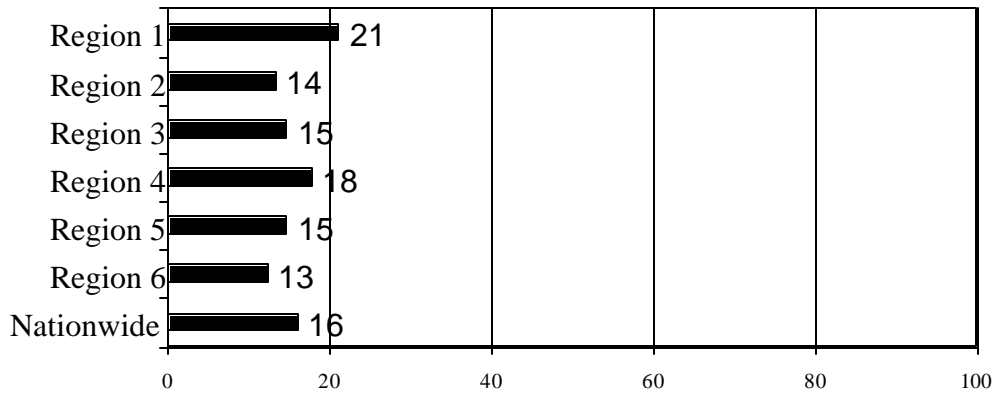
Among boaters and outdoor recreationists closely associated with recreational boating, i.e., hunters, and anglers, there are very low levels of awareness, especially “top-of-the-mind” awareness, of the Federal Aid in Sport Fish Restoration programs (Responsive Management 1999a). Nationwide, only 4% of boaters named excise taxes on fishing equipment or motorboat fuel as a funding source for boating opportunities. More than a third of these boaters stated they did not know where funding for boating programs originated.

Where do you think funds to enhance recreational boating in your state come from?



Source: Responsive Management 1999a

Percent who said 'yes' they have heard of Federal Aid in Sport Fish Restoration.

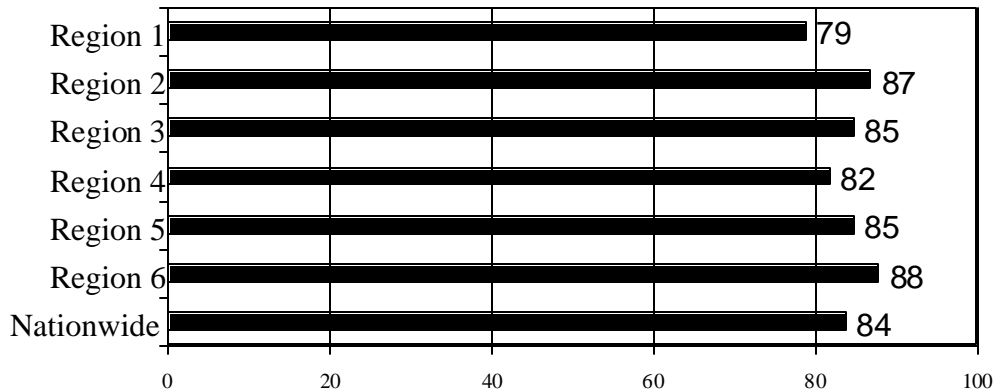


Percent Boaters (n=1213)

(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who said 'no' they had not heard of Federal Aid in Sport Fish Restoration.

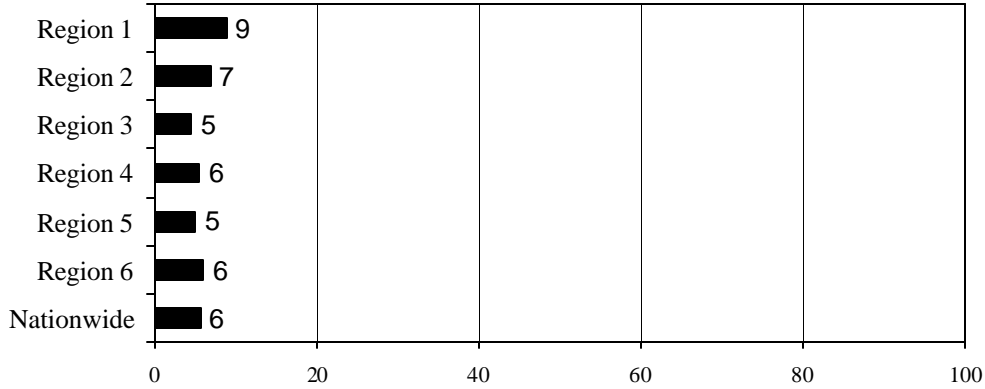


Percent Boaters (n=1213)

(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who said 'yes' they have heard of Dingell-Johnson.

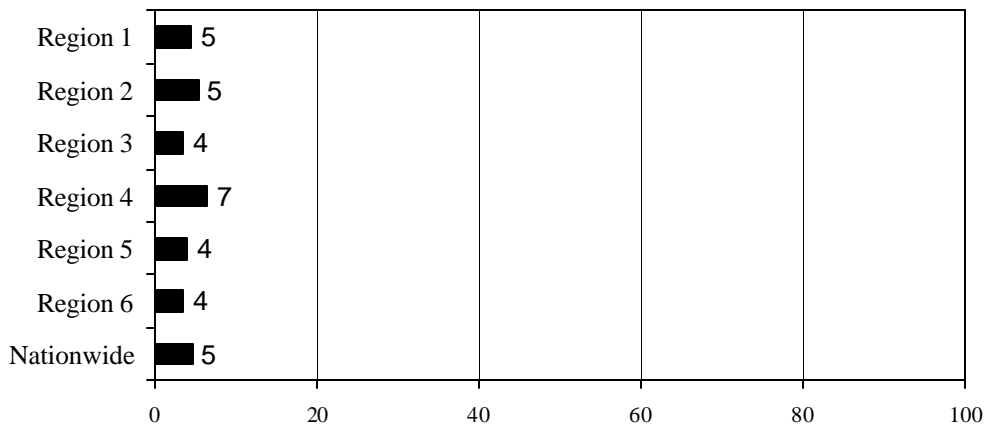


Percent Boaters (n=1213)

Data weighted by U.S Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who said 'yes' they have heard of Wallop-Breaux.

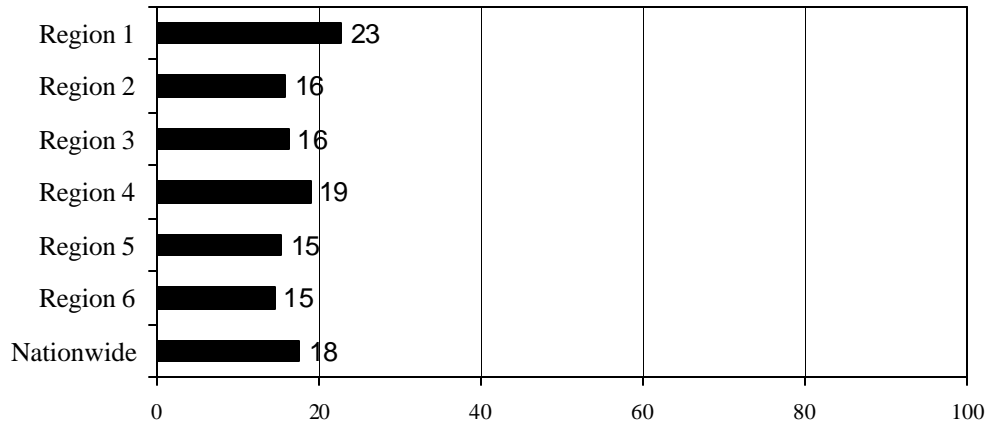


Percent Boaters (n=1213)

Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who said 'yes' they have heard of the Federal Aid in Sport Fish Restoration Program (after a full description of the program).



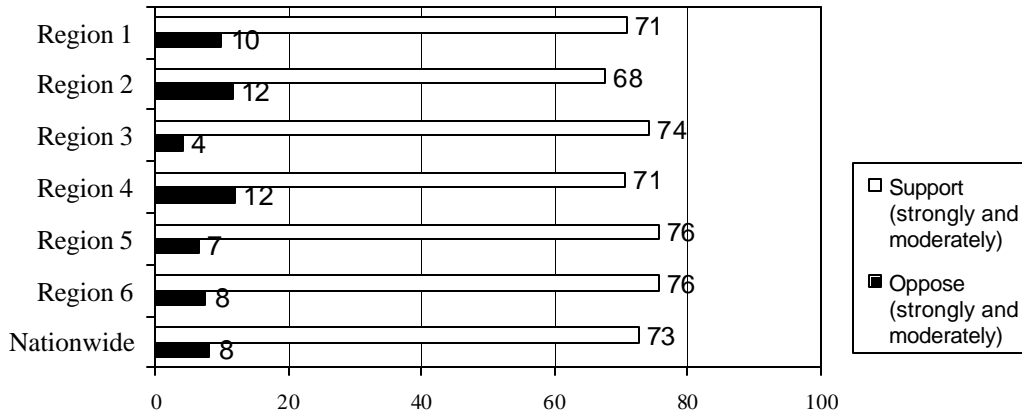
Percent Boaters (n=1213)

Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

In comparison, while awareness of the Federal Aid program among boaters was low, support for the program was high (Responsive Management 1999a). The majority of boaters (73%) support the Federal Aid in Sport Fish Restoration Program.

Do you support or oppose the Federal Aid in Sport Fish Restoration Program?

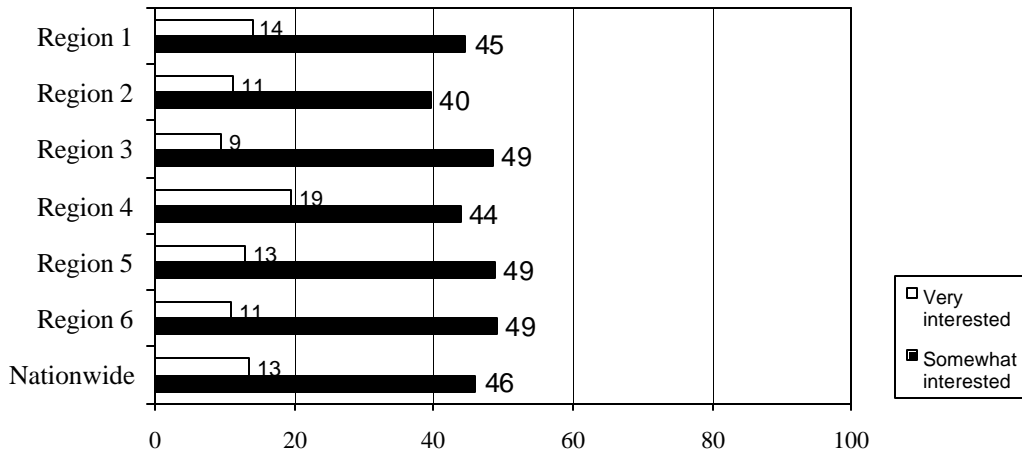


Percent Boaters (n=1213)

Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who would be interested in learning more about the Sport Fish and Wildlife Restoration Programs.

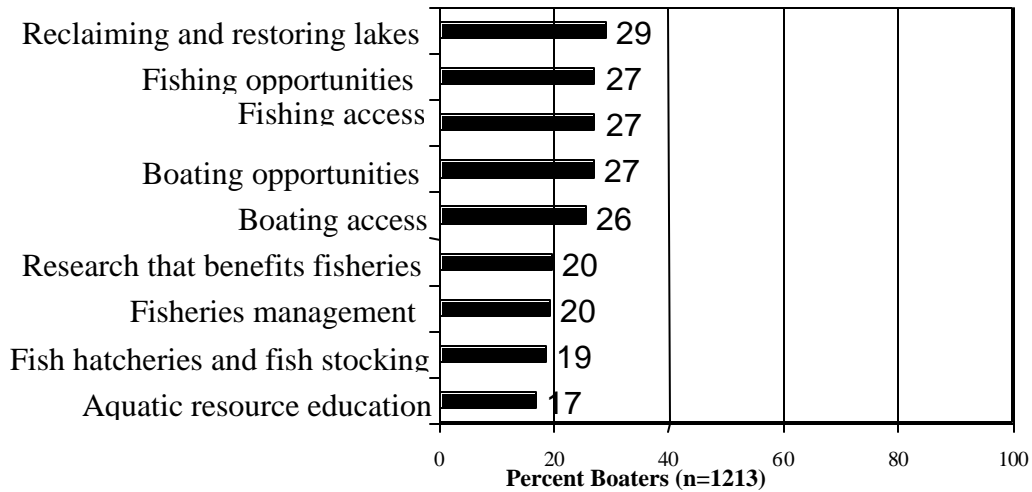


Percent Boaters (n=1213)

Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

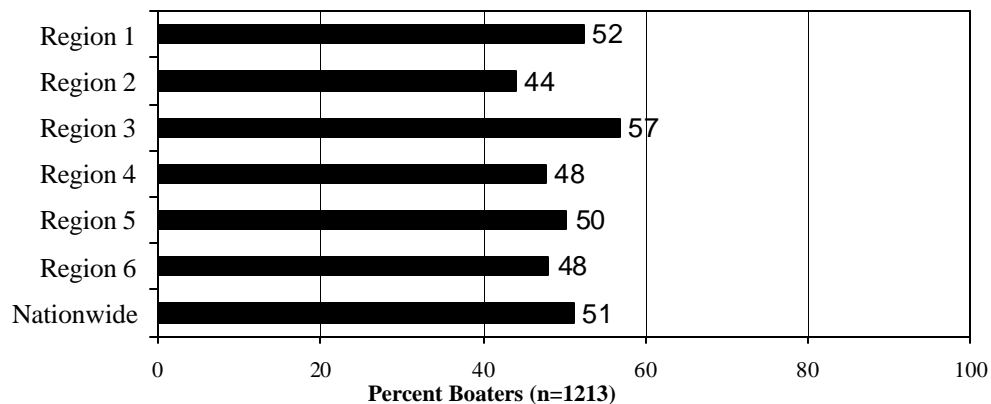
Percent who were very interested in information on the following programs/topics funded under the Federal Aid in Sport Fish Restoration Program.



(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Percent who would likely buy one brand of fishing equipment over another of equal quality and equal price if the brand advertised the Federal Aid Program (and that a portion of their equipment purchase goes to Sport Fish Restoration projects).



(Data weighted by U.S. Fish and Wildlife Service Regions for nationwide representation)

Source: Responsive Management 1999a

Boating Safety and Accidents

Data on boating accidents is difficult to interpret at times. This difficulty stems from the fact that legal requirements for boat registration vary widely across legal jurisdictions, and therefore, the criteria for reporting boating accidents varies because accident reporting is an issue of whether or not a boat is registered. One strong suggestion because of this difficulty is a move toward codifying boat registration and accident reportage across the United States (see U.S. Department of Transportation 2000 for a summary of reporting requirements and registration regulations). In addition, differences in reportage about accidents for different organizations exist as well. The result is that some figures for boating accidents are not consistent across databases. For example, the number of accidents reported by the U.S. Coast Guard (U.S. Department of Transportation 2000), Boat US (1999), and Boating Safety (2000) are different from each other. The need to standardize accident reporting in terms of the specific factors of the accident is evident.

Overall rates. Overall, the number of recreational boating accidents and injuries are increasing; however, the number of fatalities has declined somewhat in recent years (Barach et al. 1998). Recreational boating accidents, especially fatalities, are second only to traffic accidents in terms of transportation-related injuries (American Red Cross 1991, Anon 1987, Bell and Pilk 1987, Robbins 1988).

Putting the numbers in perspective, taken as a percentage of numbered boats only, the percentage of fatalities, accidents and injuries have remained stable since 1994. In 1994, of the 11,429,585 numbered boats only .00007 were involved in fatal boating accidents. In comparison, in 1998 there were 12,565,930 numbered boat of which .00007 were involved in fatal accidents.

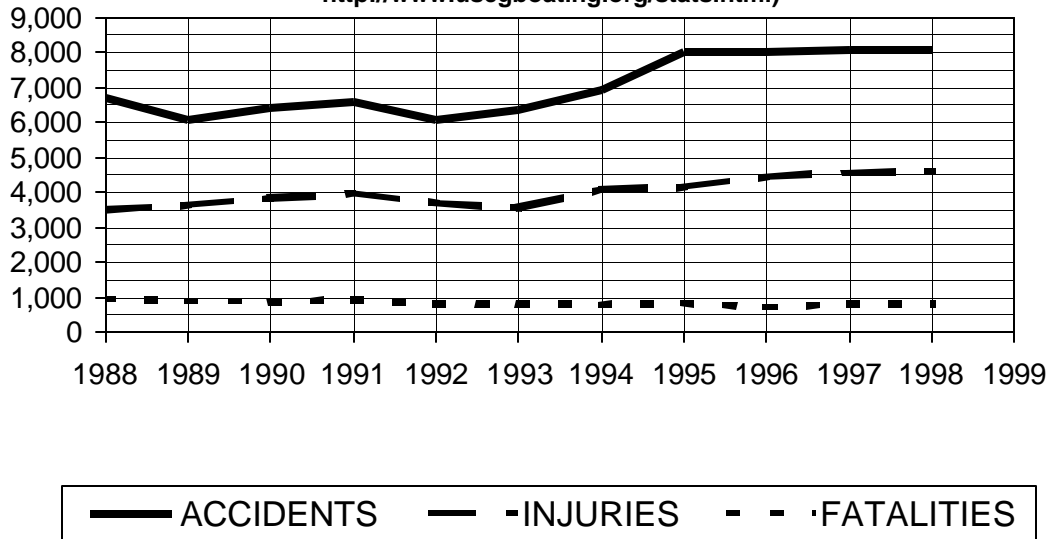
The percentage of boating accidents was the same for 1994 and for 1998 (.0006). In terms of injuries reported, the percentages were again the same for 1994 and 1998 (.0004). During the timeframe of 1994 to 1998, the percentages varied by only .00001-.00002.

There were over 8,000 boating accidents in 1998 with more than 4,600 injuries, the highest number ever reported. The number of fatalities associated with boating accidents in 1998 was 815 (U. S. Department of Transportation 2000). In 1997, the number of boating accidents was also more than 8000.

The number of non-fatal boating accidents has steadily increased since 1994. In 1994, 4,084 injuries and 6,906 accidents were reported. In comparison, in 1998, 4,612 injuries and 8,061 accidents were reported (U.S. Department of Transportation 2000).

BOATING ACCIDENTS AT A GLANCE

(U.S. Department of Transportation, 2000). Recreational Boating Statistics
 1998. United States Coast Guard. Washington, D.C.
<http://www.uscgboating.org/stats.html>



BOATING ACCIDENTS AT A GLANCE			
Year	Fatalities	Injuries	Accidents
1988	946	3,476	6,718
1989	896	3,635	6,063
1990	865	3,822	6,411
1991	924	3,967	6,573
1992	816	3,683	6,048
1993	800	3,559	6,335
1994	784	4,084	6,906
1995	829	4,141	8,019
1996	709	4,442	8,026
1997	821	4,555	8,047
1998	815	4,612	8,061

(U.S. Department of Transportation, 2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C.
 COMDTPUB P16754.12. <http://www.uscgboating.org/stats.html>

Fatalities. Looking at the long-term trend in boating fatalities, the numbers and percentages have decreased since 1988. For example, the number of fatalities per 100,000 registered boats in 1988 was 9.1 and by 1998, this number declined to 6.5 (U.S. Department of Transportation 2000). This decrease may be in part due to increased emphasis on boating education (BOAT U.S. 2000).

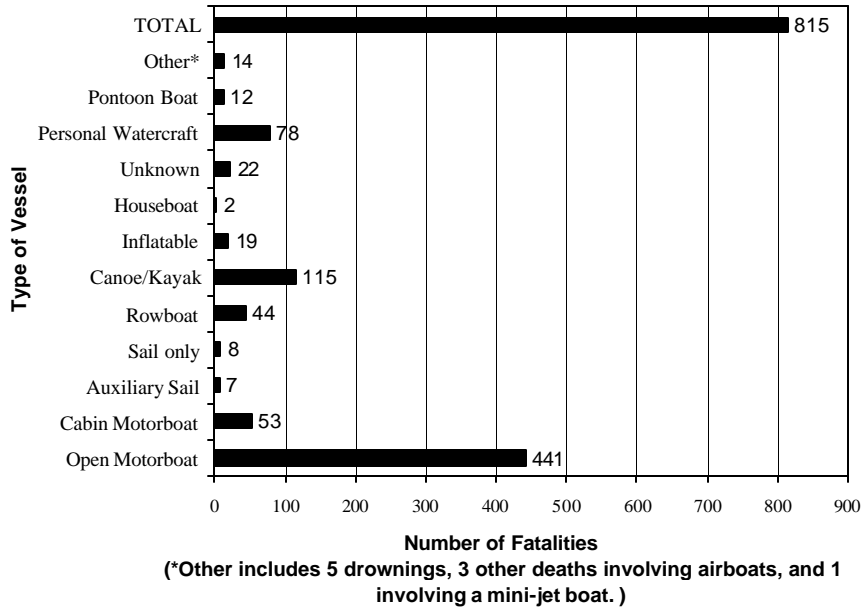
Boating fatalities decreased from 1997 to 1998. In 1997, 821 boating fatalities occurred, whereas in 1998, 815 occurred (U.S. Department of Transportation 2000). Factors related to boating fatalities include type and length of boat, boater behavior in terms of alcohol use and non-use of personal flotation devices, and degree of boater education.

Boating fatalities occurred more on motorized boats than on any other type of boat (U.S. Department of Transportation 2000). In 1997, 593 fatalities occurred on motorized boats, with the bulk occurring on open motorboats (441), personal watercrafts (78), and cabin motorboats (53). In this same year, 115 fatalities occurred with the use of kayaks and canoes and 44 occurred with rowboats.

Boating fatalities most commonly involve boats under 26 feet in length. More fatalities occurred in 1997 than in 1996 for boats under 26 feet in length (U.S. Department of Transportation 2000). In 1997, 104 more fatalities occurred than in 1996 involving boats under 26 feet in length. While this is somewhat related to the number of boats this size, it is also an observation that smaller boats account for a disproportionate number of fatalities. For example, in 1998 the highest number of fatalities (366) was associated with boats 16 feet in length and smaller (U.S. Department of Transportation 2000).

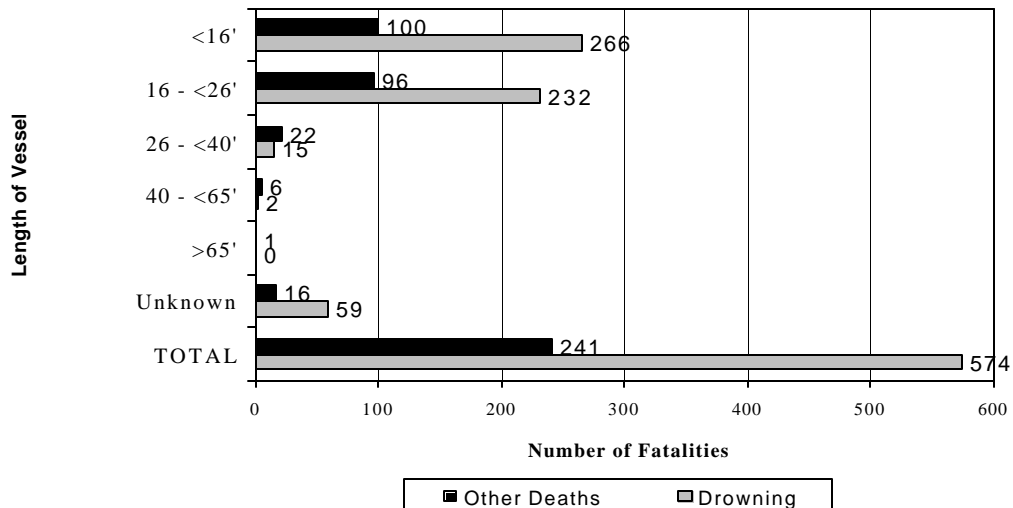
NUMBER OF FATALITIES BY TYPE OF VESSEL

(U.S. Department of Transportation, 2000). Recreational Boating Statistics 1998.
 United States Coast Guard. Washington, D.C. <http://www.uscgboating.org/stats.htm>



Number of Fatalities by Boat Length

(U.S. Department of Transportation, 2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C.
<http://www.uscgboating.org/stats.htm>



Summaries of boating fatalities are reported in the U. S. Department of Transportation study (2000) and on the Boating Safety website (<http://www.boatingsafety.com/stats2.htm>). It should be noted that these reports differ in the numbers of fatalities reported as well as in the frequency of boating accident causes.

	<i>Year</i>	1994	1995	1996	1997	1998
Number of fatalities ²		784	829	709	821	815
Number of drownings with PFDs ¹		ND	68	60	59	ND
Number of drownings without PFDs ¹		ND	561	440	527	ND
Percent of fatalities where operator had no boater education ¹		ND	89%	85%	84%	ND
Number of alcohol-related deaths ²		113	171	190	223	217

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<http://www.boatingsafety.com/stats2.htm>

²U.S. Department of Transportation, (2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C. <http://www.uscgboating.org/stats.html>

ND, No data available

Recreational Boating Accident Causes

<i>Year</i>	1994	1995	1996	1997	1998
<i>Type of Accident</i>	# Fatalities	# Fatalities	# Fatalities	# Fatalities	# Fatalities
Grounding	15	5	10	15	11
Capsizing	219	255	207	245	243
Flooding/swamping	73	51	42	43	60
Sinking	14	20	27	23	20
Fire/explosion	6	3	3	2	5
Collision w/vessel	91	86	77	80	112
Collision w/fixed object	58	59	32	56	60
Collision w/floating object	12	5	14	14	11
Falls overboard	208	215	180	243	234
Fall in boat	2	4	4	6	7
Struck by boat	0	5	11	8	7
Struck by motor/propeller	13	2	5	1	1
Struck submerged object	0	2	0	6	4
Skier mishap	7	10	3	8	17
Other/unknown	66	107	94	71	23
TOTAL	784	829	709	821	815

²U.S. Department of Transportation, (2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C. <http://www.uscgboating.org/stats.html>

The number of boating fatalities due to alcohol use decreased in 1998. In 1994, 113 alcohol-related deaths were reported, 171 in 1995, 190 in 1996, 223 in 1997, and 217 in 1998 (U. S. Department of Transportation 2000). While the actual numbers decreased in 1998, from 1994 to 1998, alcohol-related boating fatalities increased 13%. In 1994, 14% of boating fatalities were alcohol-related, while in 1998 27% were alcohol-related.

The number of deaths due to capsizing boats has fluctuated over the last five years. Fatalities increased from 219 in 1994 to 255 in 1995, decreased to 207 in 1996, then increased to 245 in 1997, and dropped slightly in 1998 to 243 (U. S. Department of Transportation 2000). Taken as a percentage of all boating fatalities in 1998, 30% are due to capsizing boats. This percentage has remained stable since 1996.

From 1994 to 1997, the number of deaths due to collisions (with fixed objects, or vessels, or floating objects) decreased, but then increased in 1998. Fatalities involving collisions decreased from 161 in 1994 to 150 in 1997, but increased to 183 in 1998 (U.S. Department of Transportation 2000). Taken as a percentage of all boating fatalities in 1998, 22% are due to collisions. This percentage has gradually increased since 1994.

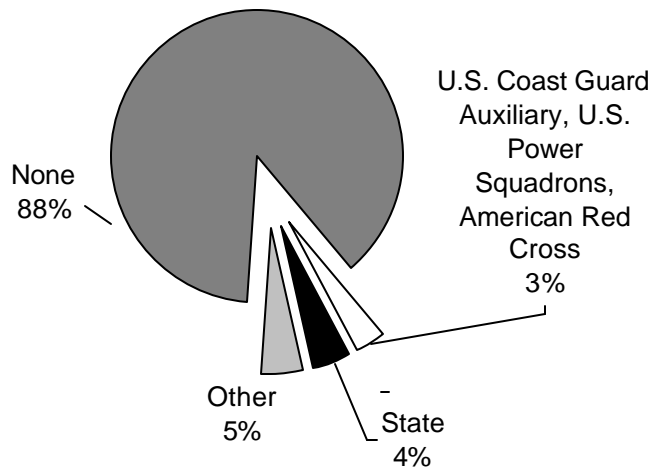
The number of boating fatalities due to not wearing a life jacket has also fluctuated. From 1995 to 1996, the number of fatalities decreased from 561 to 440, but in 1998 increased to 527 (Boating Safety site <http://www.boatingsafety.com/stats2.htm>). Taken as a percentage of all boating fatalities, 62% are associated with not wearing a life jacket. This percentage has remained stable since 1995.

At least 80% of boating fatalities occur on boats where the operator had not completed a boating safety education course (Boating Safety site website <http://www.boatingsafety.com/>

stats2.htm, U.S. Department of Transportation 2000). From 1996 to 1997, 87 more boating fatalities occurred on boats where the operator had not completed a boater safety course (Boating Safety site <http://www.boating safety.com/stats2.htm>).

PERCENT OF FATALITIES BY KNOWN BOAT OPERATOR INSTRUCTION - 1998

(U.S. Department of Transportation, 2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C. <http://www.uscgboating.org/stats.html>)



In 1998, the activity most associated with fatal recreational boating was fishing (31%). For 49% of fatalities the activity was unknown (49%). Other activities associated with boating fatalities include hunting (3%), skiing and/or tubing (3%), racing (1%), and diving and/or swimming (.5%). Of the types of boats involved in fatal boating accidents, open motorboats account for the majority (54%). Canoes and kayaks account for 14% of fatalities, personal watercraft including jet skis next account for 10%, and cabin motorboats account for 7%. Other types of craft, such as sailboats, rowboats, jet boats, and others, make up the remainder (U. S. Department of Transportation 2000).

Weather conditions do not seem to be a major factor in boating fatalities. In most fatal boating accidents, the water conditions were either calm or slightly choppy, visibility was good (night or day), water temperatures was above 60°F, and currents were light to none (U. S. Department of Transportation 2000). There is some concern about lightning protection for open boats (Becker 1985).

Of course, accidents are most common on fresh water impoundments, lakes, or waterways, but this is probably because most recreational boating occurs there (Molberg et al. 1993).

Cause of death. Drowning is the major cause of death in boating fatalities. Of the 815 fatalities in 1998, 574 of them were by drowning. Other causes of death are hypothermia, traumatic injury, loss of blood, propeller caused injuries, and an assortment of other causes (Becker 1985, Branche-Dorsey et al. 1994, Gross 1994, Red Cross 1991, U.S. Department of Transportation 2000).

Personal watercraft injuries and fatalities. The number of accidents, injuries, and fatalities in the use of personal watercraft has substantially increased since 1987 (Boating Safety 2000). However, taken as a percentage of personal watercrafts in use, the percentages have remained stable since 1987. In 1987, 5 personal watercraft fatalities occurred, but in 1997, 84 deaths occurred. In 1995, 12,000 personal watercraft injuries occurred, a substantial increase from the 2,890 injures reported in 1990.

PERSONAL WATERCRAFT (PWC) STATISTICS

<i>Year</i>	<i>PWC'S in Use**</i>	<i>PWC Accidents</i>	<i>PWC Injuries</i>	<i>PWC Fatalities</i>
1987	92,756	376	156	5
1988	126,881	650	254	20
1989	178,510	844	402	20
1990	241,376	1,162	532	28
1991	305,915	1,513	708	26
1992	372,283	1,650	730	34
1993	454,545	2,236	915	35
1994	600,000	3,002	1,338	56
1995	760,000	4,028	1,631	68
1996	900,000	4,091	1,831	57
1997		4,070	1,812	84
TOTALS		23,622	10,309	433

*Estimates from the National Marine Manufacturers Assoc.

**Estimates from the Personal Watercraft Industry Assoc.

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<http://www.boatingsafety.com/stats2.htm>

Use of personal flotation devices. Life jackets or personal flotation devices (PFD) were not worn in 574 of the fatalities that occurred in 1998 (U.S. Department of Transportation, 2000). Nearly 89% of these deaths (509) could have been prevented with the use of PFDs. In 341 of these fatalities, approved PFDs were accessible, but in 220 of these fatalities, approved PFDs were present, but not accessible. Declining fatalities involving children under the age of 12 suggests that the increased usage of PFDs in this group has achieved significant results. Many states now require PFDs to be worn by children at all times (U. S. Department of Transportation 2000).

Mangione et al (2000) reported PFD usage by type of boat operator. In this nationwide study, most boat operators (91%) reported carrying PFDs on their primary boat; 74% reported using them “always” or “most of the time”. Personal watercraft operators were most likely to

carry PFDs and to use them “always” or “most of the time”. Operators of sailboats with motors were the least likely to use PFDs. Females, renters, and boaters with less than 100 hours of experience were as likely to use PFDs as males, owners, and boaters with more than 100 hours of experience. Overall, 98% of boat operators report having “enough” PFDs on their primary boat for all passengers. Operators of personal watercraft and sailboats were less likely to have “enough” PFDs. Differences between male and female operators, owners and renters, and boaters of varying experience were minor.

Most boaters own at least one PFD (Lydecker 1999). Most owners have checked their PFDs for mildew, but fewer than 75% have actually checked them in water for flotation. Mangione et al (2000) also reported that that only 27% of boaters report wearing a PFD all of the time, and over 36% report never wearing a PFD. In the Mangione et al study, there seems to be a large discrepancy between reported use and wear. Despite the high rate of ownership, most recreational boaters only wear their PFD during risky water conditions or activities (U.S. Department of Transportation 2000).

In a nationwide study, boaters strongly support the mandatory use of PFDs for children under the age of 12 (Mangione et al. 2000). Eighty nine percent of boaters agreed that children under 12 years should be required to wear a PFD while boating. However, most boaters (67%) do not agree that all boat occupants should be required to wear PFDs while boating (Mangione et al. 2000).

Even though many boaters cannot swim, the use of PFDs by non-swimmers was still only about 75%. Mandatory requirements concerning the use of PFDs are not uniform by jurisdiction

or by activity. In some states, requirements exist for PFD use for children and even adults, but enforcement data is lacking (U.S. Department of Transportation 2000).

Use of PFDs varied by type of boat operator (Mangione et al. 2000). Among boat operators who reported falling overboard, 69% reported wearing a PFD at the time. Ninety-seven percent (97%) of personal watercraft operators who fell overboard reported wearing a PFD at the time. Eighty-seven percent (87%) of operators falling off sail boats with motors reported wearing a PFD at the time. The highest percentage for people falling overboard and not wearing a PFD (70%) was for cabin motorboats, houseboats, and pontoon boats. The percentage of people falling off rowboats not wearing a PFD was 65% and people falling off open motorboats (the most commonly used boat) not wearing a PFD was 44%.

The perceived necessity of wearing PFDs varies by type of boat operator (Mangione et al. 2000). Only 33% of all boat operators agreed that PFDs should be required at all times. Operators of rowboats (55%) were more likely to agree than disagree that PFDs should be required at all times. Operators of inflatable boats (49%) were as likely to agree as disagree that PFDs should be required at all times. Operators of all other types of boats were more likely to disagree that PFDs should be required at all times. The strongest opposition came from operators of sailboats with motors (84%) and operators of cabin, house, or pontoon boats (82%). Females, renters, and boaters with less than 100 hours of experience were more likely to favor required PFD use.

In Arizona, only 28% of recreational boaters favor wearing a PFD at all times. Another 25% favor using a PFD for certain activities, 15% favor using a PFD when the conditions are bad, and 12% favor using a PFD when the boat is moving (Responsive Management 1998a).

Alcohol use and accidents. Alcohol-related boating fatalities are one area in which the numbers as well as the percentages have increased since 1994. In 1994, 14% of boating fatalities were attributable to alcohol, whereas in 1998 27% were. The percentage of alcohol use among recreational boaters not involved in accidents is probably under-reported (American Red Cross 1991, Anon 1999). Studies have shown that recreational boaters feel that while the boat operator should not consume alcohol while operating the boat, boat passengers can safely consume alcohol and boat operators can consume alcohol when the boat is at rest (Anon 1999, Glover et al. 1995, Howland et al. 1996). The perception that alcohol consumption is not an issue for anyone except an active boat operator is a potential source of problems for recreational boating (Ray Vilorus, BOAT U.S. Foundation personal communication: 2000, Glover et al. 1995, Howland et al. 1996, Hoxie et al. 1998, Wood 1987).

Nearly all boat operators (96%) favored an initiative to prohibit drinking and boating (Mangione et al. 2000). There were no significant differences in terms of type of boat operator, gender, owner or renter, and experience level to this initiative.

Other safety issues. Forty-four percent of all recreational boats are not insured (American Red Cross 1991). This estimate, along with the seeming lack of operator education seems a formula for disaster. This estimate has implications for the insurance industry, for state health departments, and the general population. If the costs of boating accidents are passed to tax payers and insurance rates are forced upward; then society, in general, has a stake in this issue.

In the American Red Cross (1991) and Mangione et al. (2000) studies, the authors reported the type of safety equipment carried and used on primary boats. In the American Red

Cross study, they reported that 63% of all recreational boats do not carry a radio of any type, and only about 15% carry a two-way radio. Fire extinguishers were carried on 70% of boats, first aid kits on 66% of boats, and emergency distress signals on 55% of boats. A reaching assist was carried on 72% of boats. In the Mangione et al. study (2000), boaters were more likely to carry a PFD (91%), an anchor/line (77%), or throwable flotation device (72%) than any other equipment. Smaller percentages of these boaters carried a CB radio (8%), a loran (7%), or radar (3%). Fire extinguishers were carried on 68% of boats and first aid kits on 61% of boats. Since first aid kits, emergency flares, and fire extinguishers are often standard on new boats, this compliance rate is very low (American Red Cross 1991).

While many boat operators reported carrying safety equipment, reported use of equipment was substantially less (Mangione et al. 2000). While 77% of boaters reported carrying anchors and lines, only about half of these boaters (mostly motorboat operators) reported using this equipment “most” or “all of the time”. Twenty-eight percent of boaters carried navigational charts, but only 8% reported using them “most” or “all of the time”. Sailboat operators were most likely to use navigational charts. Twelve percent of boaters carried a VHF marine radio, but only 10% “always” or “most of the time” used this equipment. Operators of sailboats with motors, pontoons, and houseboats were most likely to use this equipment. Cellular phones were carried (38%) and used (14%) more often than other communication tools. Personal watercraft users were most likely to carry them. Seven percent of boaters carried a loran, but only 4% used this equipment. Twelve percent of boat operators carried a global positioning system (GPS), but 6% used them “most” or “all of the time” on their primary boat. Operators of sailboats with motors were most likely to use a GPS. Other safety

equipment, such as flashlights, bailing buckets, paddles and oars, and tool kits were carried and used at high levels.

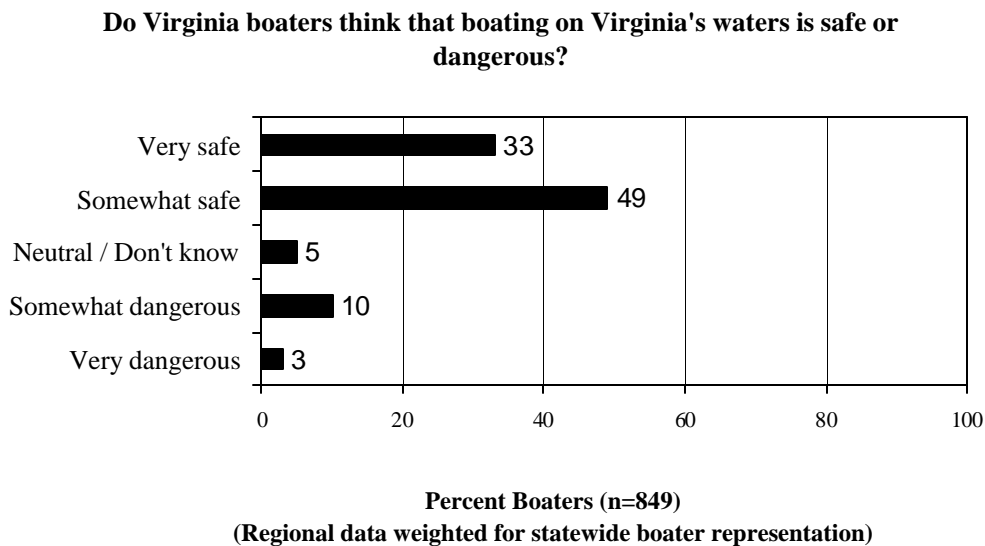
Accident occurrence and perceptions of safety. Provided in this section are estimates of occurrence of non-fatal recreational boating accidents and perceptions of safety. Nearly one-third of recreational boaters reported being involved in an accident or near accident (American Red Cross 1991). About 11% of these boaters reported being involved in a “high risk incident” in which they felt their lives were threatened, 9% reported being in an “urgent situation” requiring help from others, and roughly 6% reported being in some sort of minor accident. In addition, 5% of these boaters reported involvement in an accident leading to death, injury, or property damage. This seems to support the contention that actual accident rates in recreational boating are higher than official records indicate.

Boaters’ perceptions of safety effect their decisions to wear a PFD. Boaters in the Mangione study (Mangione et al. 2000), reported under what conditions they are most likely to wear a PFD. Boaters are more likely to wear PFDs in situations perceived as “risky” such as water skiing (94%), rough water (66%), strong currents (61%), and strong winds (61%). In other situations perceived as less risky, they are less likely to wear a PFD. Only 16% see any danger while at anchor and only 25% see fishing activity as being dangerous.

In Virginia, safety and access issues topped the list of items that boaters wanted the Virginia Department of Fish and Game to focus more effort. Safety issues included controlling boaters under the influence of alcohol or drugs and/or controlling reckless operation, and boating safety education (McMullin et al. 2000, Responsive Management 2000b). Virginia boaters were most concerned about reckless/careless operators and the use of alcohol and drugs (35%).

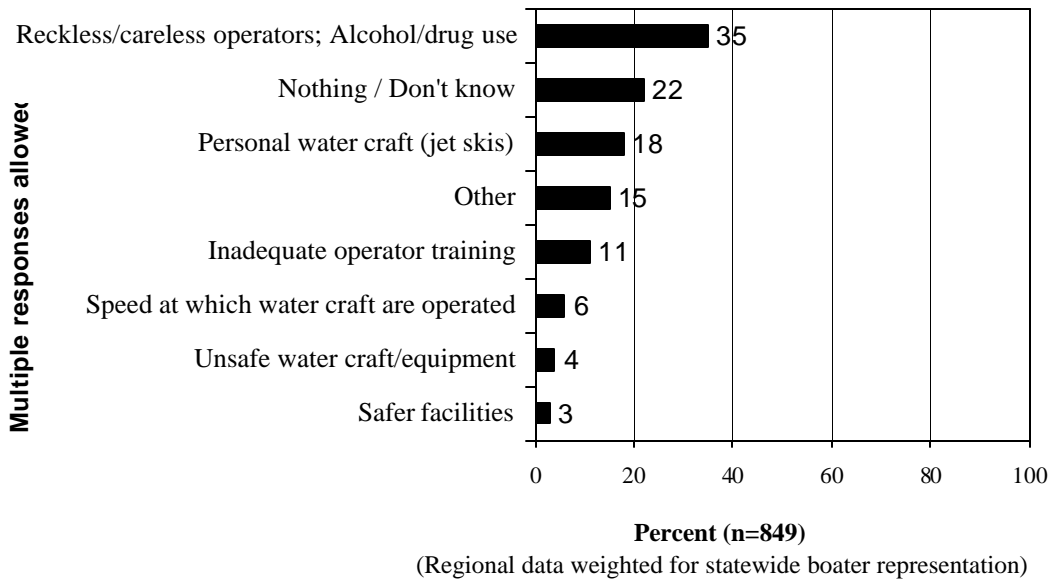
Virginia boaters were also concerned about issues of safety associated with jet skis (18%), inadequate operator training (11%), speed (6%), and unsafe equipment (4%) (Responsive Management 2000b).

Overall, boaters seem to view recreational boating as safe. For example, in Virginia, nearly 85% of recreational boaters feel that boating is safe (Responsive Management 2000b). Recreational boaters in Virginia are aware of safety issues (Responsive Management 2000b). In this study, 44% of recreational boaters attribute reckless and/or careless operation and use of alcohol (35%) as the main causes of boating accidents. In this same study, 48% of boaters support increased enforcement of laws that prohibit the use of alcohol and drugs. Forty-eight percent also support the need for increased law enforcement to control reckless operation of boats.



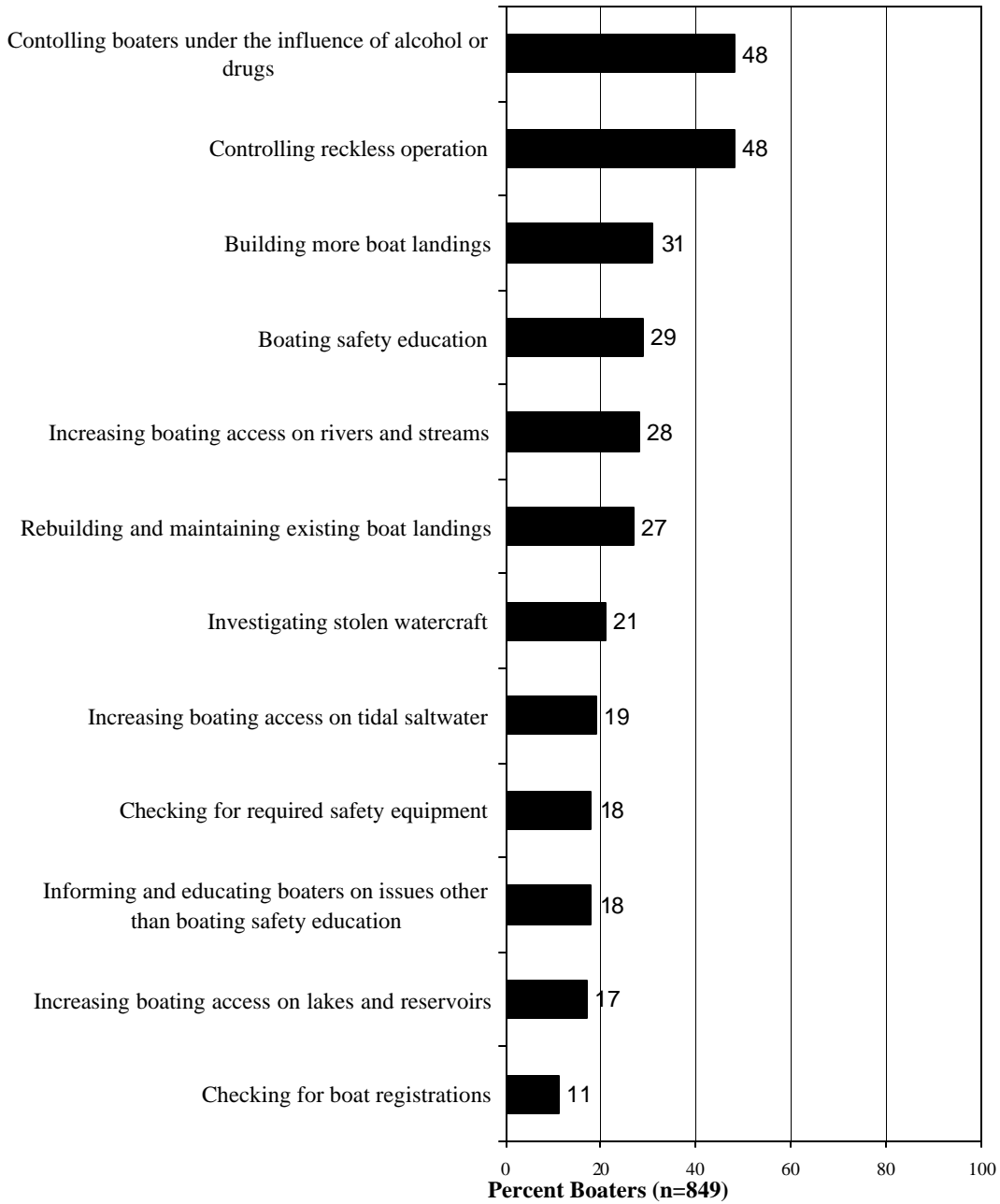
Source: Responsive Management 2000b

**The types of safety or facility issues that concern Virginia boaters
the most.
(Statewide)**



Source: Responsive Management 2000b

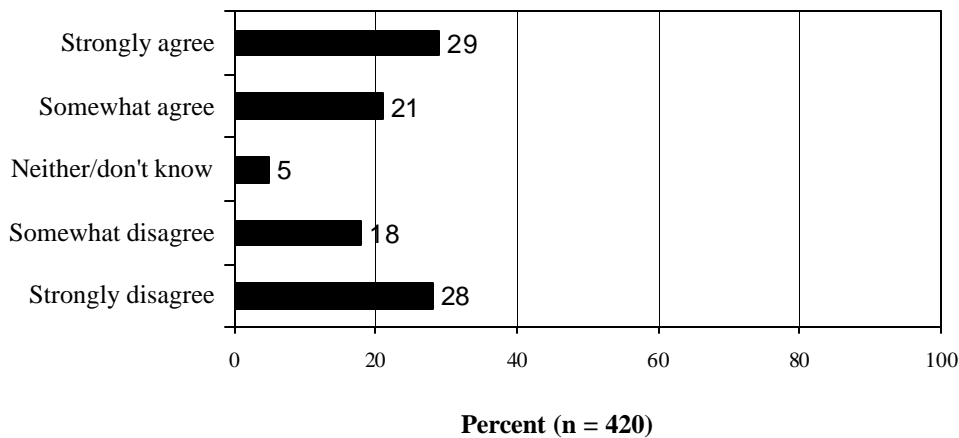
**Percent of boaters who think that the Virginia Department of Game and Inland Fisheries should provide much more effort on...
(Statewide)**



Source: Responsive Management 2000b

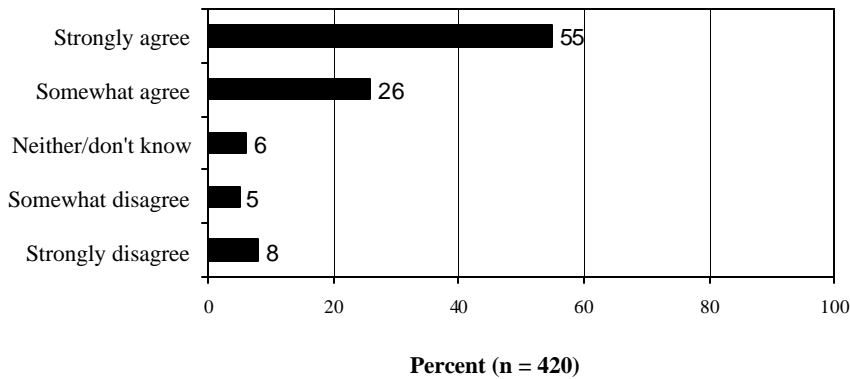
In Arizona, only 8% of recreational boaters reported ever being in any type of recreational boating accident (Responsive Management 1998a). In this study, 79% of recreational boaters agreed that boating on public waters was safe. Alcohol and/or drugs top the list (86%) as boaters' perceptions of the main reason for boating accidents in Arizona. Other perceptions as causes for accidents include reckless driving (45%), not paying attention (29%), speeding (20%), lack of awareness of boating rules (17%), inexperience (12%), and not being familiar with equipment (12%). The safety issues that concern Arizona boaters the most include reckless operators (33%), use of alcohol and/or drugs (26%), and interference from personal watercraft (23%). In this study, boaters (76%) were more concerned with enforcement of laws to control boating under the influence of drugs and alcohol and laws to prohibit careless operation of boats (83%) than laws to enforce PFD use (41%).

**Do you agree or disagree that Arizona public waters, rivers, and lakes are safe for general recreation activities?
(Arizona Boaters Statewide)**



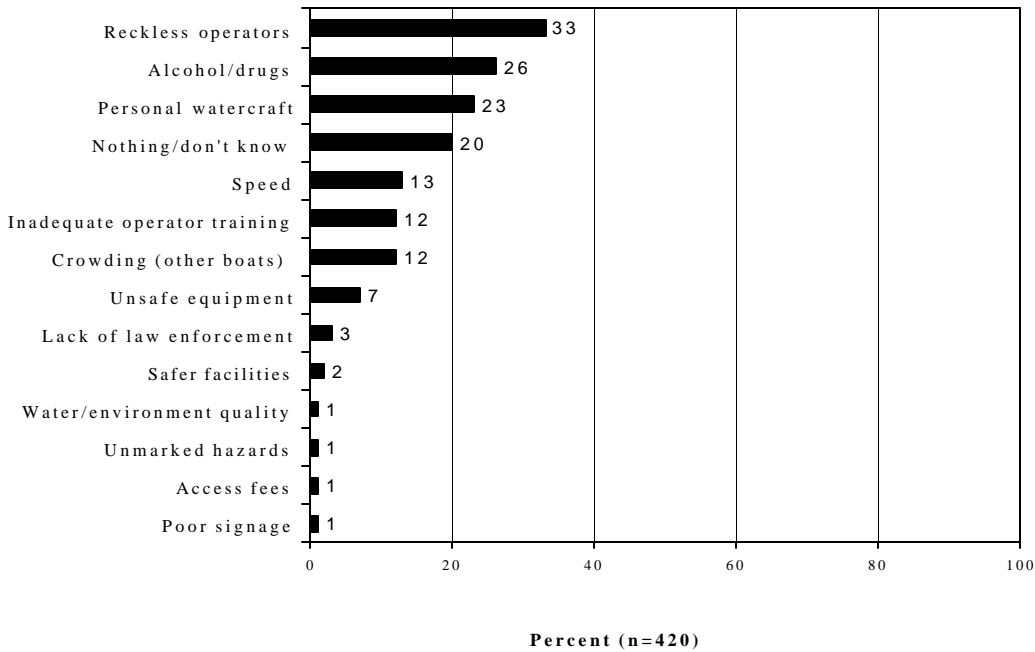
Do you agree or disagree that Arizona public waters, rivers, and lakes would be safer if all watercraft operators could receive watercraft safety instruction?

(Arizona Boaters Statewide)



As a boater, what types of safety or other issues concern you the most?

(Arizona Boaters Statewide)



Source: All Arizona boater graphs, Responsive Management 1998a

Boating accidents among hunters and anglers. Given that hunting and, especially, fishing account for such a high percentage of the activities of recreational boaters, there is a need

to consider accidents and safety issues associated with these activities separately (Boat U. S. 1999).

While recent trends in hunting and fishing overall suggest a stable or declining participation rate in those activities (Aiken 1999), recreational boating fatalities associated with these activities have increased steadily. Boating fatalities associated with hunting and fishing as reported in BOAT U.S. (1999) revealed that 219 fatalities occurred in 1995, 221 in 1996, and 250 in 1997. Of the 813 boating fatalities reported in 1998, fishing accounted for 254 and hunting for 29. From the period of 1995 to 1997, 22% of boating fatalities were of anglers and hunters. In each year, angler fatalities occurred at a much higher rate than hunter fatalities. In 1995, 1996, and 1997, 27% of boating fatalities involved anglers and 1%-2% involved hunters. Most of these deaths were due to drowning (86%) or capsizing the boat (42%).

In the majority of fatalities involving hunters and anglers, drowning is the main cause of death. Capsizing, falling overboard, or swamping/flooding the boats are the events that led to most of these fatalities.

The use of alcohol/drugs is known to be associated with an increasing rate of fatalities among anglers involved with recreational boating, as is the failure to use a PFD (BOAT U.S. 1999). A large number of these fatalities (in excess of 90%) seem to involve failure of the angler or hunter to be wearing a PFD. In the large majority of fatalities associated with fishing, the victim did not wear a PFD. Moreover, this trend in fatalities is increasing among anglers involved in recreational boating. This increasing rate probably indicates the need for increased enforcement and education (Ray Vilorus, BOAT U.S. Foundation personal communication: 2000).

Boating during poor weather and water conditions do not appear to be factors in angler fatalities. The majority of fatalities among anglers in recreational boating occurred under light (0-6 mph) weather conditions and with waves less than 6 feet (Boat U. S. 1999).

The type and length of boat do appear to be factors in angler fatalities (Boat U. S. 1999). Most angler fatalities occur on open motorboats. Although boats under 16 feet in length are most often involved in angler fatalities, a substantial number of fatalities also occur on boats 16 to 26 feet in length

Age of boaters appears to be a factor in angler fatalities (Boat U. S. 1999). Although fatalities span a wide range of ages, the highest risk group is between 30 and 50 years of age (BOAT U.S. 1999).

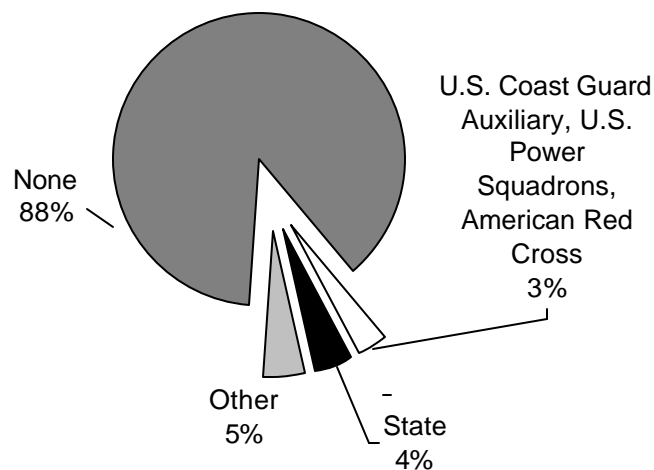
Boater education. Eighty-eight percent of 1998 boating fatalities occurred on boats where the operator did not have a boating safety education course (U.S. Department of Transportation 2000). As much as 73% of all reported accidents involved factors that the operator could have controlled. Most authorities emphasize the need for boating safety education (U.S. Department of Transportation 2000). The primary operator related causes of accidents are inattention, careless or reckless operation, inexperience, unsafe speeds, and not having a safety lookout onboard. Mangione et al.(2000) reported that 66% of boaters had never taken a boating safety class and 19% had not taken a course within the last ten years.

Participation rates in boating safety courses has declined over the years. In 1976, 5% of boaters aged 16 and older had taken a boating safety course in the previous year as compared to 4% in 1989 (American Red Cross 1991). In 1976, 31% of boaters aged 16 years and older had participated in a boating safety course at some point in their lifetime, in comparison to only 24%

of boaters in 1989. It would appear that many new boaters are not taking boating safety courses. While most boaters do not participate in boating safety courses, they do participate in basic first aid, water safety, or rescue courses at a rate higher than that of the general population (American Red Cross 1991).

PERCENT OF FATALITIES BY KNOWN BOAT OPERATOR INSTRUCTION - 1998

(U.S. Department of Transportation, 2000). Recreational Boating Statistics 1998. United States Coast Guard. Washington, D.C.
<http://www.uscgboating.org/stats.html>



Given the high boating accident rate, the need for boater education is clear (Ray Vilorus, BOAT U.S. Foundation personal communication: 2000). The recreational boating community should promote boating safety classes, swimming, first aid, CPR, boating rescue, and water rescue as standard requirements for boat operators. State agencies should consider the mandatory licensing of boat operators, and the inclusion of boating education in the licensing process.

Most boaters have access to safety information. In the Mangione et al. study (2000), 80% of boaters had been exposed to boating safety information in some way. Sailboat operators, boat renters, and boaters with less than 100 hours of experience were less likely to have been exposed to boating safety information in 1998.

Attitudes Toward Mandatory Education. Recreational boaters support more than oppose mandatory licensing and boater safety education. For example, in Virginia, 58% of recreational boaters agree that operators of motor powered watercraft should be licensed; only 37% disagree (McMullin et al. 2000, Responsive Management 2000b). Thirty-six percent of Virginia boaters have actually taken a boating safety course. For the 64% who had not taken a safety class, the main reasons they gave included that they did not need it (49%), did not have the time (19%), or did not know boating safety courses were available (14%). Sixty-three percent of Virginia recreational boaters support mandatory safety courses for operators other than jet skiers, only 34% oppose. Eighty-seven percent of Virginia recreational boaters support a mandatory boating safety course for jet skiers.

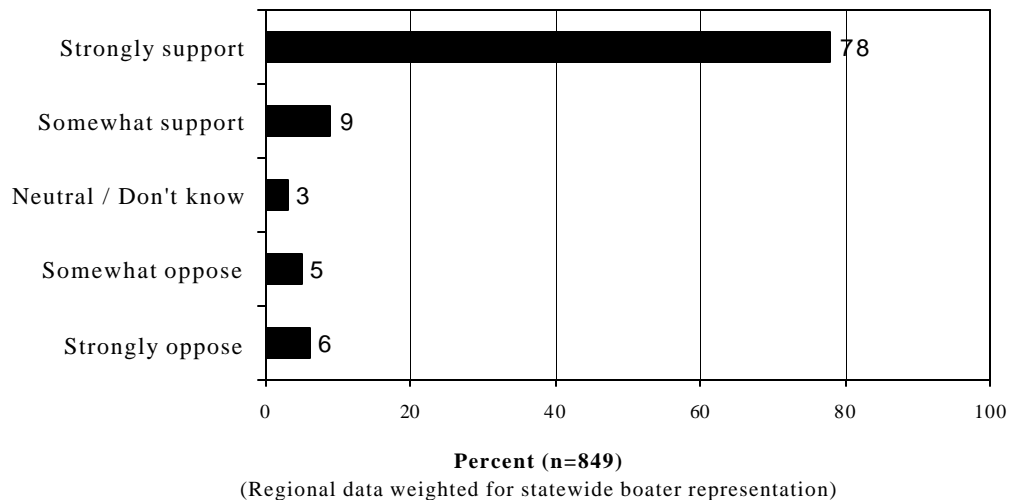
In a nationwide survey (Mangione et al. 2000), 73% of boat operators agreed that boaters should be required to pass a basic boating knowledge test to operate a boat. Operators of all types of sailboats were more likely to agree (81%) than operators of rowboats (66%). Females and renters were more likely to agree than males or boat owners.

Although a majority of Virginia residents did not feel it was very important for the Virginia Department of Game and Inland Fisheries to provide boating opportunities in the state, they did, however, feel it was very important for the Department to provide boating safety education (McMullin et al. 2000; Responsive Management 2000b). Among a list of 18

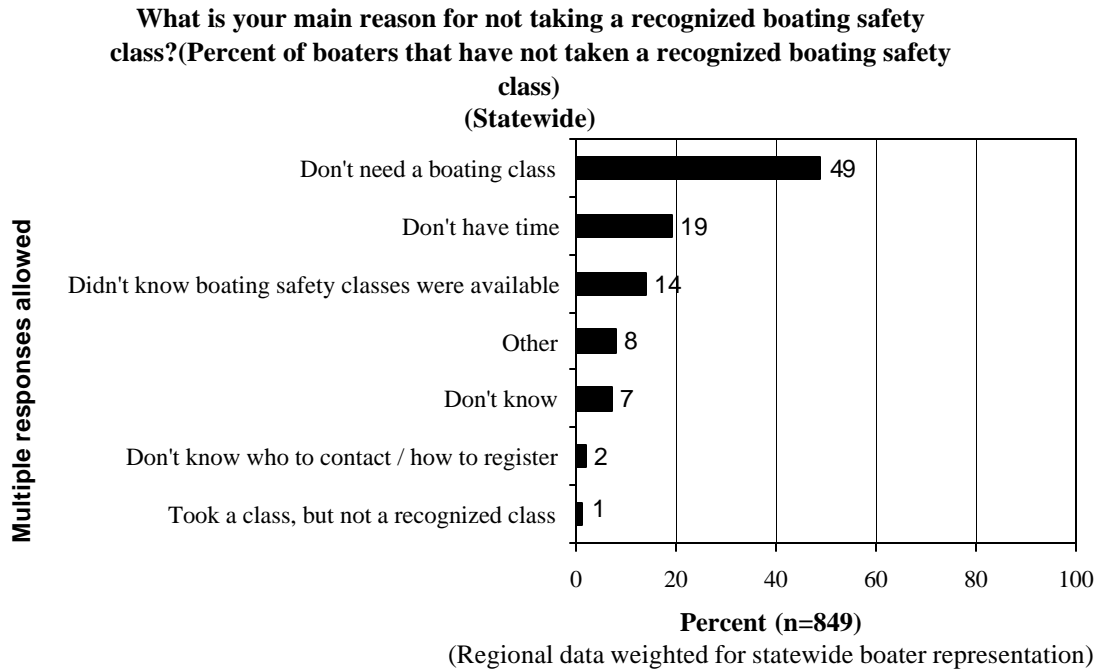
Department programs, boater safety education importance was rated 4th on the list while providing boating opportunities was 16th. Over half of Virginia boaters felt the Department was doing an excellent or good job of providing boating safety education (Responsive Management 2000b).

Although there was a substantial amount of opposition, a majority of Virginia registered boaters support instituting a mandatory boating safety course that boaters, other than jet skiers, must take before operating a boat in Virginia. Sixty-three percent supported a mandatory course for boaters other than jet skiers, while 34% opposed it (Responsive Management 2000).

**Would you support or oppose instituting a mandatory boating safety course that jet skiers must take before operating a boat in Virginia?
(Statewide)**

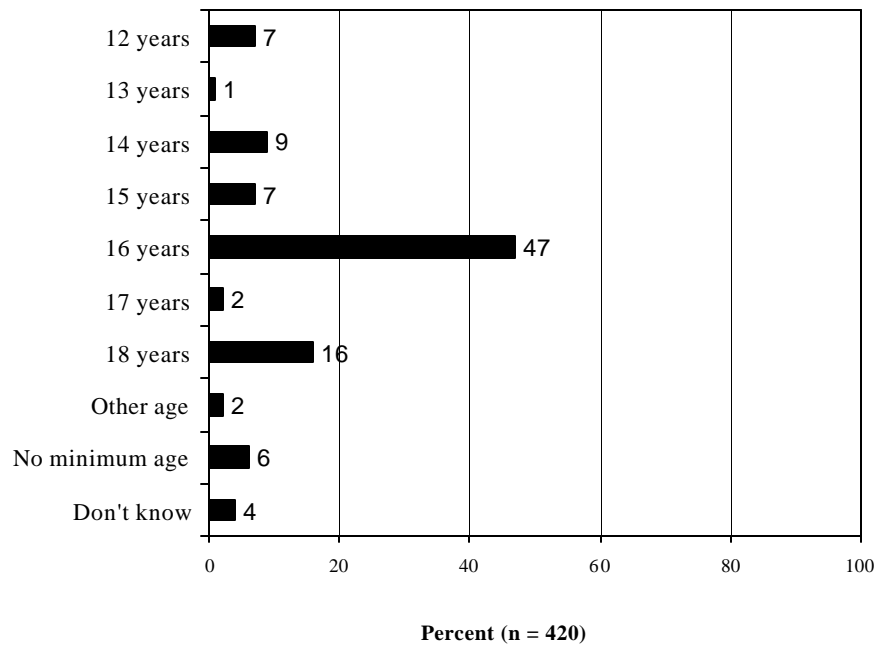


Source: Responsive Management 2000b



Source: Responsive Management 2000b

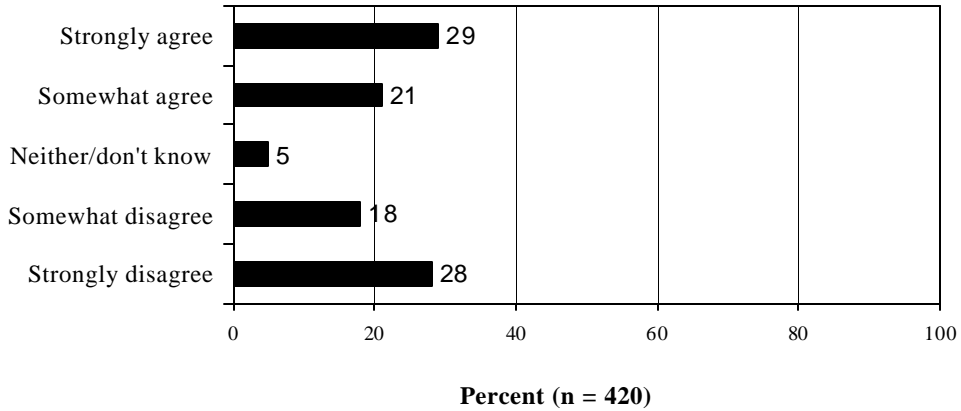
**Should the minimum, legal age to operate a motor-powered watercraft be 12, 13, 14, 15, 16, 17, or 18 years of age, some other age, or do you think there should not be a minimum legal age?
(Arizona Boaters Statewide)**



Source: Responsive Management 1998a

In Arizona, 46% of recreational boaters support mandatory boating safety education for operators, and 66% support more effort in boating education by the state agencies (Responsive Management 1998a). With regard to licensing, slightly more boaters (50%) support mandatory licensing, than oppose it (46%). Most Arizona boaters (47%) stated that the minimum legal age to operate a motor-powered watercraft in Arizona should be 16 years of age. While 63% of Arizona boaters are aware of the availability of certified boating safety course, only 28% have taken one. As in Virginia, the main reason for not taking the course is a perceived lack of personal need (45%), time constraints (16%), or lack of awareness (12%).

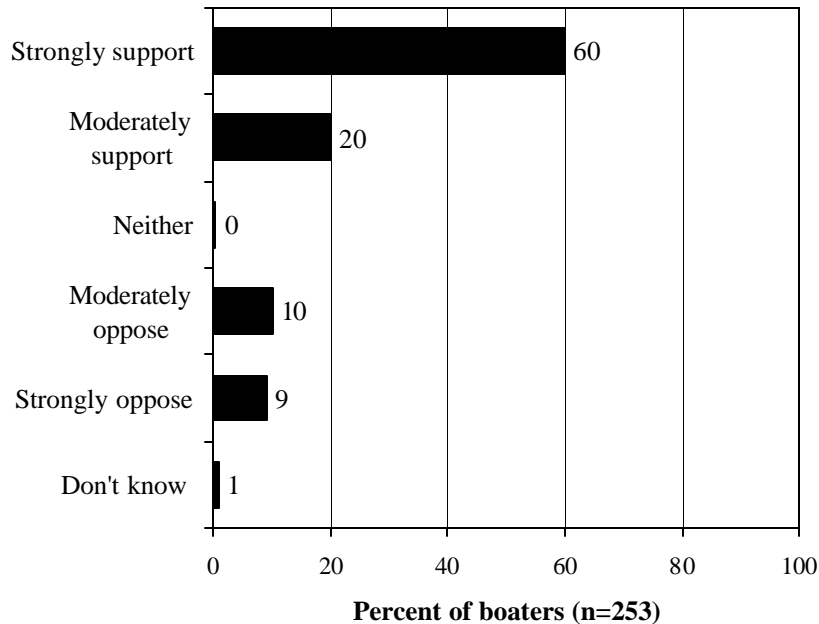
**Do you agree or disagree that Arizona public waters, rivers, and lakes are safe for general recreation activities?
(Arizona Boaters Statewide)**



Source: Responsive Management 1998a

In Pennsylvania, boaters feel that the Commission should spend more effort on boater education programs (64%). A large majority of boaters (60%), resident (69%) and non-resident anglers (70%) support boater education. Much smaller percentages oppose the idea (Responsive Management 1996).

Do you support or oppose requiring a boater education course for all people who operate motorboats in Pennsylvania?

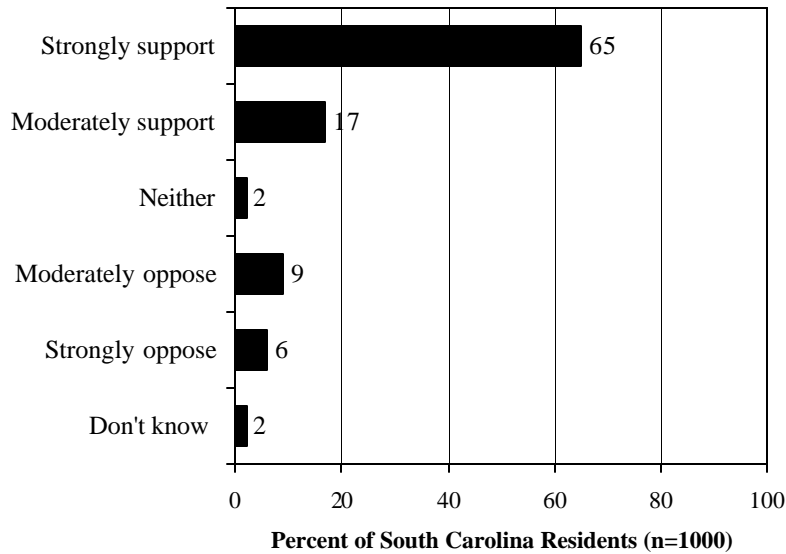


Source: Responsive Management 1996

Other studies indicate that that boater education is important to the public. South Carolina residents were presented with 18 different South Carolina Department of Natural Resources programs (Responsive Management 1994). Of the 18 programs, 76% of South Carolina residents rate boater education as the second highest priority for the Department to spend more time and money. South Carolina residents also strongly support instituting a mandatory boating safety course that boaters must take before operating a boat in South Carolina. Eighty-two percent of South Carolina residents support and 15% oppose a mandatory boating safety course. Much of the support is strong support. Non-boaters (86%) are more likely than boaters (77%) to support a mandatory boater safety course. Arkansas residents

support (81%) a mandatory boater education course for all people who operate motorboats in Arkansas (Responsive Management 2000).

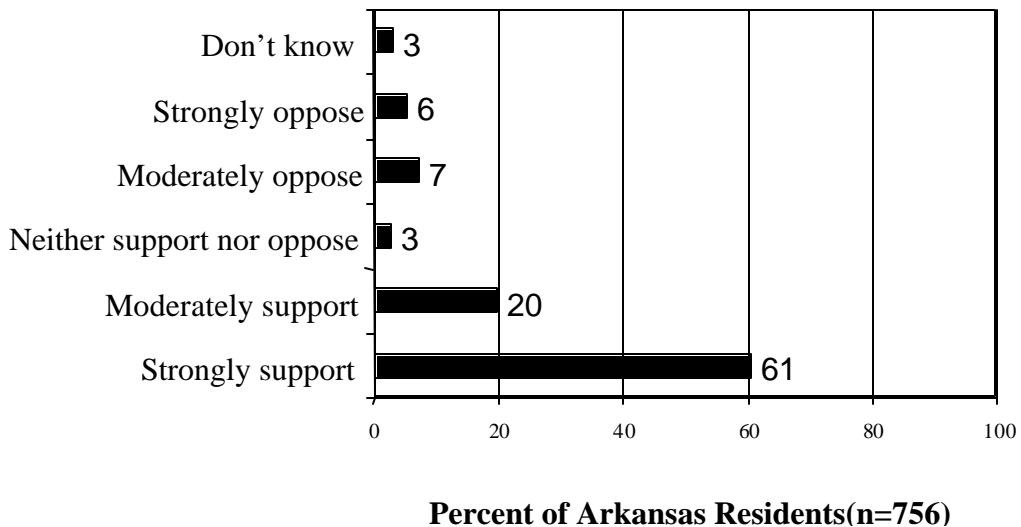
Opinion of instituting a mandatory boating safety course for all South Carolina boaters.



Source: Responsive Management 1994

Source: Responsive Management 2000

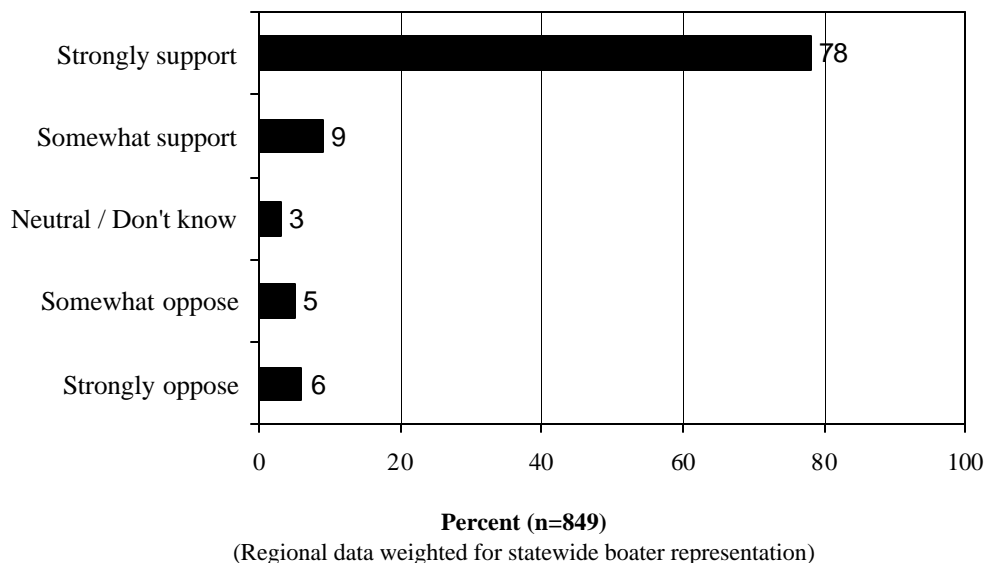
Do you support or oppose a mandatory boater education course for all people who operate motorboats in Arkansas?



Mississippi residents feel that watercraft safety and enforcing watercraft laws should be a high priority for the Mississippi Department of Wildlife, Fisheries and Parks (Responsive Management 1998d). Out of 17 programmatic areas presented to Mississippi residents, watercraft safety and enforcing watercraft laws was 3rd in importance, following only water resource protection, and providing environmental education to schools.

Mandatory education for jet ski operators. Virginia boaters overwhelmingly and strongly support instituting a mandatory boating safety course that jet skiers must take before operating a PWC. Seventy-eight percent strongly support and 9% somewhat support this mandatory safety course for jet skiers (McMullin et al. 2000, Responsive Management 2000).

**Would you support or oppose instituting a mandatory boating
safety course that jet skiers must take before operating a boat in
Virginia?
(Statewide)**

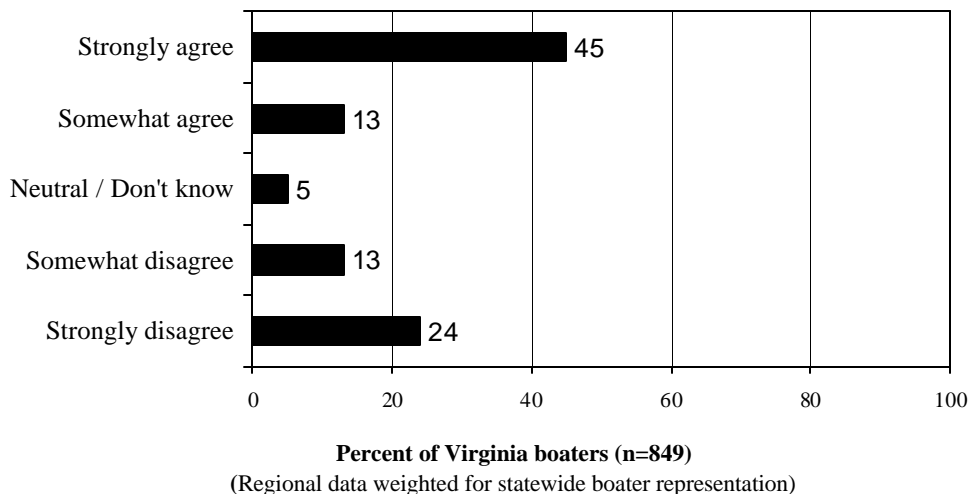


Source: Responsive Management 2000b

Mandatory licensing. Nationwide, boaters support more than oppose mandatory boater licensing. In Mangione et al. (2000), 61% of boater operators agree and 39% disagree that boat operators should be required to have licenses. Operators of personal watercraft and sailboats were even more likely to favor mandatory licensing (67%). A majority of females, renters, and boaters with less than 100 hours of experience also favor mandatory licensing. In addition, boaters agree that boaters should be required to pass a test in order to operate a boat. Seventy-four percent agree and 27% disagree.

In Virginia, a slight majority of Virginia boaters agree that all operators of motor-powered watercraft in Virginia should be licensed, just as automobile operators. Fifty-eight percent of registered boaters agree while 37% disagree (McMullin et al. 2000, Responsive Management 2000).

Do you agree or disagree that all operators of motor-powered watercraft in Virginia should be licensed, just as automobile operators?



Source: Responsive Management 2000b

Issues and Implications

1. Recreational boating in the United States is increasing along several distinct lines. While the number of boats as a percentage of the population is not, seemingly, increasing; the number of boats per boating household is increasing. In addition, the amount of time spent by recreational boaters is increasing, and the demand for additional time for boating is increasing. All of these factors lead to increased demands for and usage on public and private boating access, boating facilities, and boating supplies.
2. Boat ownership is increasing in certain areas. The number of boat ownerships by households that already own one boat has increased. This may be due to the increase in personal watercraft ownership, but the overall rate appears for boat owners to increasingly own more than one boat.
3. The majority of recreational boating in the United States is done in open motorboats under 26 feet in length. Boats under 16 feet in length are the most commonly used craft in recreational boating. Boat ownership has increased in specific areas in recent years; this is probably associated with increased income. Jet skis and other personal watercraft ownership have increased remarkably, but they still represent a minority of recreational boaters. Most recreational boating takes place on freshwater lakes or impoundments. Recreational boaters are fairly avid in that the average number of boating days is 17, and the average number of hours per day boating is 5.
4. Inconsistent registration requirements confound the accurate description of boating demographics. Standard codified boating registration and accident reportage would increase the accuracy of analysis of boating participation and accident rates.

5. The demographics of recreational boaters mirror the national population in most areas. White males represent a larger group than others, but not as much as other types of outdoor recreation. Income is correlated to boating recreation and boat ownership in the middle to upper income levels. There is a correlation between education and participation in recreational boating. Those with graduate or professional degrees and college graduate are slightly more likely to participate in recreational boating. Ethnic minorities are under-represented in boating and boat ownership, but the reasons for this are unclear, although income-related reasons are plausible.
6. Recreational boating is closely tied to fishing. Over 80% of recreational boaters also fish. This connection is found throughout the various issues of satisfactions, ownership, accidents, and education. An interesting aspect is that fishing nationally is stable to declining, but boating is increasing. It remains to be seen whether or not the fishing segment of boating participation is increasing. Recreational boaters take part in many outdoor activities, some associated with boating and some not.
7. Although the issue of access has been raised as a negative in recreational boating, little evidence suggests that a lack of access is anything other than a local issue. The research does not suggest that issues regarding access or boating facilities from a national perspective are displacing recreational boaters.
8. Recreational boating satisfactions do not come from the physical characteristics of boats or boating. Rather, satisfactions from recreational boating, as in other types of outdoor recreation, tend to be about naturalistic experiences, rest and relaxation, and social issues around friends and family. The implications of these observations about satisfactions,

motivations, and benefits of recreational boating are profound. The fact that naturalistic experiences, being with friends and family, relaxation, and other less tangible reasons are of primary importance, and proximal factors such as costs, challenge, physical characteristics of boats, boat performance, and others are of less importance need to be carefully considered in the development of management and marketing plans.

9. Attitudes and opinions toward recreational boating by agency personnel are largely unknown. Inferentially, it would seem that some fish and wildlife agency personnel do not place as much importance on boating recreation enhancement, or boating enforcement than on other issues such as game and fish. However, these attitudes need to be assessed in a comprehensive study.
10. The issue of a theoretical carrying capacity for recreational boating centers on the physical and social carrying capacity. Another issue is the biological or environmental carrying capacity of a body of water for recreational boating. These issues are highly complex and appear to be a function of local conditions and cultural characteristics of boaters using the area. There does not appear, at this time, to be a general model for carrying capacity.
11. There is a need for standardization in the reportage of recreational boating accidents. A full analysis of the data is confounded by variations in estimates and methods of record keeping. However, if recreational boating accidents are taken as a percentage of total recreational boating, then the number of accidents has decreased. As far as transportation safety is concerned, recreational boating remains second only to traffic accidents.

12. Recreational boating fatalities occur primarily in boats under 26 feet in length.

Capsizing, swamping, or flooding of the boat are also factors. Alcohol is found in a fair number of accidents. The use of PFDs and mandatory education would appear to be factors that could reduce fatalities.
13. Among boating fatalities involving hunters and anglers, over 80% are from drowning. A very high percentage involves capsizing, swamping, and/or flooding the boat. Most accidents are with open motorboats less than 16 feet in length. Anglers and hunters aged 30-50 years old are at highest risk. The use of alcohol and failure to use a PFD is increasing. Fatalities involving hunters and anglers appear to be going contrary to the declining trend for all recreational boaters.
14. The actual use of PFDs in any given group and for all recreational boaters needs to be studied empirically. There is a need for a national survey of PFD use based on actual observation and count, not reportage by boaters.
15. Participation in boating safety education is declining as a percentage of the boating population. Over 80% of boat operators have not taken a boating safety course. In comparison to the general population, boat operators seem to be more familiar with CPR, first aid, and rescue; however, in comparison to other boat operators the numbers are low. Recreational boaters favor mandatory boating safety and operator licensing, but few feel they personally need either. Recreational boaters are more likely to favor mandatory requirements for new boat operators, especially personal watercraft operators. Mandatory licensing, boating safety, and other education are problematic issues. Most

recreational boaters seem to favor it, but the logistics of implementation will be difficult for state and federal governmental agencies.

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