

2012 Life Jacket Wear Rate Observation Study

featuring

National Wear Rate Data from 1999 to 2012

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Table of Contents

I. INTRODUCTION	1
II. NATIONAL CORE DATA RESULTS	2
Adult Life Jacket Wear Rates on Open Motorboats 2006 to 2012	2
Figure A – Adult Wear Rates on Open Motorboats 2006-2012.....	3
National Life Jacket Wear Rates for ALL Boaters 1999 to 2012	4
Figure B – Life Jacket Wear Rates for ALL Boaters.....	5
National Life Jacket Wear Rates for ADULTS (18 years or older) 1999 to 2012	6
Figure C – Life Jacket Wear Among Adult Boaters	6
National Life Jacket Wear Rates for YOUTH (17 years or younger) 1999 to 2012	7
Figure D – Life Jacket Wear Among Youth Boaters	7
Life Jacket Wear Rates by Age Categories 1999 to 2012	8
Table 2.1 – Life Jacket Wear Rates by Age Excluding Boaters on PWCs	9
Powerboats for Adults (18 years or older)	10
Figure E – Adult Wear Rates for ALL Powerboats Except PWCs	10
Table 2.2 - Life Jacket Wear Rates by Powerboats for Adults	11
Powerboats for Youth (17 years or younger)	12
Figure F – Youth Wear Rates for ALL Powerboats Except PWCs	12
Table 2.3 – Life Jacket Wear Rates by Powerboats for Youth	13
All Paddlecraft for Adults (18 years or older)	14
Figure G – Adult Wear Rates for ALL Paddlecraft	14
Table 2.4 – Life Jacket Wear Rates by Paddlecraft for Adults	15
All Paddlecraft for Youth (17 years or younger)	16
Figure H – Youth Wear Rates for ALL Paddlecraft	16
Table 2.5 – Life Jacket Wear Rates by Paddlecraft for Youth	17
Sail Craft for Adults (18 years or older)	18
Figure I – Adult Wear Rates for ALL Sail Craft	18
Table 2.6 – Life Jacket Wear Rates by Sail Craft for Adults	19
Sail Craft for Youth (17 years or younger)	20
Figure J – Youth Wear Rates for ALL Sail Craft	20
Table 2.7 – Life Jacket Wear Rates by Sail Craft for Youth	21
Boat Type and Size for Adults (18 years or older)	22

Table 2.8 – Life Jacket Wear Rates by Boat Type and Size for Adults	23
III. CHANGES IN INFLATABLE LIFE JACKET USE.....	24
Changes in Inflatable Life Jacket Use for All Adult Boaters	24
Figure J1 – Comparison of Types of Life Jackets on All Boats	25
Figure J2 – Proportional Comparisons of Types of Life Jackets on All Boats among Life Jacket Users.....	25
Changes in Inflatable Life Jacket Use for Boaters on Skiffs	26
Figure J3 – Comparison of Types of Life Jackets on Skiffs	27
Figure J4 – Proportional Comparisons of Types of Life Jackets on Skiffs among Life Jacket Users	27
Changes in Inflatable Life Jacket Use for Boaters on Speedboats/Runabouts.....	28
Figure J5 – Comparison of Types of Life Jackets on Speedboats/ Runabouts.....	29
Figure J6 – Proportional Comparisons of Types of Life Jackets on Speedboats/Runabouts among Life Jacket Users.....	29
Changes in Inflatable Life Jacket Use for Boaters on Cabin Sailboats	30
Figure J7 – Comparison of Types of Life Jackets on Cabin Sailboats	31
Figure J8 – Proportional Comparisons of Types of Life Jackets on Cabin Sailboats among Life Jacket Users.....	31
Changes in Inflatable Life Jacket Use for Boaters on Cabin Cruisers	32
Figure J7 – Comparison of Types of Life Jackets on Cabin Cruisers	33
Figure J8 – Proportional Comparisons of Types of Life Jackets on Cabin Cruisers among Life Jacket Users	33
IV. WEAR IT! CAMPAIGN TRACKING	34
Wear It! Campaign – California	34
Table 4.1 Summary of Delta Adult Wear Rates by Year Showing Number of Observations and Observation Opportunities.....	34
Figure 4.1 – Association between Wear Rates & Number of Campaign Boat Tour Appearances in Each Year	35
Wear It! Campaign – Tennessee and Michigan	36
Table 4.2 – Wear Rates on Powerboats by Age for Pre and Post Campaign Periods	37
Table 4.3 – Adult Wear Rates by Length of Boat for Pre and Post Campaign Periods	38
Table 4.4 – Adult Wear Rates by Activity for Pre and Post Campaign Periods	39
V. DO MANDATORY LIFE JACKET REGULATIONS WORK?	41
Responses to Varying Regulations Mandating Wear for Youth	42
Table 5.1 – Wear Rates by General Boat Type Group for Youth Mandated and Not Mandated to Wear.....	42
Table 5.2 – Wear Rates for Youth Age Groups for Different Levels of State Mandates	43
Life Jacket Wear Rates on PWCs versus Small Powerboats.....	44
Table 5.3 – Comparison of Wear Rates for PWCs versus Other Small Powerboats <16ft	44
Towed Sport Participants versus Occupants of Towing Boats.....	45
Table 5.4 – Comparison of Wear Rates for those Being Towed versus those on Boat Towing Others.....	45
Mississippi Mandatory Experiment with Comparison Area	46

Table 5.5 – Comparison of Lakes in Mississippi with Mandatory Regulations to Those Lakes Without Mandatory Regulations.....	46
Summary of Whether Mandatory Regulations Work	47
VI. CONCLUSIONS FOR LIFE JACKET WEAR RATES - NATIONAL TREND DATA 1999 TO 2012.....	48
VII. APPENDIX: METHODS & DESCRIPTIVE INFORMATION	49
JSI Data Collection Form: 2012 Boat Form	51
JSI Data Collection Form: 2012 Site Form	52
VIII. INFORMATION ON BOATS & PEOPLE OBSERVED	53
Figure K – Number of Boats and People.....	54
Figure L – Types of Boats	55
Figure M – Length of Boats	56
Figure N – Length of Boats 2004-2012 Data Only	57
Figure O – Operation of Boats	58
Figure P1 – Activity of Boaters—ALL YEARS	59
Figure P2 – Activity of Boaters 2007-2012 Data.....	60
Figure P3 – Activity of Boaters 2002-2012	61
Figure Q – Gender of Boaters	62
Figure R1 – Age of Boaters	63
Figure R2 – Age of Youth Boaters	64
Figure S – Water Temperature in which all Boaters were Observed	65
Figure T – Water Current in which all Boaters were Observed.....	66
Figure U – Wave Height in which all Boaters were Observed.....	67
Figure V – Visibility in which all Boaters were Observed	68
Figure W – Weather in which all Boaters were Observed	69
Figure X – Air Temperature in which all Boaters were Observed	70
Figure Y – Wind Speed in which all Boaters were Observed.....	71

I. INTRODUCTION

This report provides data and analysis on the 2012 National Life Jacket Wear Rate Observation Study with comparison information from the previous thirteen years' studies (1999-2011). Tracking changes in life jacket wear rates over time provides important statistics for those individuals and groups responsible for educating the public about boating safety, improving boating safety programs, and for legislative efforts targeting safety improvements for recreational boating. The Boating Statistics 2011 report, published by the United States Coast Guard (USCG), shows that among the 533 drowning deaths in 2011, approximately 84% (415) of the individuals were reported as not wearing a life jacket. These statistics make it essential to not only track the national life jacket wear rate among recreational boaters, but also to understand the circumstances and patterns in which life jackets are worn.

Calendar year 2012 marked the fourteenth year of life jacket wear rate data collection efforts conducted by JSI Research & Training Institute. The cumulative years of data allow for a higher level of analysis (i.e., controlling for the impact of influencing factors like age, weather, and boat type) in order to unmask potential trends and indicators of increased or decreased life jacket wear among different groups of recreational boaters.

Most information in this report is presented separately for adults (18+ years old) and youth (0 to 17 years old). Over the fourteen years of the presented data, the general distribution of ages, gender, boat types, boat characteristics, and site characteristics have remained relatively stable. The appendix contains a detailed description of methods used and proportions of various boaters; boat and site characteristics are shown for the period 1999-2012 of data collection.

II. NATIONAL CORE DATA RESULTS

Adult Life Jacket Wear Rates on Open Motorboats 2006 to 2012

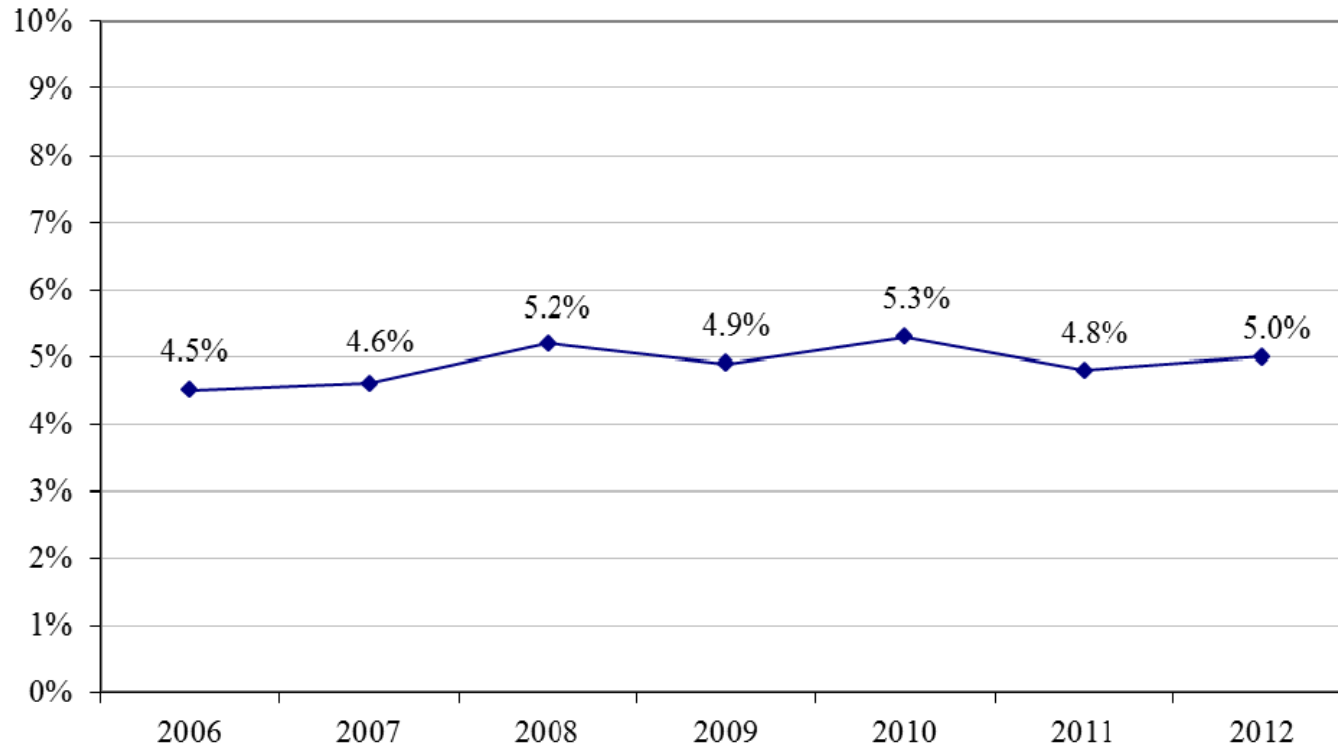
The National Boating Safety Advisory Council (NBSAC) recommended the creation of a strategic plan for the National Recreation Boating Safety Program in 2005. The goals, objectives, and strategies in this Plan can help all partners in boating safety work together to reduce the incidents of preventable deaths, injuries, and property damage. One of the objectives of the Strategic Plan is to increase the observed life jacket wear rate of adults in open motorboats. For the purposes of this measurement, “open motorboats” are a combination of the Skiff/Utility (hereafter as “skiffs”) and Runabout/Speedboat (hereafter as “speedboats”) categories that are individually presented later in this report. This objective was put in place beginning in 2006.

To ensure that comparisons to 2006 are valid, the proportion of skiffs to speedboats in each state for each subsequent year was set to mirror the proportions found in 2006. For example, in 2006 the national proportion across all states of the number of skiffs to the number of speedboats was 22% versus 78%, but in 2011 the proportions were 31% to 69%. If proportions of these boat categories were not adjusted, the 2011 combined wear rate would appear more positive simply because JSI observed more skiffs relative to speedboats this year than in 2006. Similarly, the proportions are likely to fluctuate each year in each state.

Weighting each state’s data to correspond to the 2006 state ratios, the wear rate for open motorboats in 2012 is 5.0%. (See Figure A for a chart showing these trends and also Table 2 on page 11.) This rate is up slightly from 2011 (4.8%).

Figure A – Adult Wear Rates on Open Motorboats* 2006-2012

(Weighted to 2006 Skiff-Speedboat Proportions for Each State)



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* The Open Motorboat category is created by grouping "Skiffs" and "Speedboat/Runabouts" together. Two factors are controlled for in this chart: Age (proportions of 18 to 64 and 65+ adults), and the proportion of Skiffs to Speedboat/Runabouts, which has been set each year within each state to reflect the proportions observed in 2006, the year in which the Strategic Plan goals were first measured. In addition, each state's contribution to the national average is weighted to reflect the 2006 proportions.

National Life Jacket Wear Rates for ALL Boaters 1999 to 2012

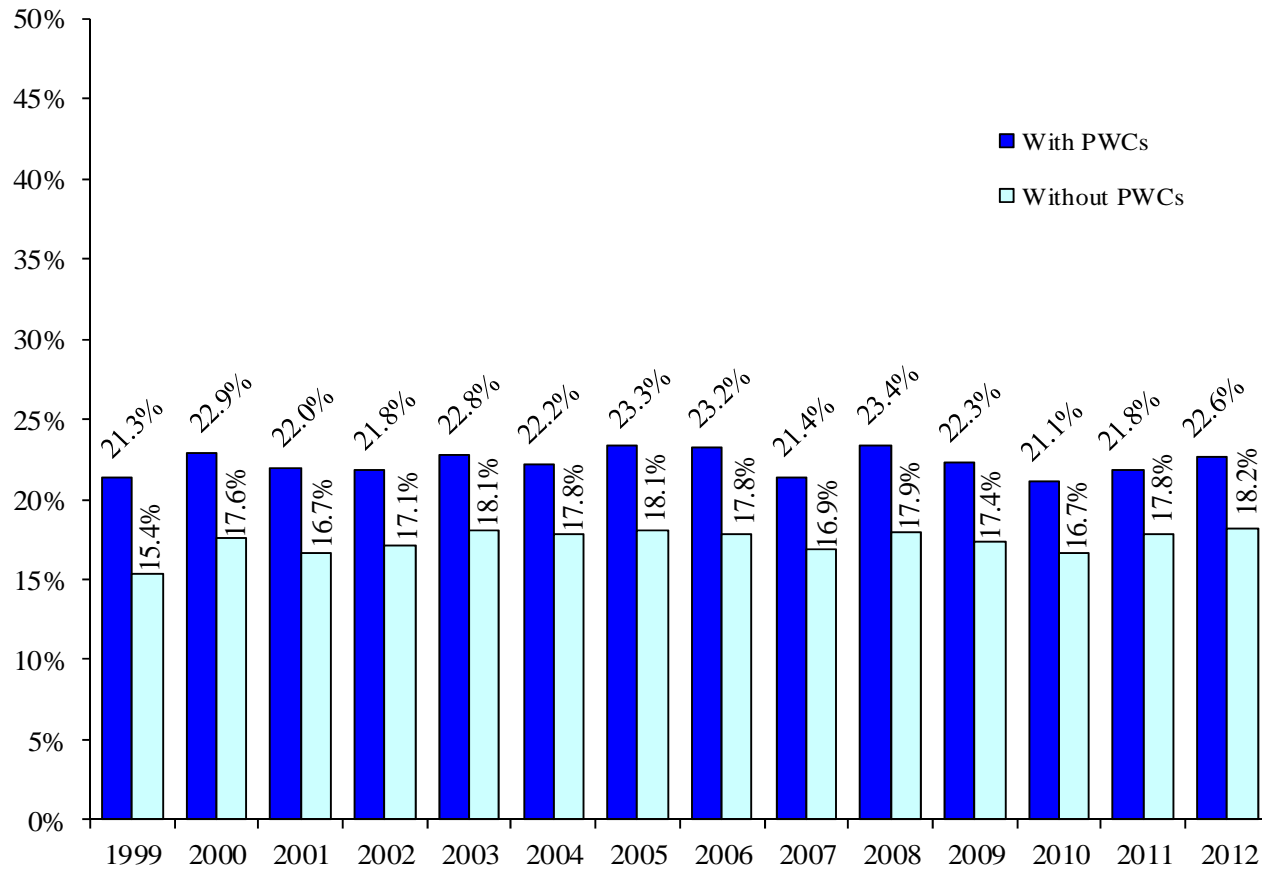
Figure B shows trends for national life jacket wear rates, including all groups of recreational boaters together (youth and adults) for two groups of boats - “all boats” and “all boats except PWCs”. The two sets of data present a clear indication of the impact of PWCs (Personal Watercraft) on the overall average wear rates. In subsequent tables in this report we remove PWCs from the findings since this will provide a more valid representation of the trends in voluntary wear rates, since life jacket wear is mandated for all operators and passengers of PWCs.

The average life jacket wear rate for all boats and boaters combined for 2012 was 22.6%, a small increase from 2011 (21.8%) which in turn was a small increase from 2010 (21.1%). So over the last three years there has been an increase of 1.5 percentage points for total wear rates.

The 2012 average wear rate excluding PWCs was 18.2% and also represents a three year upward trend from 2010 at 16.7% and 2011 at 17.8%. Again, the three year trend in wear rates shows an increase of 1.5 percentage points for youth and adults combined on all types of boats except PWCs.

As shown in the sections that follow, this increase in wear rates over this three year period is mostly due to increases in observed rates on paddlecraft.

Figure B – Life Jacket Wear Rates for ALL Boaters

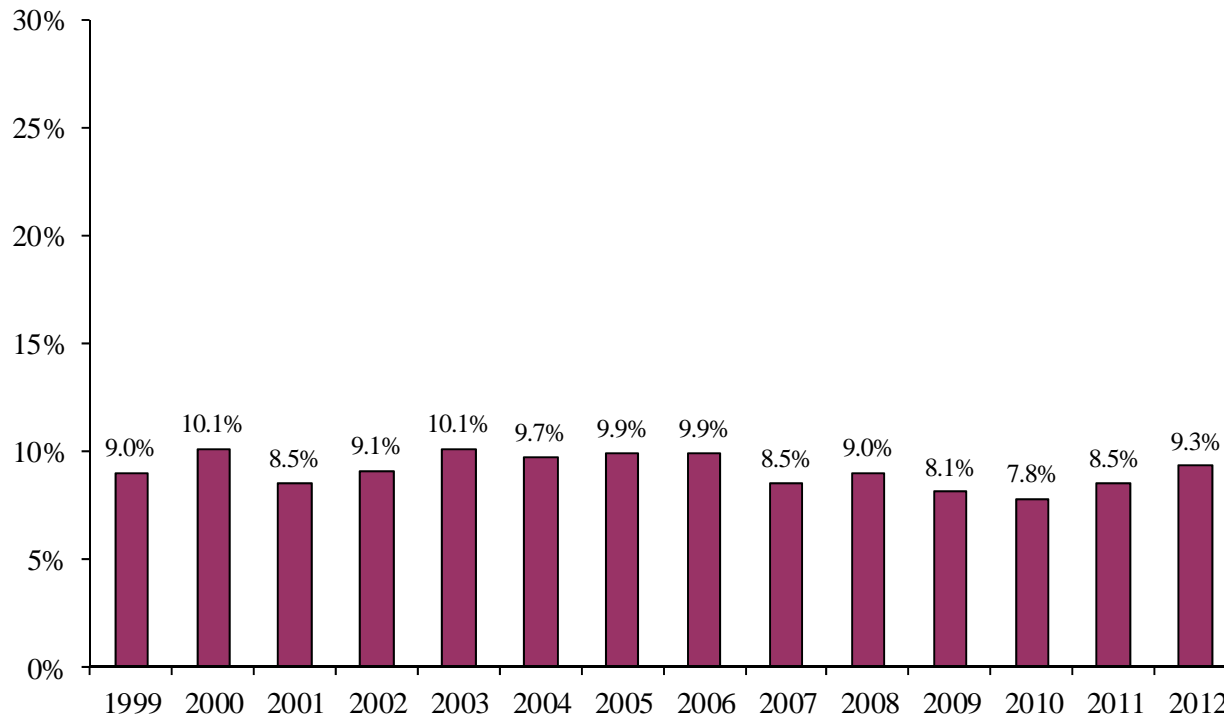


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*Factors controlled for: Age & Boat Type.

National Life Jacket Wear Rates for ADULTS (18 years or older) 1999 to 2012

The national average wear rate for all adults on all boats excluding PWCs in 2012 was 9.3%. This matches the increasing wear rates reported above for adults and youth combined, with a change from 7.8% in 2010, increasing to 8.5% in 2011 and increasing again to 9.3% in 2012, representing an increase of 1.5 percentage points (see Figure C and Table 1). Discussions for individual boat type wear rates later in this report will show that this increase is primarily due to higher wear rates on paddlecraft.

Figure C – Life Jacket Wear Among Adult Boaters*
(All boats except PWCs)



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*Factors controlled for: Age & Boat Type.

National Life Jacket Wear Rates for YOUTH (17 years or younger) 1999 to 2012

Figure D and Table 1 show the national wear rate trend for all youth (17 years or younger) on all boats except PWCs. These rates are relatively high across the fourteen years of data shown with a general upward trend (the last three years are the three highest rates). The rate for 2012 is 67.5%, the third highest rate since the beginning of the study.

Figure D – Life Jacket Wear Among Youth Boaters*
(All boats except PWCs)



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*Factors controlled for: Age & Boat Type.

Life Jacket Wear Rates by Age Categories 1999 to 2012

Table 1 presents wear rates by the different age categories used in the study.

Youth trends in all age groups showed small decreases from the historically highest rates observed in 2011. For the under 6 year olds rates dropped from 96.6% in 2011 to 94.7% in 2012; for those between 6 and 12 years of age rates dropped from 90.7% in 2011 to 84.9% and for teens (ages 13 to 17) rates dropped from 41.4% in 2011 to 37.6% in 2012. The overall youth rate declined from 70.7% in 2011 to 67.5% in 2012.

For adults ages 18 to 64, the 2012 data reflects a three year trend of increasing rates from 7.7% in 2010 to 9.2% in 2012. As we will see later in this report, this increase is related to increased wear rates on paddlecraft.

For adults 65 years of age and older, the 2012 data show wear rates of 11.8% up from 7.2% in 2011.

As previously indicated in Figure C and in Table 1, when both adult groups are combined (18+ years), there is an increase from 2010 (7.8%) to 2011 (8.5%) to 2012 (9.3%).

Table 2.1 – Life Jacket Wear Rates by Age Excluding Boaters on PWCs*

Age	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
0-5 yrs	80.6% (500)	89.1% (716)	91.7% (703)	90.1% (676)	90.3% (658)	94.9% (743)	93.1% (714)	94.4% (921)	92.2% (930)	93.5% (938)	93.6% (854)	94.8% (811)	96.6% (874)	94.7% (662)
6-12 yrs	69.1% (2104)	72.1% (2696)	76.6% (3122)	79.2% (2752)	79.7% (2627)	81.6% (27411)	80.6% (2487)	79.1% (2403)	84.1% (2819)	87.3% (2579)	86.5% (2812)	89.1% (2809)	90.7% (2381)	84.9% (2844)
13-17 yrs	24.1% (2244)	30.5% (2725)	31.2% (2893)	32.4% (2575)	32.0% (2767)	29.8% (2572)	32.8% (2230)	33.5% (2403)	31.5% (2652)	33.2% (2507)	38.9% (2420)	35.1% (2127)	41.4% (1817)	37.6% (2163)
0-17 yrs (all youth)	52.1% (4624)	55.6% (6094)	59.1% (6695)	60.0% (5924)	60.1% (5970)	60.6% (5955)	63.5% (5414)	60.4% (5713)	62.2% (6401)	64.5% (6024)	67.2% (6086)	67.7% (5747)	70.7% (5072)	67.5% (5669)
18-64 yrs	8.8% (24321)	10.1% (27100)	8.5% (32528)	9.2% (31742)	10.1% (28551)	9.7% (33319)	9.9% (30176)	10.0% (29591)	8.4% (32108)	9.1% (30743)	8.1% (34632)	7.7% (36420)	8.5% (33267)	9.2% (32298)
65+ yrs	12.9% (1147)	9.9% (1040)	6.9% (1276)	6.8% (922)	9.4% (1106)	8.3% (1331)	11.0% (823)	8.3% (803)	11.7% (881)	6.1% (1190)	7.0% (1129)	10.7% (763)	7.2% (951)	11.8% (1122)
18+ yrs (all adults)	9.0% (25468)	10.1% (28140)	8.5% (33804)	9.1% (32664)	10.1% (29657)	9.7% (34650)	9.9% (30999)	9.9% (30394)	8.5% (32989)	9.0% (31933)	8.1% (35761)	7.8% (37003)	8.5% (34218)	9.3% (33420)

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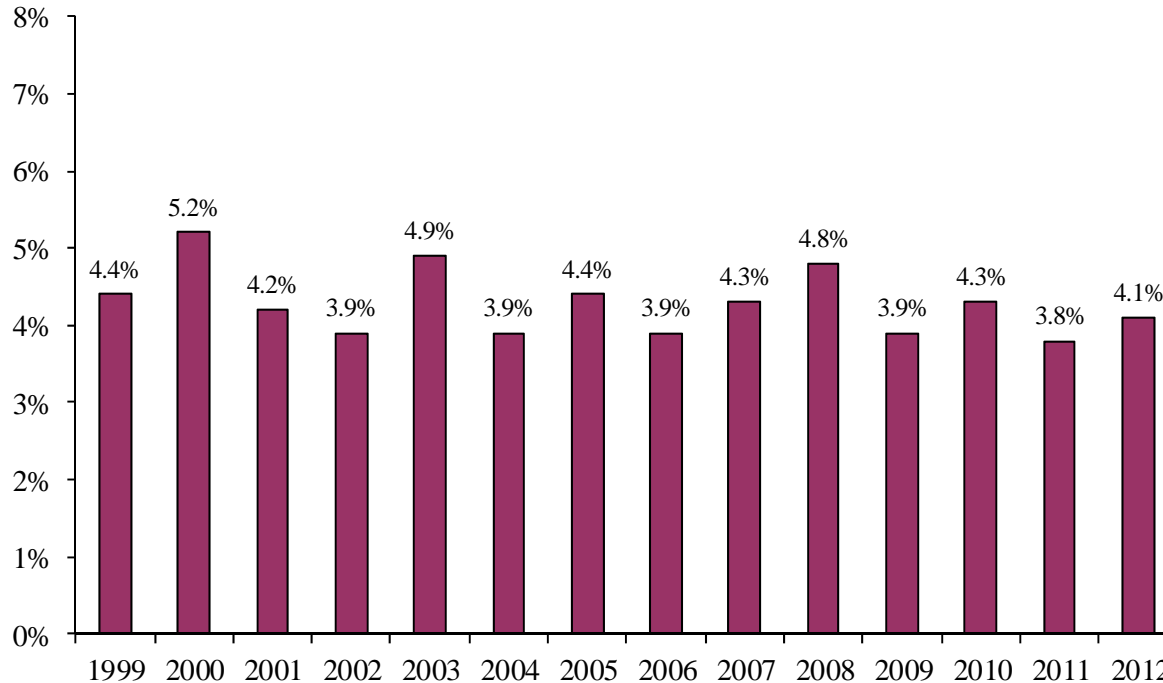
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*Factors controlled for: Age & Boat Type.

Powerboats for Adults (18 years or older)

Figure E and Table 2 present information for all powerboats for adults. Overall there is a decreasing trend since 1999. The 2012 rate for all powerboats is among the lowest it has been (4.1%); however it represents a small increase from the lowest point in 2011 (3.8%). The small shift in rates from 2011 to 2012 (3.8% increasing to 4.1%) is primarily driven by the 0.3% increase in wear rates for Runabouts/Speedboats since this is the dominant boat type for this age group. This also accounts for the small increase in the open motorboat rates described above. Also, there was a small increase among pontoon boat users. The slowly declining rates over the past decade or so are in part a reflection of a shift to larger powerboats over this same time period. In 2004, 34% of the powerboats observed were 21 feet or greater, whereas in 2011 48.1% were 21 feet or greater. Since longer powerboats have lower wear rates than shorter powerboats, this shift in length of boats observed over this time period contributes to the slight downward trend in wear rates for powerboats.

Figure E – Adult Wear Rates for ALL Powerboats Except PWCs*



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*Factors controlled for: Age & Boat Type

Table 2.2 - Life Jacket Wear Rates by Powerboats for Adults*

Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Powerboats (no PWC's)	4.4% (19894)	5.2% (22448)	4.2% (27864)	3.9% (26304)	4.9% (24190)	3.9% (28285)	4.4% (25741)	3.9% (25412)	4.3% (27623)	4.8% (27315)	3.9% (29924)	4.3% (30894)	3.8% (28954)	4.1% (27890)
Skiff/Utility	10.0% (1867)	10.3% (1903)	9.7% (2469)	5.9% (3177)	10.4% (4214)	7.9% (4429)	7.2% (5038)	7.3% (4091)	8.5% (5340)	9.2% (6633)	6.9% (7257)	9.7% (6634)	8.2% (6530)	7.8% (6936)
Runabout/Speedboat	4.2% (13195)	5.3% (14463)	4.5% (16985)	4.3% (14066)	4.6% (13057)	3.9% (16633)	4.7% (13643)	3.7% (14512)	3.6% (14414)	4.1% (13901)	3.5% (14635)	3.2% (15093)	3.0% (14381)	3.3% (13441)
Open Motorboats** (Skiff/Utility+ Runabout/Speedboat)	5.5% (15062)	6.4% (16366)	5.6% (19454)	4.7% (17243)	5.9% (17271)	4.8% (21052)	5.3% (18681)	4.5% (18603)	4.6% (19754)	5.2% (20534)	4.9% (21892)	5.3% (21727)	4.8% (20911)	5.0% (20377)
Cabin Cruiser	1.8% (3396)	1.6% (4391)	1.2% (6222)	1.9% (7111)	1.7% (5119)	1.0% (5242)	1.1% (5054)	1.7% (4280)	2.0% (5353)	1.4% (4430)	1.6% (5342)	1.5% (5900)	1.6% (5085)	1.6% (4611)
Houseboat	0.0% (151)	0.0% (216)	0.6% (162)	0.8% (124)	0.0% (328)	5.6% (216)	0.4% (219)	0.0% (112)	0.0% (43)	0.0% (51)	0.0% (31)	0.0% (140)	1.2% (309)	0.0% (18)
Pontoon	4.0% (1231)	6.2% (1458)	1.9% (1929)	2.7% (1796)	2.9% (1610)	2.9% (1770)	4.1% (1849)	2.4% (2276)	2.7% (2150)	1.1% (2051)	2.1% (2436)	1.5% (2922)	1.4% (2734)	2.3% (2624)
PWC	94.2% (1899)	97.4% (1761)	96.0% (2091)	95.8% (1798)	94.7% (1589)	95.5% (1721)	95.3% (1858)	97.1% (1962)	96.1% (1736)	97.6% (2009)	97.4% (2093)	97.5% (1921)	97.7% (1524)	96.9% (1811)
Powered Inflatable/Raft	15.7% (205)	22.3% (233)	13.5% (259)	27.2% (154)	14.8% (190)	9.0% (211)	1.9% (157)	11.0% (253)	19.1% (366)	17.6% (228)	11.9% (254)	16.7% (345)	14.3% (224)	14.1% (278)

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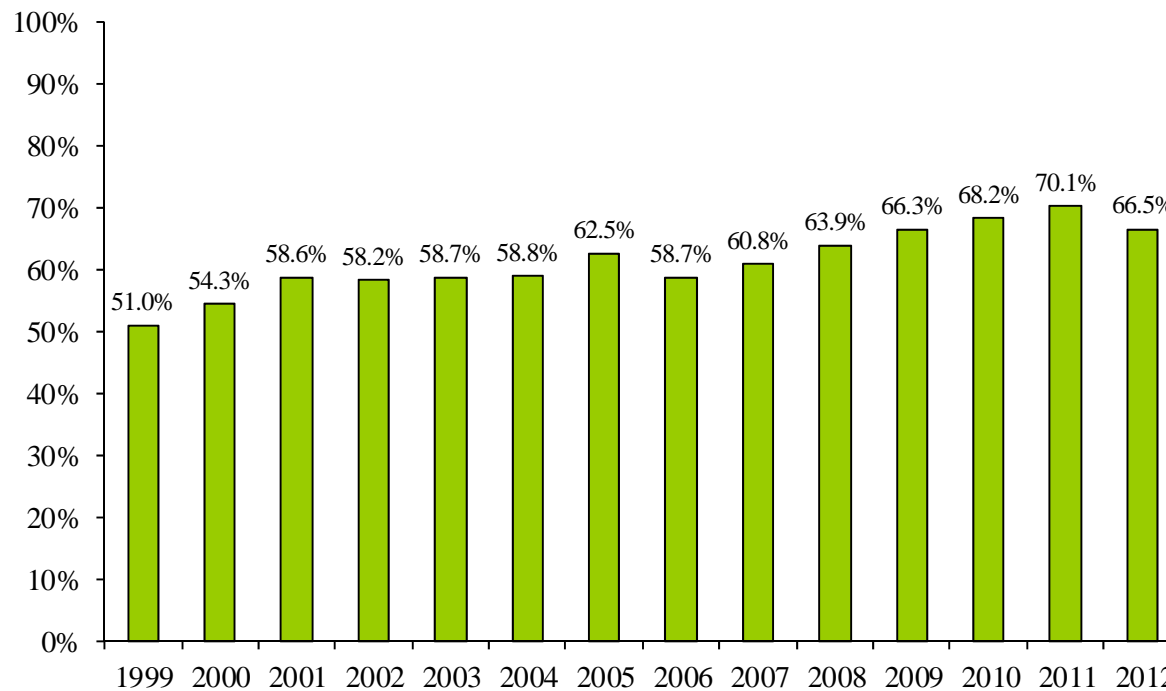
*Factors controlled for: Age & Boat Type.

** The Open Motorboat category is created by grouping "Skiffs" and "Speedboat/Runabouts" together. Factors controlled for in this line of the chart are Age (proportions of 18 to 64 and 65+ adults) and the proportion of Skiffs to Speedboat/Runabouts has been set in each year within each state to reflect the proportions observed in 2006, the year in which the Strategic Plan goals were first measured. In addition, each state's contribution to the national average is weighted to reflect the 2006 proportions.

Powerboats for Youth (17 years or younger)

Figure F and Table 3 present data for all powerboats for the three age groups of youth combined (17 years or younger). In contrast to the adult trends, wear rates for youth are generally increasing with the overall rate for powerboats in 2012 being among the highest it has been (66.5%), down somewhat from the highest rate in 2011 of 70.1%. This drop-off in 2012 is primarily due to a drop in the Skiff wear rate for youths which went from 75.4% to 65.1%. Skiffs are the third most popular boat type in which youth are found and involve about 20% of the youth boaters.

Figure F – Youth Wear Rates for ALL Powerboats Except PWCs*



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*Factors controlled for: Age & Boat Type.

Table 2.3 – Life Jacket Wear Rates by Powerboats for Youth*

Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Powerboats (no PWCs)	51.0% (3834)	54.3% (5179)	58.6% (5717)	58.2% (5162)	58.7% (5170)	58.8% (5191)	62.5% (4737)	58.7% (5043)	60.8% (5583)	63.9% (5257)	66.3% (5451)	68.2% (5090)	70.1% (4589)	66.5% (4846)
Skiff/Utility	52.7% (338)	49.5% (369)	68.2% (441)	54.9% (557)	63.2% (768)	60.7% (641)	63.3% (781)	58.4% (661)	63.1% (947)	68.4% (988)	70.4% (1097)	68.1% (862)	75.4% (929)	65.1% (1022)
Runabout/Speedboat	51.6% (2744)	55.2% (3776)	58.8% (3987)	59.4% (3479)	60.0% (3369)	60.0% (3574)	63.5% (2966)	60.9% (3348)	61.7% (3517)	64.6% (3256)	68.2% (3133)	69.7% (2943)	71.0% (2624)	69.9% (2744)
Open Motorboats** (Skiff/Utility+ Runabout/Speedboat)	51.8% (3082)	54.3% (4145)	60.1% (4428)	58.7% (4036)	60.5% (4137)	60.1% (4215)	63.5% (3747)	60.5% (4009)	61.9% (4464)	65.2% (4244)	68.6% (4230)	69.5% (3805)	71.6% (3553)	69.1% (3766)
Cabin Cruiser	42.6% (418)	48.2% (587)	48.3% (774)	50.7% (690)	45.3% (659)	49.6% (529)	54.6% (528)	50.7% (501)	52.0% (639)	51.0% (581)	51.2% (644)	58.8% (524)	61.6% (507)	50.6% (465)
Houseboat	8.7% (46)	12.7% (64)	25.7% (44)	30.3% (30)	17.8% (63)	24.7% (35)	12.9% (38)	28.2% (40)	37.6% (5)	0.0% (1)	25.8% (4)	19.1% (18)	39.9% (19)	6.9% (3)
Pontoon	38.3% (272)	46.3% (379)	54.8% (455)	55.6% (399)	51.8% (338)	48.5% (394)	64.6% (440)	50.3% (505)	64.1% (414)	65.9% (392)	66.2% (530)	68.4% (716)	65.7% (494)	67.3% (580)
PWC	96.0% (551)	99.1% (649)	99.1% (691)	98.8% (502)	98.0% (562)	98.5% (543)	98.3% (652)	99.2% (580)	98.7% (522)	99.4% (664)	98.6% (572)	99.4% (427)	99.1% (376)	98.7% (401)
Powered Inflatable/Raft	59.3% (62)	69.7% (68)	79.5% (60)	72.8% (37)	66.8% (36)	65.8% (53)	71.2% (22)	70.6% (28)	71.1% (66)	79.7% (39)	70.3% (47)	78.2% (45)	73.1% (35)	58.5% (35)

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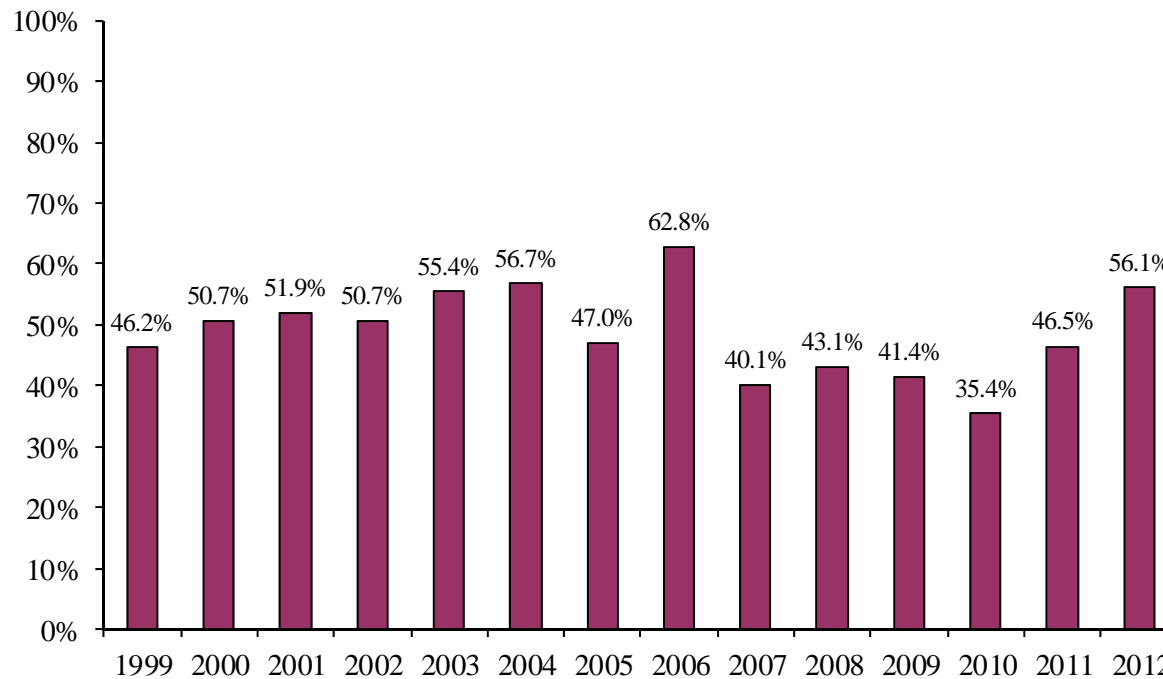
*Factors controlled for: Age & Boat Type.

** The Open Motorboat category is created by grouping "Skiffs" and "Speedboat/Runabouts" together. The proportion of Skiffs to Speedboat/Runabouts has been set to reflect the national proportions observed in 2006, the year in which the Strategic Plan goals were first measured and in addition we control for age of youth as we do for the other boat types in this table.

All Paddlecraft for Adults (18 years or older)

Figure G and Table 4 present results for adults in all paddlecraft. The rates for all paddlecraft combined increased noticeably from last year's rate (46.5% to 56.1%), continuing a trend of increasing wear rates between 2010 (35.4%) and 2012 (56.1%). These changes in rates should be viewed with caution since paddlecraft activity is mostly observed at only a few sites (Washington, Oklahoma, Maine, Utah) and therefore the overall averages can be highly influenced by local factors such as weather or special events at these sites.

Figure G – Adult Wear Rates for ALL Paddlecraft*



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*Factors controlled for: Age & Boat Type.

Table 2.4 – Life Jacket Wear Rates by Paddlecraft for Adults*

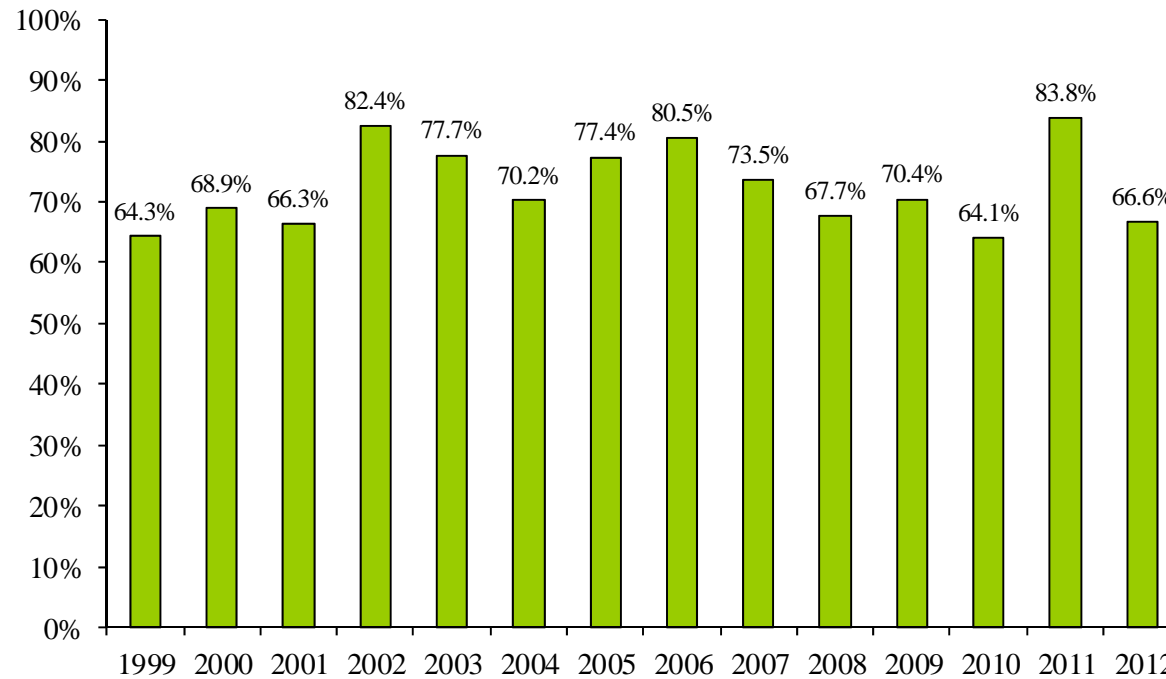
Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Paddlecraft	46.2% (1676)	50.7% (1676)	51.9% (1816)	50.7% (1864)	55.4% (1672)	56.7% (1637)	47.0% (1616)	62.8% (1456)	40.1% (2065)	43.1% (1523)	41.4% (1939)	35.4% (2551)	46.5% (1608)	56.1% (2014)
Paddled Inflatable/Raft	71.8% (174)	13.0% (198)	65.1% (250)	65.6% (307)	60.5% (290)	57.8% (283)	76.0% (225)	77.8% (308)	23.9% (526)	38.4% (311)	8.2% (340)	6.9% (813)	10.9% (324)	39.4% (485)
Rowboat/Dinghy	24.4% (82)	37.2% (118)	18.7% (119)	27.3% (193)	22.8% (117)	10.1% (38)	59.2% (71)	26.7% (78)	15.0% (92)	23.0% (65)	35.3% (51)	34.8% (46)	34.3% (87)	60.2% (35)
Canoe	17.7% (809)	33.8% (714)	23.6% (750)	15.4% (701)	30.4% (607)	26.7% (622)	14.8% (679)	29.2% (364)	19.4% (764)	19.7% (481)	25.0% (758)	19.1% (994)	37.4% (386)	32.7% (438)
Kayak	82.7% (611)	85.7% (646)	84.4% (697)	85.7% (663)	81.4% (658)	87.0% (694)	74.1% (675)	77.9% (706)	72.0% (683)	65.5% (648)	72.6% (790)	75.9% (698)	68.6% (811)	74.9% (1056)
Canoe/Kayak Combined	45.9% (1420)	58.6% (1360)	53.1% (1447)	49.7% (1364)	56.8% (1265)	58.6% (1316)	44.4% (1354)	61.2% (1070)	44.3% (1447)	46.0% (1129)	49.1% (1548)	47.3% (1692)	49.4% (1197)	52.8% (1494)

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 *Factors controlled for: Age & Boat Type.

All Paddlecraft for Youth (17 years or younger)

Figure H and Table 5 present results for youth in paddlecraft. Data in this table should be viewed cautiously because of the relatively small number of youth who use these types of craft. For all paddlecraft combined, wear rates have fluctuated across the years. In 2012, rates dipped to 66.6% which are down from the high rate of 83.8% observed in 2011.

Figure H – Youth Wear Rates for ALL Paddlecraft*



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*Factors controlled for: Age & Boat Type.

Table 2.5 – Life Jacket Wear Rates by Paddlecraft for Youth*

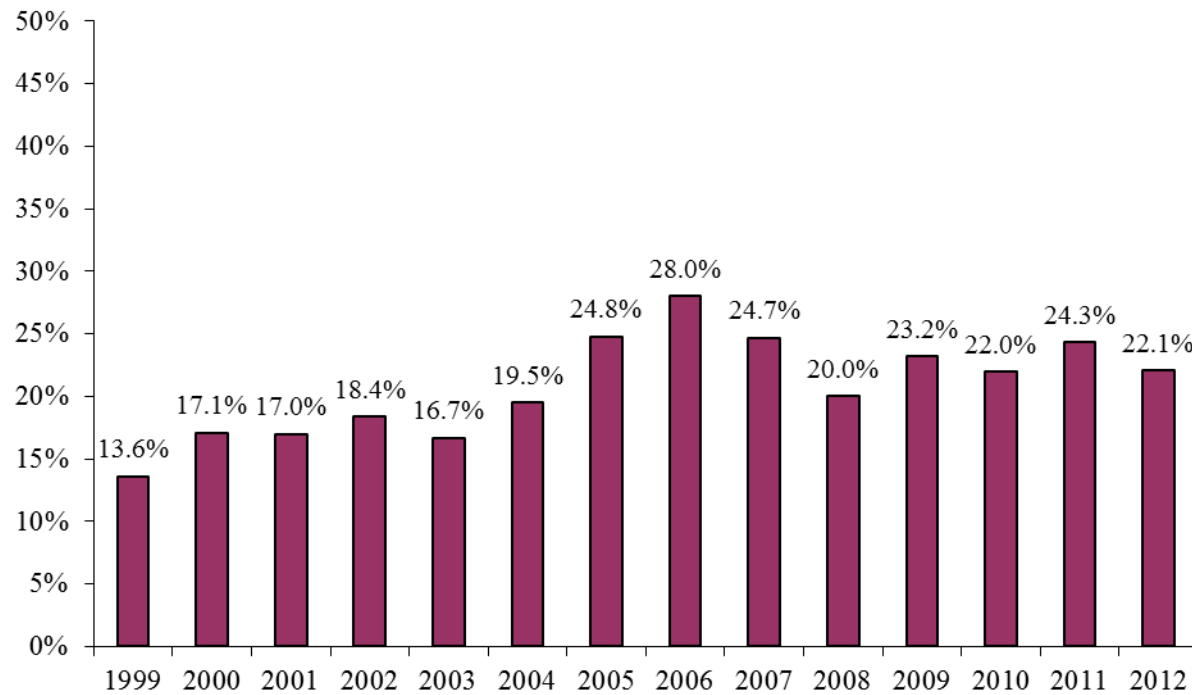
Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Paddlecraft	64.3% (317)	68.9% (457)	66.3% (457)	82.4% (312)	77.7% (372)	70.2% (360)	77.4% (281)	80.5% (225)	73.5% (520)	67.7% (492)	70.4% (319)	64.1% (419)	83.8% (231)	66.6% (476)
Paddled Inflatable/Raft	62.4% (82)	45.8% (124)	52.3% (153)	90.3% (136)	68.9% (113)	68.4% (118)	77.5% (79)	77.9% (87)	58.4% (244)	55.6% (218)	59.0% (76)	41.9% (139)	68.5% (49)	50.2% (192)
Rowboat/Dinghy	11.1% (9)	47.1% (15)	60.3% (32)	54.7% (31)	88.6% (21)	58.0% (11)	77.1% (17)	67.3% (26)	61.0% (21)	77.8% (25)	91.1% (9)	98.0% (14)	94.0% (15)	88.0% (10)
Canoe	57.7% (142)	74.6% (222)	62.4% (181)	71.1% (98)	75.0% (130)	60.3% (146)	69.4% (101)	68.9% (49)	81.0% (123)	78.0% (158)	70.6% (132)	68.0% (169)	95.2% (82)	66.5% (89)
Kayak	83.3% (84)	89.2% (96)	94.3% (91)	83.7% (47)	91.6% (108)	91.2% (85)	88.7% (94)	89.0% (63)	90.1% (132)	83.5% (86)	85.3% (102)	85.4% (97)	89.3% (85)	84.8% (185)
Canoe/Kayak Combined	67.3% (226)	78.9% (318)	73.1% (272)	74.5% (145)	82.9% (238)	71.3% (231)	79.6% (195)	82.2% (112)	85.7% (255)	80.0% (244)	76.0% (234)	75.1% (266)	88.8% (167)	74.6% (274)

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 *Factors controlled for: Age & Boat Type.

Sail Craft for Adults (18 years or older)

Figure I and Table 6 document observations of adults in sail craft. For all sail craft combined, there was a decrease in wear rate from 24.3% in 2011 to 22.1% in 2012. Over this period, all categories of sail craft saw a decrease in wear rates for adults, returning to levels similar to 2010.

Figure I – Adult Wear Rates for ALL Sail Craft*



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*Factors controlled for: Age & Boat Type.

Table 2.6 – Life Jacket Wear Rates by Sail Craft for Adults*

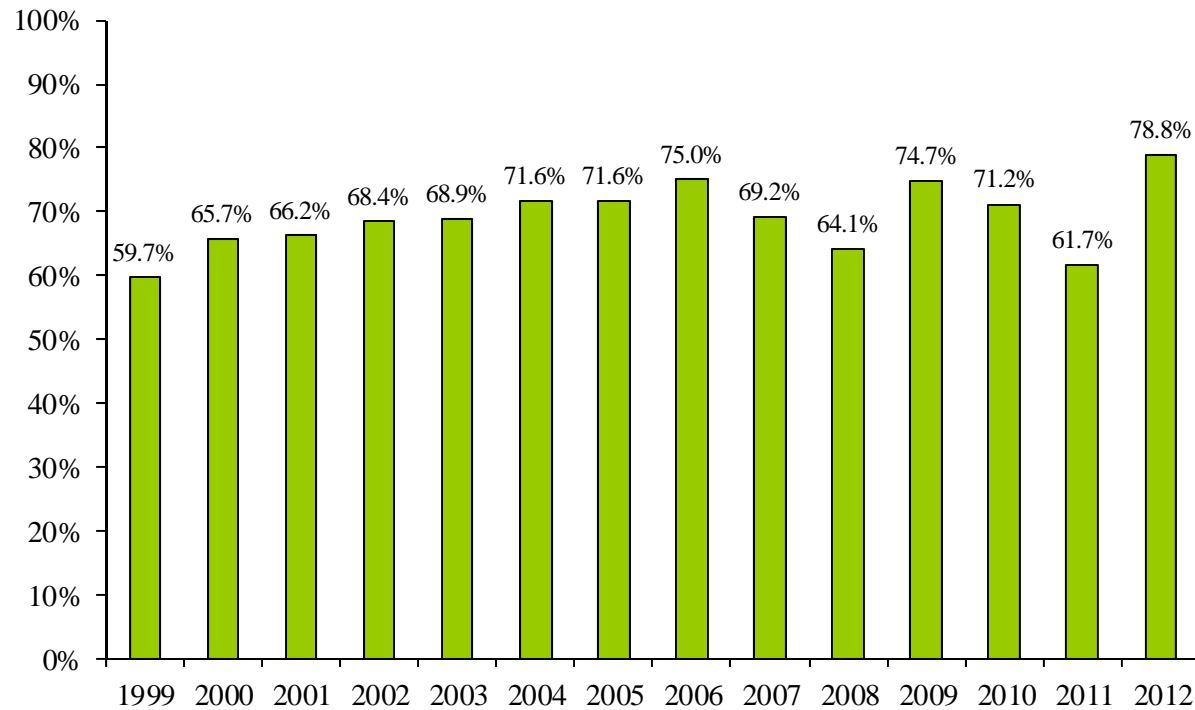
Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Sail Craft	13.6% (3420)	17.1% (3565)	17.0% (3843)	18.4% (4087)	16.7% (3149)	19.5% (4149)	24.8% (3084)	28.0% (3279)	24.7% (3217)	20.0% (3079)	23.2% (3733)	22.0% (3336)	24.3% (3231)	22.1% (3297)
Sailboard	16.4% (46)	94.0% (30)	80.6% (15)	83.2% (55)	96.7% (27)	92.9% (40)	53.0% (20)	92.1% (12)	83.7% (18)	94.6% (17)	71.9% (7)	83.2% (29)	100% (9)	93.3% (14)
Day Sailor	30.7% (739)	35.6% (791)	37.9% (604)	46.7% (1124)	38.4% (815)	49.7% (984)	56.4% (736)	59.1% (607)	50.4% (397)	48.3% (649)	61.7% (652)	57.5% (731)	61.3% (736)	54.0% (682)
Cabin Sailboat	9.1% (2635)	11.3% (2744)	10.2% (3224)	9.5% (2908)	10.2% (2307)	10.1% (3125)	15.4% (2328)	19.1% (2660)	17.1% (2802)	12.0% (2413)	13.0% (3074)	11.7% (2576)	13.4% (2486)	12.9% (2601)

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 *Factors controlled for: Age & Boat Type.

Sail Craft for Youth (17 years or younger)

Figure J and Table 7 show that, in contrast to adult rates, the national average wear rates on all sail craft for all youth rose to the highest rates ever observed for this category (from 61.7% in 2011 to 78.8% in 2012). Wear rates went up for both day sailors and cabin sailboats in 2012. However, relatively few youth are found on any type of sail craft and, therefore, fluctuations in rates should be interpreted with caution.

Figure J – Youth Wear Rates for ALL Sail Craft*



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*Factors controlled for: Age & Boat Type.

Table 2.7 – Life Jacket Wear Rates by Sail Craft for Youth*

Boat Type	1999 % (N's)	2000 % (N's)	2001 % (N's)	2002 % (N's)	2003 % (N's)	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)
All Sail Craft	59.7% (347)	65.7% (329)	66.2% (424)	68.4% (381)	68.9% (323)	71.6% (323)	71.6% (327)	75.0% (371)	69.2% (270)	64.1% (274)	74.7% (305)	71.2% (202)	61.7% (219)	78.8% (313)
Sailboard	0.0% (3)	100% (7)	66.7% (6)	75.0% (4)	-- (0)	92.1% (48)	100% (1)	100% (4)	82.2% (8)	-- (0)	-- (0)	100% (1)	-- (0)	100% (1)
Day Sailor	71.1% (114)	81.6% (81)	92.0% (85)	82.1% (113)	84.3% (107)	87.5% (83)	73.4% (67)	93.2% (122)	86.5% (54)	88.0% (75)	92.5% (80)	85.2% (86)	80.2% (57)	98.2% (166)
Cabin Sailboat	58.3% (230)	61.5% (241)	58.2% (333)	63.5% (264)	60.6% (216)	68.3% (192)	69.4% (259)	65.7% (245)	62.4% (208)	56.4% (196)	66.4% (225)	65.9% (115)	54.9% (162)	60.3% (146)

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 *Factors controlled for: Age & Boat Type.

Boat Type and Size for Adults (18 years or older)

Table 8 shows the breakdown of adult wear rates by boat size for three general categories of boats: powerboats, sailboats, and paddlecraft. Data are presented only for 2004 to 2012, since 2004 was the first year that observations were divided into two size categories as 16 to 21 feet and 21 to 26 feet, from one category, 16 to 26 feet.

As might be expected, wear rates and boat size show a dependent relationship: wear rates decrease as size of the boat increases. However, the general level of wear is also highly influenced by the type of craft. Powerboat wear rates range from a nine year average of 8.5% for boats less than 16 feet to 1.5% for boats over 26 feet in length. For sailboats, the nine year average goes from 73.1% for sailboats less than 16 feet to 11.0% for sailboats over 26 feet in length. For paddlecraft, the nine year average for boats less than 16 feet is 50.5% and for boats in the 16 to 21 foot category it is 44.2%.

One interesting point to note (although not shown directly in Table 8) in the powerboat category: there is a shift in the proportion of boats over 21 feet from 34% in 2004 to 48% in 2011. This shift may contribute to a gradual decrease in wear rates among powerboaters across this time period because wear rates are lower on longer powerboats compared to shorter powerboats.

**Table 2.8 – Life Jacket Wear Rates by Boat Type and Size for Adults*
2004 to 2012**

Boat Type and Size	2004 % (N's)	2005 % (N's)	2006 % (N's)	2007 % (N's)	2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	Total % (N's)
Powerboats										
<16 ft.	8.2% (2320)	7.6% (2734)	7.1% (3395)	8.7% (2173)	7.6% (1862)	8.5% (1824)	11.5% (2764)	8.4% (2183)	9.3% (1599)	8.5% (20854)
16-20.9 ft.	4.7% (16298)	5.1% (14629)	4.4% (11778)	4.9% (13034)	6.1% (12586)	5.0% (13125)	5.0% (13944)	5.2% (13255)	5.1% (12898)	5.0% (121547)
21-25.9 ft.	2.4% (6218)	3.2% (5503)	2.4% (6957)	3.7% (8634)	3.4% (9127)	2.3% (10420)	2.4% (9713)	2.0% (8718)	2.7% (9389)	2.8% (74679)
26+ ft.	0.8% (3407)	1.4% (2865)	1.6% (3268)	1.5% (3782)	1.5% (3650)	1.8% (4546)	1.3% (4473)	1.3% (4798)	2.0% (4004)	1.5% (34793)
Sailboats										
<16 ft.	75.0% (481)	74.0% (376)	79.7% (265)	67.6% (77)	73.2% (163)	70.2% (247)	65.5% (299)	74.6% (160)	74.2% (194)	73.1% (2262)
16-20.9 ft.	34.2% (357)	41.9% (312)	57.7% (609)	51.8% (193)	46.8% (370)	58.0% (157)	57.4% (346)	63.8% (390)	48.6% (379)	51.9% (3113)
21-25.9 ft.	12.2% (1428)	24.1% (1527)	21.0% (793)	25.5% (797)	14.0% (911)	21.5% (949)	16.7% (766)	27.5% (846)	24.3% (989)	20.6% (9006)
26+ ft.	9.9% (1864)	3.2% (875)	11.5% (1614)	15.2% (2148)	11.6% (1629)	13.1% (2380)	11.0% (1925)	9.6% (1835)	8.3% (1735)	11.0% (16005)
Paddle Boats										
<16 ft.	60.4% (1056)	68.4% (1012)	70.6% (1147)	44.8% (1306)	38.2% (1319)	42.7% (1296)	38.0% (1953)	42.6% (1021)	57.2% (1647)	50.5% (11761)
16-20.9 ft.	49.4% (531)	11.1% (488)	53.0% (171)	35.7% (672)	67.9% (180)	64.4% (347)	42.0% (331)	53.2% (587)	47.3% (367)	44.2% (3674)

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*Factors controlled for: Age & Boat Type.

III. CHANGES IN INFLATABLE LIFE JACKET USE

Changes in Inflatable Life Jacket Use for All Adult Boaters

In 2002 a change was made to the observation procedures to distinguish between wearing an inflatable life jacket or a traditional type of life jacket. In this section we examine whether the use of inflatable life jackets increased across time, and if so, are inflatables contributing to an increase in life jacket use overall?

Charts J1 and J2, indicate the differences in inflatable use for two periods of time—2002 to 2006 and 2007 to 2012. Chart J1 shows the absolute percent of all adult boaters (minus PWCs and in-the-water towed boaters) wearing either traditional style life jackets or the inflatable style. Chart J2 is limited to only those boaters wearing any type of life jacket and indicates the proportion of life jacket users who are wearing either traditional or inflatable styles.

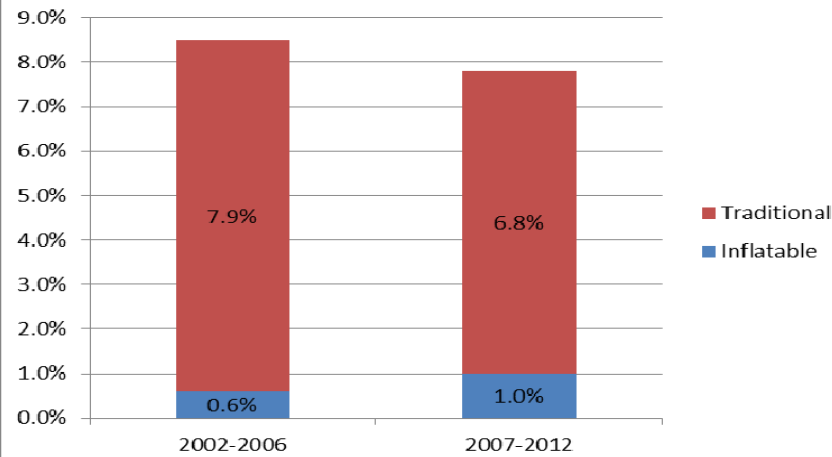
For all boaters, the absolute percent wearing inflatable life jackets has increased from 0.6% to 1.0% over the two time periods. At the same time, traditional life jacket wear rates have declined by a larger amount (7.9% decreasing to 6.8% or a decrease of 1.1%). Even though inflatable use almost doubled across all boaters, it was not enough of an increase to raise the total rate of life jacket wear. Overall it seems that the increase of inflatable life jacket use to date is essentially a “substitution” for traditional life jackets, rather than a mechanism for increasing overall wear rates.

Chart J2 shows more clearly the increase in the proportion of life jacket users choosing an inflatable style. In the 2002-2006 period, 6.9% of the users were wearing inflatables, and this rate increases to 12.9% in the 2007 to 2012 period.

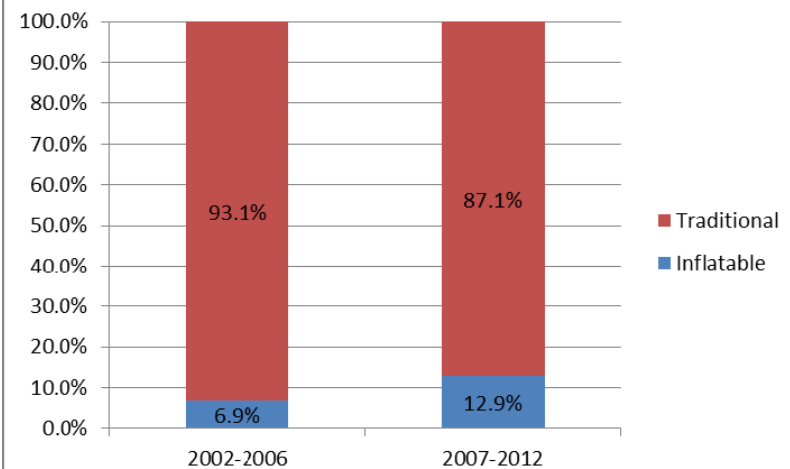
Charts in this section show changes in the use of inflatable styles for specific types of boats that have a sizeable absolute number of inflatable life jacket users or proportion of all users---skiffs, speedboats, cabin sailboats, and cabin cruisers.

The data and summaries that follow show increases in inflatable use account for increases in overall wear rates for boaters on skiffs and cabin sailboats but not on cabin cruisers or speedboat/runabouts.

J1. Comparison of Types of Life Jacket Use on All Boats (minus PWCs) 2002-2006 versus 2007-2012



J2. Proportional Comparisons of Types of Life Jacket Use on All Boats (minus PWCs) among Life Jacket Users 2002-2006 versus 2007-2012



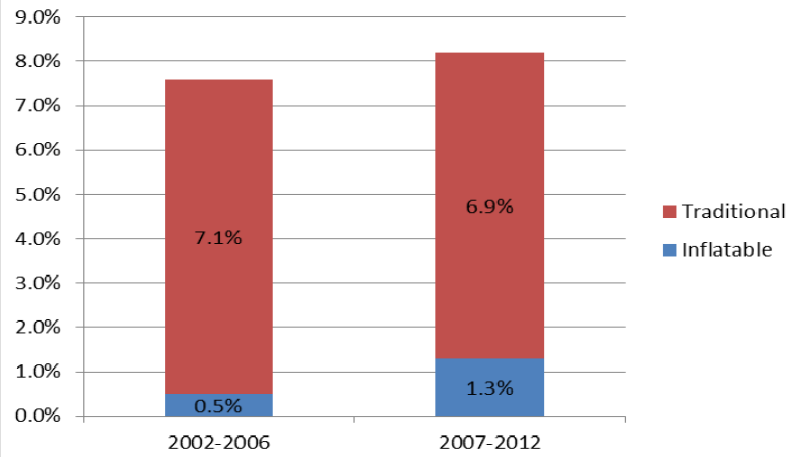
Changes in Inflatable Life Jacket Use for Boaters on Skiffs

Inflatable and traditional style life jacket use is shown for skiffs in charts J3 and J4. Over the two time periods, the rate of use of traditional life jackets stayed the nearly the same at 7.1% and 6.9% respectively. However, inflatable life jacket use increased in absolute wear rates from 0.5% to 1.3%, almost a tripling of use. In contrast to the findings for all boaters, inflatable life jacket use for boaters on skiffs seems to have contributed to an absolute increase in wear rates.

Chart J4 shows the relative increase moving from 7.2% of users in the 2002 to 2006 time period to 16.1% of users in the 2007 to 2012 time period. Although not shown in graphical form in this report, for those boaters on skiffs who are involved in fishing or intent to fish during the 2007 to 2012 time period, the proportion of life jacket users who are wearing inflatable styles increases to 21.8%

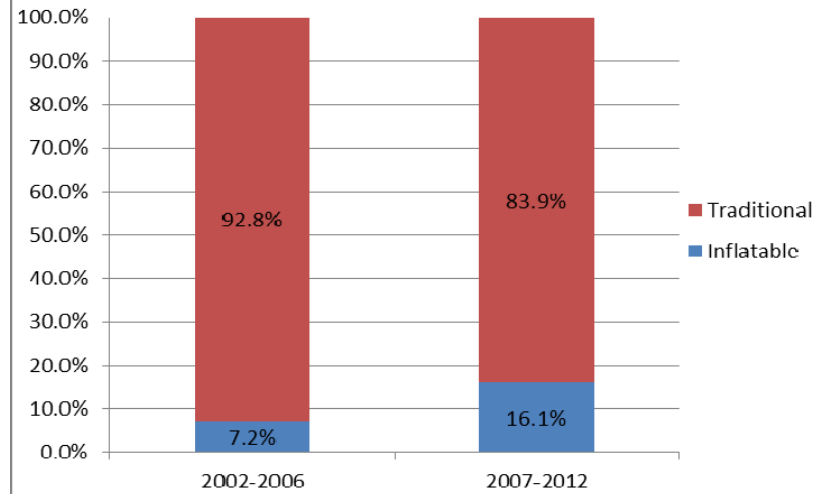
J3. Comparison of Types of Life Jacket Use on Skiffs

2002-2006 versus 2007-2012



J4. Proportional Comparisons of Types of Life Jacket Use on Skiffs among Life Jacket Users

2002-2006 versus 2007-2012

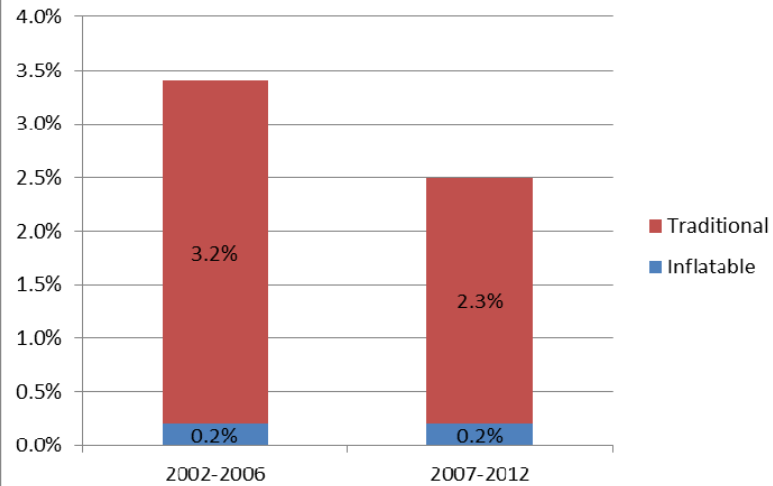


Changes in Inflatable Life Jacket Use for Boaters on Speedboats/Runabouts

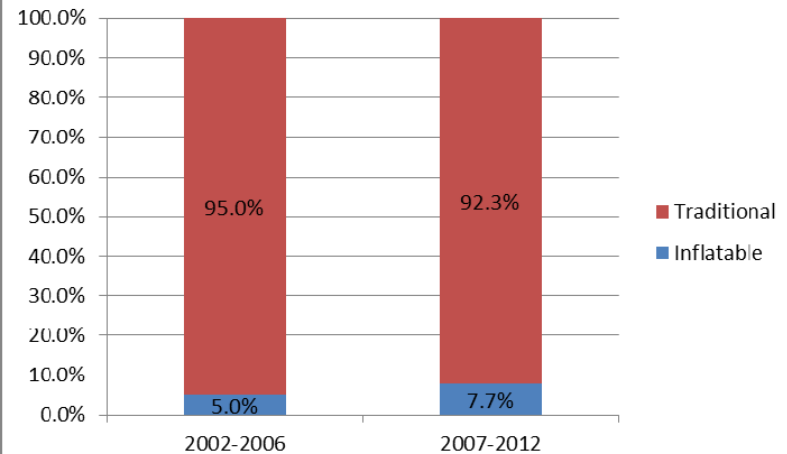
Inflatable and traditional style life jacket use is shown for speedboats/runabouts in charts J5 and J6. Over the two time periods, the rate of use of traditional life jackets actually decreases from 3.2% to 2.3% (as discussed earlier, some of this is due to a proportional shifting of boaters to larger sized craft). However, inflatable life jacket use stayed the same in these two periods with an absolute wear rate of 0.2%.

Chart J6 shows the relative increase moving from 5.0% of users in the 2002 to 2006 time period to 7.7% of users in the 2007 to 2012 time period. Although not shown in graphical form in this report, for those boaters on speedboats/runabouts who are involved in fishing or intent to fish during the 2007 to 2011 time period, the proportion of life jacket users who are wearing inflatable styles increases to 19.4%.

J5. Comparison of Types of Life Jacket Use on Speedboats/Runabouts 2002-2006 versus 2007-2012



J6. Proportional Comparisons of Types of Life Jacket Use on Speedboats/Runabouts among Life Jacket Users 2002-2006 versus 2007-2012

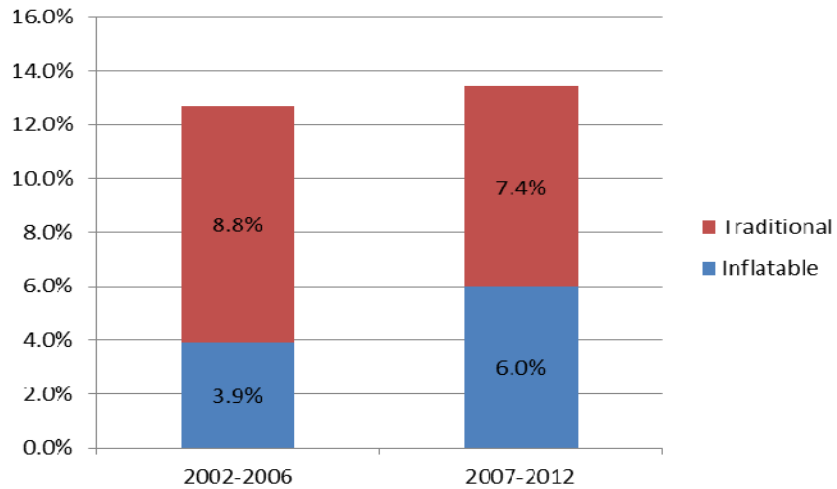


Changes in Inflatable Life Jacket Use for Boaters on Cabin Sailboats

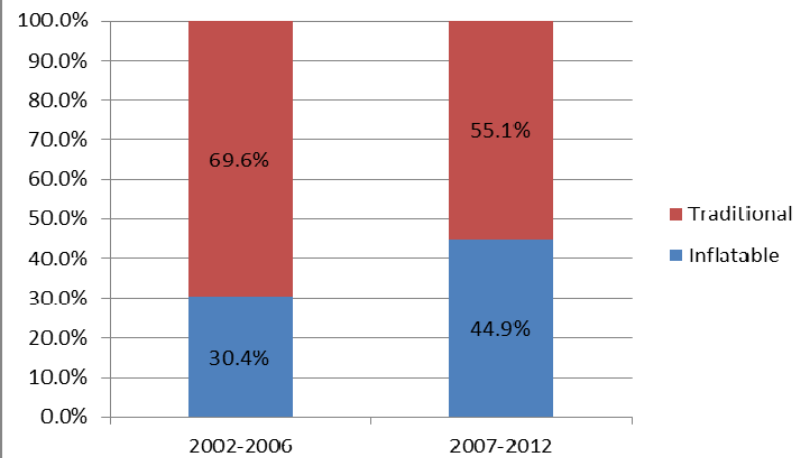
Inflatable and traditional style life jacket use is shown for cabin sailboats in charts J7 and J8. Over the two time periods, the rate of use of any life jacket increases from 12.7% to 13.4%. However, traditional life jacket use actually decreases across these two time periods from 8.8% to 7.4%. On the other hand, inflatable life jacket use increased substantially from 3.9% to 6.0%. This means that about half of the increase in inflatable use was the substitution of traditional life jacket wear and the other half represents an increase in overall wearing behaviors.

Chart J8 shows the relative increase moving from 30.4% of users in the 2002 to 2006 time period to 44.9% of users in the 2007 to 2012 time period.

**J7. Comparison of Types of Life Jacket Use on Cabin Sailboats
2002-2006 versus 2007-2012**



**J8. Proportional Comparisons of Types of Life Jacket Use on Cabin Sailboats among Life Jacket Users
2002-2006 versus 2007-2012**

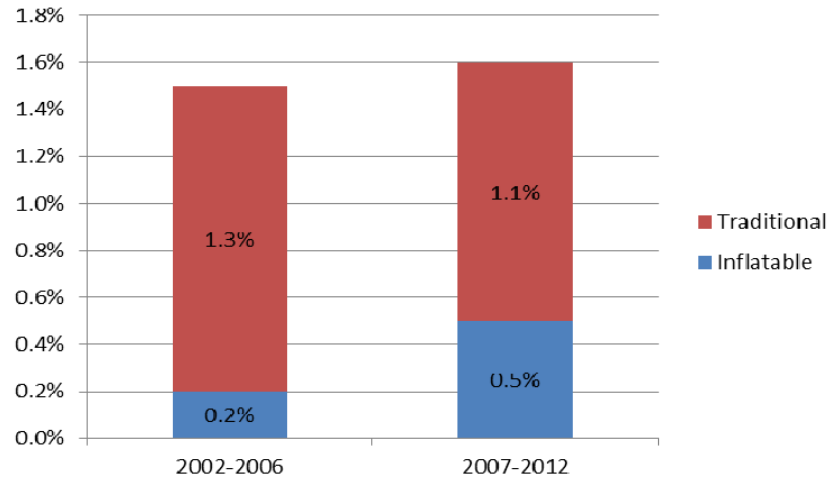


Changes in Inflatable Life Jacket Use for Boaters on Cabin Cruisers

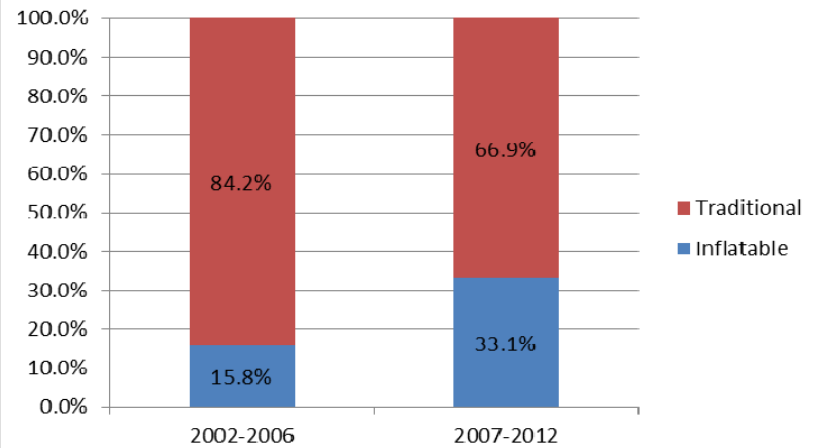
Inflatable and traditional style life jacket use is shown for cabin cruisers in charts J9 and J10. Over the two time periods, the rate of use of any life jacket essentially stayed the same (1.5% versus 1.6%). However, traditional life jacket use decreases slightly across these two time periods from 1.3% to 1.1%. On the other hand, inflatable life jacket use increased from 0.2% to 0.5%. This means that although inflatable use increased, it was primarily about substitution behavior and not about increasing overall wear.

Chart J10 shows the relative increase moving from 15.8% of users in the 2002 to 2006 time period to 33.1% of users in the 2007 to 2012 time period.

**J9. Comparison of Types of Life Jacket Use on Cabin Cruisers
2002-2006 versus 2007-2012**



**J10. Proportional Comparisons of Types of Life Jacket Use on Cabin Cruisers among Life Jacket Users
2002-2006 versus 2007-2012**



IV. WEAR IT! CAMPAIGN TRACKING

The Wear It! Campaign has been active in several states since the program began in 2007 in California. Information presented below focuses on three Wear It! Campaign areas—the Delta region of California, Tennessee, and Michigan. The Wear It! Campaign seeks to generate intense publicity to promote life jacket wear and involves campaign efforts on busy lakes and with statewide advertising.

Wear It! Campaign – California

In the Delta region of California the campaign also incorporated a colorfully decorated boat that cruised the waterways promoting life jacket use; gave away free life jackets; and gathered pledges to wear life jackets. The Delta region campaign was the focus of an intense evaluation effort funded by the U.S. Coast Guard from 2006 to 2008. In these years, JSI conducted observations at multiple sites within the Central Delta area where the campaign was most active. Observations were conducted for all weekends in July and August after the campaign began. After the formal evaluation was completed JSI continued to gather data in the Delta region albeit at a generally reduced level (in part we continued observations because two of our national observation study sites fell within the region but also extra observations were conducted in 2010 and 2011 to track any further effects). Table 4.1 shows wear rates, number of boaters observed, number of observation sites, total number of weekends observations were made, and how many weekends the campaign boat was on the water.

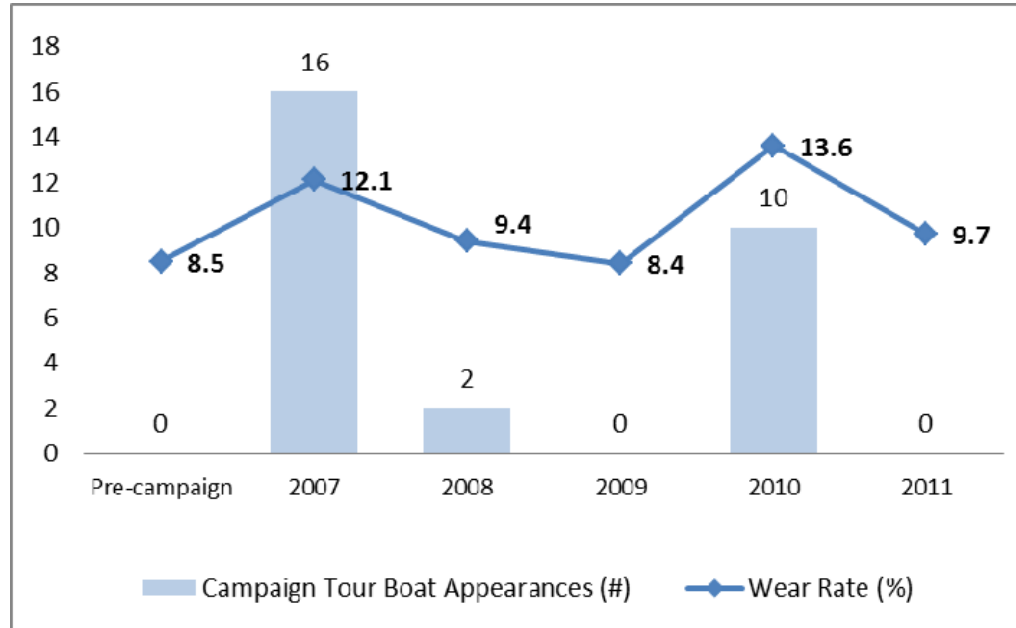
**Table 4.1 Summary of Delta Adult Wear Rates by Year
Showing Number of Observations and Observation Opportunities***

Indicator	Year of Observations					
	2006	2007	2008	2009	2010	2011
Overall Adult Wear Rate	8.5%	12.1%	9.4%	8.4%	13.6%	9.7%
Number of Observations	3117	5280	16151	1045	4097	12321
Number of Observation sites	3	7	8	2	4	4
Number of weekends observed	5	9	9	1	3	10
Total Number Observation Opportunities*	15	63	72	2	12	40
Number of Campaign Boat Tours	0	16	2	0	10	0

*Calculated by multiplying number of sites by number of weekends observed

In California there was variation across the years as to how often the campaign boat was on the water during the summer. Figure 4.1 shows the number of appearances ranging from a low of 0 to a high of 16.

Figure 4.1 – Association between Wear Rates & Number of Campaign Boat Tour Appearances in Each Year



As can be seen in Figure 4.1 the adult overall wear rate seems to be directly correlated to how many campaign tour boat visits there were on the Delta waters. The two highest wear rates in years 2007 and 2010 corresponded to the two years with the most campaign tour boat appearances and the four lowest wear rate years corresponded to years when the campaign boat made either zero appearances or only two appearances. Given the large number of observations made at multiple locations during many weekends in the summer periods in each year, it is unlikely that any environmental factors such as wind, temperature, rainy weather, etc. could account for this pattern. The most likely explanation is that the increased presence of the tour boat on the water became a visual reminder of the campaign message.

Wear It! Campaign – Tennessee and Michigan

The Wear It! Campaign has been active in a variety of states. Some of these states are not observation states for the National Wear Rate study. In other states, the campaign was focusing on areas or locations within the state where we did not conduct observations. Two states where the Wear It! Campaign was active that did correspond to our observation locations were in Tennessee and Michigan. Normally, the National Wear Rate study conducts observations during one weekend in the summer at four sites. For Tennessee and Michigan, we increased those observation weekends to three and sometimes four total weekends in a year, so as to provide more stable estimates of wear rate behavior in these states.

The next sequence of tables (Tables 4.2 – 4.4) present information for the Wear It! Campaigns in Tennessee and Michigan. In each subsequent table for these states we show wear rates aggregated across several years before the program was implemented and then aggregated across several years after the program was implemented. These data are limited to powerboats only, because in the particular observation sites, there were relatively few paddlecraft or sailboats. In Tennessee the information is presented for both direct and indirect intervention sites. Direct interventions were focused on two of the lakes where we had observation sites, whereas the indirect intervention sites were subject to messages from the Wear It! campaign that were distributed statewide. In Michigan all the interventions were statewide without a specific area of focus, so this distinction was not made in the information presented.

Table 4.2 shows wear rates by age group. Neither state shows increases in overall wear rates for adults. However, both states show increases for teens and youth under 13, with Tennessee showing a higher wear rate than Michigan.

Table 4.2 – Wear Rates on Powerboats by Age for Pre and Post Campaign Periods

	<i>Wear Rates by Year (%), By Age Group</i>							
	<i>Tennessee</i>				<i>Michigan</i>			
	<i>Direct Intervention</i>		<i>Indirect Intervention</i>		<i>Pre-Campaign 2004-07</i>		<i>Post-Campaign 2009-12</i>	
	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>		<i>Pre-Campaign 2004-07</i>	<i>Post-Campaign 2009-12</i>	
--- Adults	5.6%	4.1%	5.3%	5.5%	--- Adults	3.9%	3.0%	
... N Wearing	128	106	89	94	... N Wearing	117	127	
... N Total Observed	2283	2559	1689	1721	... N Total Observed	3035	4176	
--- Teens (13-17)	14.9%	23.5%	26.7%	38.5%	--- Teens (13-17)	13.8%	22.2%	
... N Wearing	22	28	39	52	... N Wearing	20	46	
... N Total Observed	148	119	146	135	... N Total Observed	145	207	
--- Youth (0-12)	74.4%	92.3%	75.4%	91.8%	--- Youth (0-12)	82.5%	84.6%	
... N Wearing	157	181	144	145	... N Wearing	175	242	
... N Total Observed	211	196	193	158	... N Total Observed	212	286	

Note: Life Jacket Wear Rates for Powerboats Only, Excluding PWCs and Water-skiers

Tables 4.3 shows wear rates for adults in different boat lengths. Consistent with the results for overall wear rates there is no notable increase in wear rates for adults in any length boat in either state except in Michigan for the 16 - 21 foot boats in which wear rates go from 2.7% to 5.5%

Table 4.3 – Adult Wear Rates by Length of Boat for Pre and Post Campaign Periods

	<i>Wear Rates by Year (%), Adults by Boat Length</i>							
	Tennessee				Michigan			
	<i>Direct Intervention</i>		<i>Indirect Intervention</i>		<i>Pre-Campaign 2004-07</i>		<i>Post-Campaign 2009-12</i>	
	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>		<i>Pre-Campaign 2004-07</i>	<i>Post-Campaign 2009-12</i>	
--- <16 feet	8.9%	7.4%	5.0%	5.7%	--- <16 feet	12.5%	10.0%	
... N Wearing	21	23	6	19	... N Wearing	66	18	
... N Total Observed	237	311	119	331	... N Total Observed	528	180	
--- 16-21 feet	5.9%	5.0%	5.7%	6.8%	--- 16-21 feet	2.7%	5.5%	
... N Wearing	80	67	60	70	... N Wearing	44	79	
... N Total Observed	1361	1347	1051	1029	... N Total Observed	1633	1430	
--- 21-26 feet	2.4%	2.1%	0.6%	1.6%	--- 21-26 feet	1.0%	0.9%	
... N Wearing	11	16	2	5	... N Wearing	7	12	
... N Total Observed	470	748	319	313	... N Total Observed	697	1347	
--- 26+ feet	0.0%	0.0%	11.8%	0.0%	--- 26+ feet	0.0%	1.5%	
... N Wearing	.	.	4 N Wearing	.	18	
... N Total Observed	8	153	34	46	... N Total Observed	177	1219	

Note: Life Jacket Wear Rates are for Powerboats Only, Excluding PWCs and Water-skiers

Table 4.4 shows that in Tennessee there is an increase in wear rates among those fishing or intending to fish, which was similar to observations in the Delta region of California (data not shown in this report). In Michigan, however, there was no increase in rates observed for those involved in fishing or intending to fish.

Table 4.4 – Adult Wear Rates by Activity for Pre and Post Campaign Periods

	<i>Wear Rates by Year (%), Adults by Boat Length</i>						
	Tennessee				Michigan		
	<i>Direct Intervention</i>		<i>Indirect Intervention</i>		<i>Pre-Campaign 2004-07</i>	<i>Post-Campaign 2009-12</i>	
	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>	<i>Pre-Campaign 2003-07</i>	<i>Post-Campaign 2008-12</i>			
--- <16 feet	8.9%	7.4%	5.0%	5.7%	--- <16 feet	12.5%	10.0%
... N Wearing	21	23	6	19	... N Wearing	66	18
... N Total Observed	237	311	119	331	... N Total Observed	528	180
--- 16-21 feet	5.9%	5.0%	5.7%	6.8%	--- 16-21 feet	2.7%	5.5%
... N Wearing	80	67	60	70	... N Wearing	44	79
... N Total Observed	1361	1347	1051	1029	... N Total Observed	1633	1430
--- 21-26 feet	2.4%	2.1%	0.6%	1.6%	--- 21-26 feet	1.0%	0.9%
... N Wearing	11	16	2	5	... N Wearing	7	12
... N Total Observed	470	748	319	313	... N Total Observed	697	1347
--- 26+ feet	0.0%	0.0%	11.8%	0.0%	--- 26+ feet	0.0%	1.5%
... N Wearing	.	.	4 N Wearing	.	18
... N Total Observed	8	153	34	46	... N Total Observed	177	1219

Note: Life Jacket Wear Rates are for Powerboats Only, Excluding PWCs and Water-skiers

Summary of Wear It! Campaign Results

In all three Wear It! states (CA, TN, and MI) there was no evidence of change among powerboaters involved in other activities besides fishing or intending to fish. There does seem to be some evidence for synergism between the Wear It! Campaign message and boaters for whom there is some type of mandatory regulations. The campaign seemed to heighten wear rates among youth who were mandated to wear and also among those fishing/intending to fish who in some instances are participating in fishing tournaments which have a mandatory wear requirement. The other evidence for synergism was seen in the California Delta region in which wear rates levels were correlated with the number of weekends that the campaign tour boat was on the waterways. Again, however, this heightened effect is reserved for those involved in fishing/intent to fish some of whom are involved in tournaments.

V. DO MANDATORY LIFE JACKET REGULATIONS WORK?

The National Boating Safety Advisory Council made a recommendation to the Coast Guard that regulations be enacted to make wearing a life jacket on specific categories of boats mandatory. Currently there is no mandatory life jacket wear requirement for the entire U.S. boating population. However, there are several circumstances where specific regulations are in place that mandate life jacket wear that apply during the summer period when the observation data were collected. Over the 14 years of observational data collection many states (at one time or another) had the following mandatory life jacket wear regulations: (1) for youth under the age of 13; (2) for water-skiers or others participating in towed sports; (3) for those using PWCs; and (4) for those boating on four Mississippi lakes controlled by the U.S. Army Corps of Engineers. In this section of the report we compare wear rates of boaters who are mandated to wear against similar boaters for whom there is no mandate to wear. In this way we can gain some perspective of whether it is likely that any future changes in regulations would have the desired effect of increasing life jacket wear.

Responses to Varying Regulations Mandating Wear for Youth

During the 14 years of observations conducted for the National Wear Rate study, there have been a variety of mandates impacting youth under the age of 13. For example, in some years some states mandated wear for all youth under age 13, while in other states in some years boaters only under the age of 6 were mandated to wear, which did not cover youth between 6 years and 12 years. And in other states in some years there were no mandates for any youth. This variation in life jacket wear mandates allows for a comparison of wear rates for youth boaters who were mandated to wear life jackets against youth boaters who were not mandated to wear them. Table 5.1 presents wear rates for different types of boats and compares mandated and unmandated youth groups in the 0 to 12 year old range. Table 5.1 also shows wear rates for teenagers who were not mandated in any state in any of the years for comparison sake.

For all types of boats, wear rates were higher for youth 0-12 years of age, when states had mandates compared to times when they did not mandate wear. No matter what type of boat, teen wear rates were less than either the mandated or unmandated 0-12 year old group.

Table 5.1 – Wear Rates by General Boat Type Group for Youth Mandated and Not Mandated to Wear (1999-2012, excluding PWCs & WS)

Types of Boats	0 - 12 yrs not mandated	0-12 yrs mandated	13-17 years not mandated
All boats	70.7% 5175/7323	85.8% 32997/38463	28.7% 9116/31769
Power Boats	70.2% 4759/6779	85.7% 29231/34111	23.2% 6042/26042
Sail Boats	74.6% 214/287	86.9% 1680/1933	53.1% 1159/2183
Paddlecraft	83.7% 118/141	90.8% 1883/2074	58.8% 1767/3006

Table 5.2 shows wear rates for different age groups by which age groups were covered by the mandates. For 0 to 5 year olds, wear rates increase by about 10 percentage points (low 80 percent range to low 90 percent range) when mandates are put in place that cover this age group. It doesn't seem to make much difference how broad the age range mandate is beyond the age of the boater since broadening the mandate to other ages doesn't affect the wear rates of the 0-5 year olds. For 6 to 12 year olds it does make a difference how many ages are covered by the mandates. Data show about a 20 percentage point increase in wear rates when some or all of this age group are mandated to wear compared to a situation when no children are mandated. Teen wear rates do not seem to be impacted in any great way by regulations directed at younger boaters.

Table 5.2 – Wear Rates for Youth Age Groups for Different Levels of State Mandates (1999-2012, excluding PWCs & WS)

Mandatory State Youth Laws	Boaters' Age Group		
	0 - 5 yrs	6 - 12 yrs	13 - 17 yrs*
No Laws for Any Youth	82.8% 463/559	63.0% 1470/2335	26.6% 645/2428
0 - 5 years only	92.0% 1153/1253	73.2% 3242/4429	20.3% 757/3732
0 - 10 years only	92.4% 1001/1083	81.8% 2471/3022	21.6% 567/2622
0 - 12 years	93.3% 7189/7706	83.4% 21183/25399	31.1% 7147/22987

* The 13-17 year old age group does not have any life jacket wear mandates, and is shown here for comparison purposes so the reader can see the difference between the various mandates for the younger age groups and the older age group with no mandate.

Life Jacket Wear Rates on PWCs versus Small Powerboats

Almost all states have mandatory regulations for wearing life jackets while riding on a PWC (Alaska and New Hampshire do not). Although it is an imperfect comparison, it is useful to compare mandated PWC wear rates to wear rates for small powerboats under 16 feet in length that are engaging in general activities on the water (excluding fishing or intending to fish) that are not mandated. Since it is very rare that fishing is done from a PWC, we exclude those boaters engaged in these activities to create a comparison of boaters engaged in similar activities. The information shown in Table 5.3 is separated into three age categories: adults, teenagers, and youth under 13 years of age.

For adults and teens the wear rates on mandated PWCs is substantially higher than wear rates on unmandated small powerboats. For youth under 13 PWCs are still higher although the difference is much less given the existence of age based wear mandates on most boats as well as the PWC mandates.

Table 5.3 – Comparison of Wear Rates for PWCs versus Other Small Powerboats <16ft* (1999-2012)

Age Group	PWCs (mandated)	Powerboats <16 feet (not mandated)*
Adults (18+ yrs)	96.4% 24367/25266	7.8% 1238/15818
Teens (13-17 yrs)	98.4% 4749/4826	32.9% 336/1022
Youth (<13 yrs)	99.2% 2354/2374	87.2% 1299/1490

*Boaters on small powerboats under 16 feet (non-PWCs) are limited to boaters who are NOT fishing or intending to fish or who are being NOT being towed by a boat as part of a towed sport activity.

Towed Sport Participants versus Occupants of Towing Boats

In many states boaters who are being towed by a boat as part of a towed sport activity are mandated to wear a life jacket. In contrast, teens or adults who are in the boat towing the sports participant are not mandated to wear life jackets. Table 5.4 reports wear rates for those who are being towed compared to those who are doing the towing in states where there are mandates for towed participants to wear life jackets. The information is presented for three age categories---adults, teenagers, and youth under 13 years of age.

For adults and teenagers the comparisons show sizeable differences. For youth under 13 years of age the differences are smaller since in the majority of cases this aged boater is mandated to wear a life jacket while in a boat because of their age but they are still higher for those being towed.

**Table 5.4* – Comparison of Wear Rates for those Being Towed versus those on Boat Towing Others
(No PWCs, 1999-2012)**

Age Group	<i>Being Towed by Boat (mandated)</i>	<i>In a Boat Towing Others</i>
Adults (18+ yrs)	95.0% 1343/1415	5.5% 522/9510
Teens (13-17 yrs)	98.7% 1348/1366	35.0% 482/1376
Youth (<13 yrs)	99.6% 1422/1428	87.2% 1337/1534

*This table only includes boaters on boats that are involved in a towed sport.

Mississippi Mandatory Experiment with Comparison Area

Probably the strongest evidence concerning whether mandatory regulations work comes from the data collected in the evaluation of the US Army Corps of Engineers mandatory wear regulations pilot program in four lakes in northwestern Mississippi. The regulations were in place for three years and data were collected over multiple weekends during the summer, fall, and spring boating seasons. Data were also collected in two control lakes that were a significant distance away from these lakes but represented similar boating venues. Table 5.5 shows that the wear rates for adults in the intervention lakes went from 13.5% in the baseline year to 70.9% average in the three years the regulations were active. In the comparison lakes there was no such increase with the baseline year showing 13.0% wear rates and the three year average for the comparison lakes had a wear rate of 7.5%. For teens we saw similar large increases, with wear rates on the intervention lakes moving from 41.0% to 87.7% whereas in the control lakes it only moved from 25.4% to 31.4%. For youth under 13 years of age in which mandatory regulations were already in place before the experiment began, wear rates still increased in the intervention lakes moving from 94.2% to 96.3% whereas in the control areas it went from 96.6% to 86.2%. The success of the US Army Corps of Engineers experiment is a testament to the potential effectiveness of mandatory life jacket regulations. It should, however, be pointed out that there was a year of pre-implementation publicity explaining the new regulations and during the three year experimental period there was also a significant amount of visible, on the water, ranger patrols to emphasize the importance of following the regulations and continually educating boaters. It should also be pointed out that after the trial period's success, the local district of the US Army Corps of Engineers petitioned to keep those regulations in place on a permanent basis.

Table 5.5 – Comparison of Lakes in Mississippi with Mandatory Regulations to Those Lakes Without Mandatory Regulations (No PWCs or WS)

Age Group	Intervention Lakes Baseline	Intervention Lakes 3 years post average*	Control Lakes Baseline	Control Lakes 3 years post average
Adults (18+)	13.5%	70.9%	13.0%	7.5%
	297/2200	13038/18381	115/888	1086/14428
Teens (13 to 17 yrs)	41.0%	87.7%	25.4%	31.4%
	57/139	1430/1630	16/63	304/967
Youth <13 yrs	94.2%	96.3%	96.6%	86.2%
	276/293	2429/2522	85/88	1738/2017

*Based on data only from boat types that were regulated in the intervention lakes.

Summary of Whether Mandatory Regulations Work

As the debate and planning continues at the U.S. Coast Guard about whether to institute wider mandatory regulations consistent with the recommendation of the National Boating Safety Advisory Council, the information presented in this section showing the impact of existing mandatory regulations is instructive. In all instances where current mandatory regulations exist, there are clear and strong differences in wear rates when compared to other similar boaters without mandates. This information provides support for the notion that if new mandatory regulations are put in place and if all parts of the boating community join together to educate the boating public about the appropriateness of these regulations, then changes in behavior will follow.

VI. CONCLUSIONS FOR LIFE JACKET WEAR RATES - NATIONAL TREND DATA 1999 TO 2012

This report includes observational data collected from 1999 to 2012. Trends in life jacket wear for types of boats and for various age groups were displayed. A summary of key findings are:

1. For all youth combined (17 years or younger), wear rates have generally climbed since the study began in 1999. Wear rates for youth have increased from 52.1% (1999) to 67.5% (2012). In all likelihood this is a reflection of both changing legal mandates at the state and federal level and effects of targeted educational campaigns.
2. National adult wear rates continue to be higher in boats that are easier to capsize or for which there is mandated wear – PWCs, kayaks, and day sailers. Powerboats between 16 and 21 feet in length continue to show relatively low wear rates (5.0% in 2012).
3. Wear rates on PWCs for both adults and children are almost universal.
4. In circumstances where mandatory regulations currently exist, wear rates are substantially greater than for those boaters involved in similar activities but for which there are no mandatory regulations.

VII. APPENDIX: METHODS & DESCRIPTIVE INFORMATION

To provide reliable and valid indicators of changes in life jacket wear rates, it was essential for observation procedures to remain as close as possible to those used in previous years. The same states were observed for each of the years of data collection efforts, over the same period of time. The vast majority of the sites in each of 30 states observed have remained the same for all years. The following is a detailing of the methods used in all years of data collection.

Time period - Observations were conducted during the summer months of each year, beginning the weekend of July 4th and ending on Labor Day weekend.

Site selection - A total of 30 states were chosen in which to conduct observations. The states were originally selected by a stratified random sampling procedure. Approximately three-fourths of the coastal states (20 out of 26 states) were chosen, and approximately 40% of the inland states (10 out of 24) were selected. Four sites from each state were visited, except in California, where eight sites were observed due to the size of the state. The 124 sites represented a wide range of water venues including lakes, rivers, harbors and bays, and intra-coastal waterways. The sites were selected based on consultations with local offices of the USCG, members of the local Coast Guard Auxiliary or Power Squadron, and state boating or fishing law enforcement agencies. Sites were selected to roughly represent a variety of available boating venues in the state, as well as their proximity to one another to allow for relatively short travel time between sites. In addition, sites needed to have suitable shore-based viewing locations from which observations of life jacket wear could be made using high-powered binoculars.

Observational procedures - Observations were conducted for four-hour periods either in the morning or the afternoon of a Saturday or Sunday. The goal was to observe as many boats as possible during a four-hour time frame. Viewing locations were on shore at a narrowing, bridge, or near a marina to facilitate observations. Two-person teams observed boating activity. One team member made the observations using high-powered binoculars and called out the information, which was then recorded on observation forms by the second team member. Team members alternated responsibilities frequently to ward off fatigue. In addition to recording information on boating activity and life jacket wear, observers recorded data about the site. This included information on weather and water conditions. JSI project staff trained the observers during two half-day sessions. The first half-day training consisted of reviewing the observation manual, observation forms, and required equipment. The observation manual contained procedures, definitions, and pictures of various types of boats to facilitate consistent classification by the observers. The second half-day of training allowed observation team members an opportunity to practice using the required equipment and observation forms with the assistance and guidance of an experienced JSI project staff member.

Observation Forms - There were two observation forms designed. The first was the boat observation form, which was intended to record information about the boat and people on the boat. The second form was the site form, which was designed to record information about the site, weather and water conditions. The forms have remained the same from year to year, with the exception of two changes made in 1999, one change made in 2004 and one change made in 2007. These changes are discussed in detail below.

A) Boat Forms - Observers recorded the observation **time period** in two hour blocks of time (7:59 or earlier, 8am – 9:59am, 10am – 11:59pm, 12pm – 1:59pm, 2pm – 3:59pm, 4pm – 5:59pm, 6pm or later); the **type of boat** observed (skiff, speedboat/runabout, cabin cruiser, personal watercraft (PWC), pontoon boat, houseboat, sailboat, day sailor, cabin sailboat, rowboat, inflatable, canoe, kayak, and other); the **type of propulsion** (outboard engine, sterndrive/inboard engine, sail only, sail and auxiliary engine/motor, paddles/oars/manual, air thrust, and other); **length of boat** (less than 16 feet, 16-20.9 feet, 21-25.9 feet, 26-45.9, and 46+ feet); **type of operation** (motoring, sailing, paddling, drifting, or at anchor); and **activity** engaged in (fishing, intent to fish, water-skiing, white-water, high speed racing, swimming, pleasure boating, and other). Observers also recorded **operator/passenger status; gender** (male, female, or unknown); **age** (less than six, 6 - 12, 13 - 17, 18 - 64, 65 or older); **life jacket wear** (wearing or not wearing); **life jacket type** (traditional=old or inflatable=new). In addition, if the boat was involved in water-skiing or a towing sport, observers indicated which **boaters were skiing** (or being towed) at the time.

B) Site Forms - At each site, the observers recorded the beginning time and ending **time of the observation period**, **water type** (lake, river, harbor/bay, Great Lake, intra-coastal

waterway), and **water temperature**. The following environmental factors were measured by observers at each two hour time block during the observation period: **air temperature; wind speed; wave height** (less than six inches, six inches up to two feet, or over two feet); **weather** (sunny, partly cloudy, cloudy, raining, or stormy); and **visibility** (good, fair, or poor).

Over the past 14 years of observations only three categories of information have changed. In 1999, the original 6 to 17 year old age category was divided into a 6 to 12 year old group and a 13 to 17 year old group. Also in 1999, the boat category of canoes/kayaks was separated to record canoes and kayaks individually. In 2004 the USCG requested that JSI breakout the boat size categories from three (less than 16 feet, 16-25 feet and over 26 feet) to four categories (less than 16 feet, 16-20 feet, 21-25 feet and over 26 feet). Observations made in 2004 to 2011 are the only years to record observations using the expanded boat size categories. Finally, in 2007, we added an “intent to fish” category distinct from “pleasure”. Intent to fish was indicated when a boat could be observed with obvious fishing gear (fishing rods, trolling motors, etc.) even though at the moment of observation, the boaters were not fishing.

PFD Study 2012

of Belt Pack PFD's
 # of Boats Observed
 ID

State Site Block Group Phase

1. Site Information

Observer Names: _____ City: _____
 Site Name: _____ Water: _____
 Date of Observation: / / Day of the week: Sat. Sun.
 Observation start time: : AM PM
 Observation end time: : AM PM

2. Type of Body of Water

Bay, inlet or sound River, stream, creek or canal Other: _____
 Harbor Lake, pond, or reservoir (not Great Lakes)
 Intercoastal waterway Great lake (not including tributaries)

3. Site Conditions

Water temperature: degrees F

A. First Weather Observation (to be completed during 1st time block of boat observations)

Time:
 7:59 or before 8-9:59 AM 10-11:59 AM 12-1:59 PM 2-3:59 PM 4-5:59 PM 6 PM or later

Air Temp. <input type="text"/> <input type="text"/> <input type="text"/> F Wind Speed <input type="text"/> <input type="text"/> knots	Water Conditions <input type="radio"/> Calm (less than 6") <input type="radio"/> Choppy (6" to 2') <input type="radio"/> Rough (over 2')	Current <input type="radio"/> Strong <input type="radio"/> Moderate <input type="radio"/> Weak/None	Visibility <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor	Weather Conditions <input type="radio"/> Sunny <input type="radio"/> Raining <input type="radio"/> Partly Cloudy <input type="radio"/> Stormy <input type="radio"/> Cloudy
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**Actual form provides 3 blocks to record Weather Observations across the 4 hours of data collection

VIII. INFORMATION ON BOATS & PEOPLE OBSERVED

From 1999 to 2012, JSI has observed a total of 202,623 boats and 570,515 boaters (Figure K). This year, 2012, 14,214 boats carrying 41,391 boaters were observed. Across the fourteen years, the number of boats, and the number of boaters observed in the later years have generally been greater than in the earlier years. However, the proportions of the different types of boats, operation and activity of boats, as well as the age and gender of the boaters observed has remained fairly consistent (see Figures L through R2). This indicates not only that the sites chosen yielded diversity in the boats and boaters observed each year, but also that diversity has remained relatively consistent across the years. These figures demonstrate that the degree of representativeness of the sample of recreational boaters and their boating habits remained relatively constant across this fourteen year span.

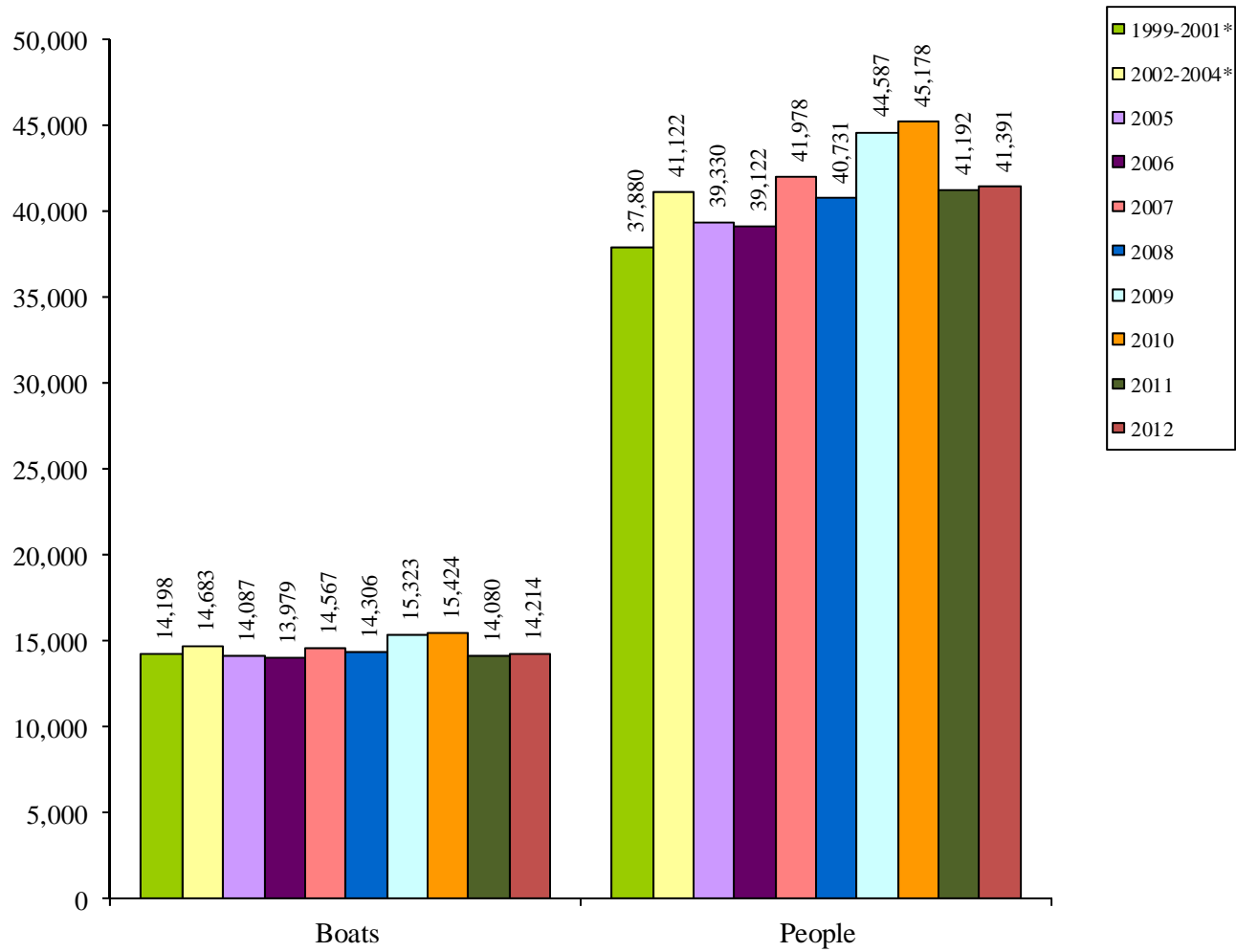
There is one shift that is apparent over the fourteen years that can be seen in Figures M and N. There has been a decrease in boats less than 16 feet in length observed and, as seen in Figure N, since 2004 there has also been a decrease in boats observed between 16 and 21 feet in length. This is matched with increases in boats observed in the 21 to 25 foot category as well as the 26 foot + category.

Figures S through Y illustrate the weather and water conditions across the sites from year to year. Like the boat and boater data, across all of the sites, the mixture of the weather and water conditions remained fairly constant over the years. Therefore, any overall changes reported in life jacket wear rates were not due to changes in types of boats or boaters observed from year to year, and most likely not due to fluctuations in weather or water conditions across the sites. Of course, at individual site locations changes in these factors from year to year could account for sizable fluctuations in wear rates at individual sites.

All Figures in this section have been modified slightly from previous years' reports prior to 2011. The percentages now exclude (like the 2011 report) any missing observations on a particular characteristic. Since missing observations are relatively rare, this switch in presentation does not result in any major shifts in proportions shown in previous reports (before 2011).

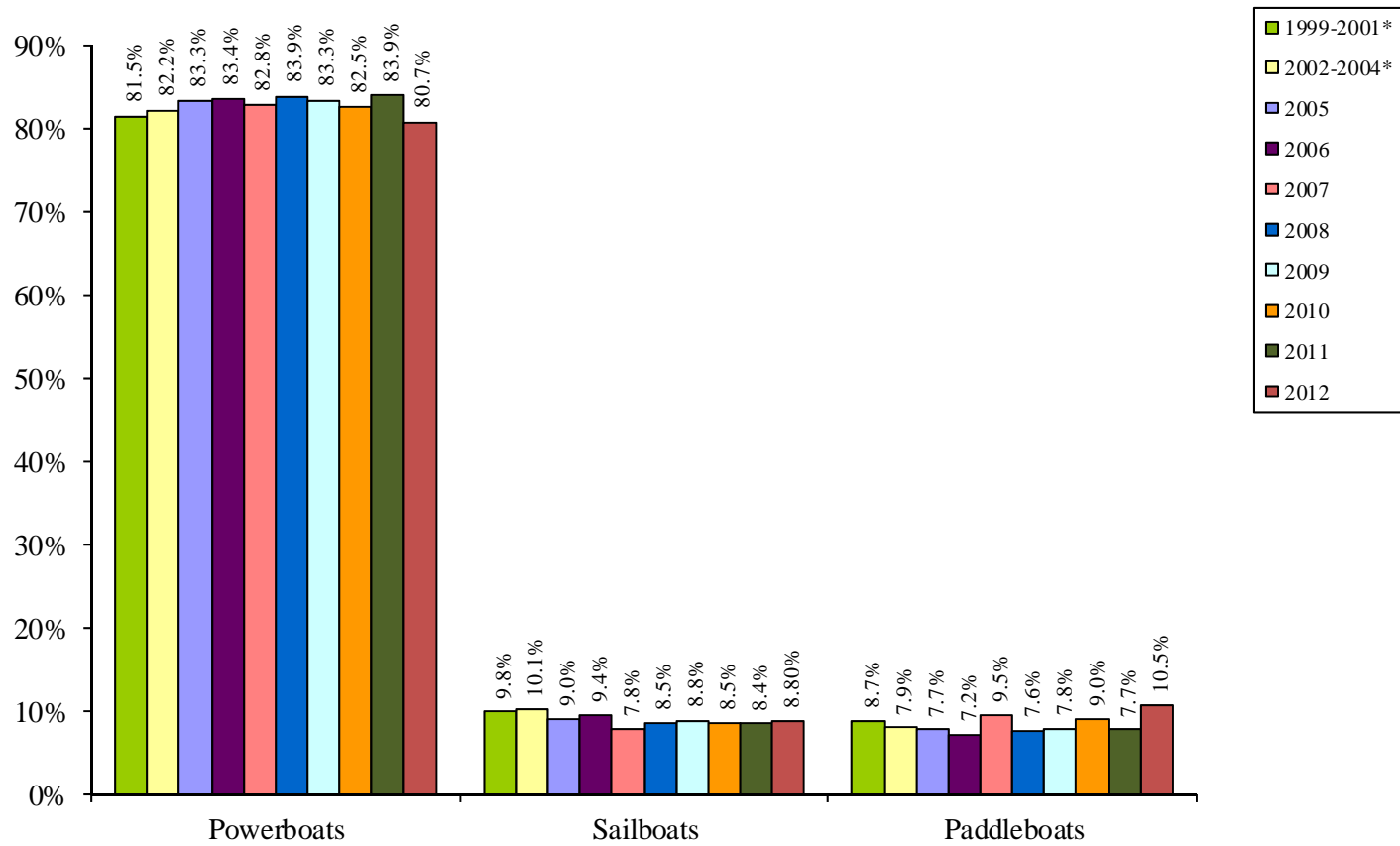
Figure L is constructed differently from previous years. It now compares only speedboats, sailboats, and paddle boats, and excludes "other" types of boats.

Figure K – Number of Boats and People



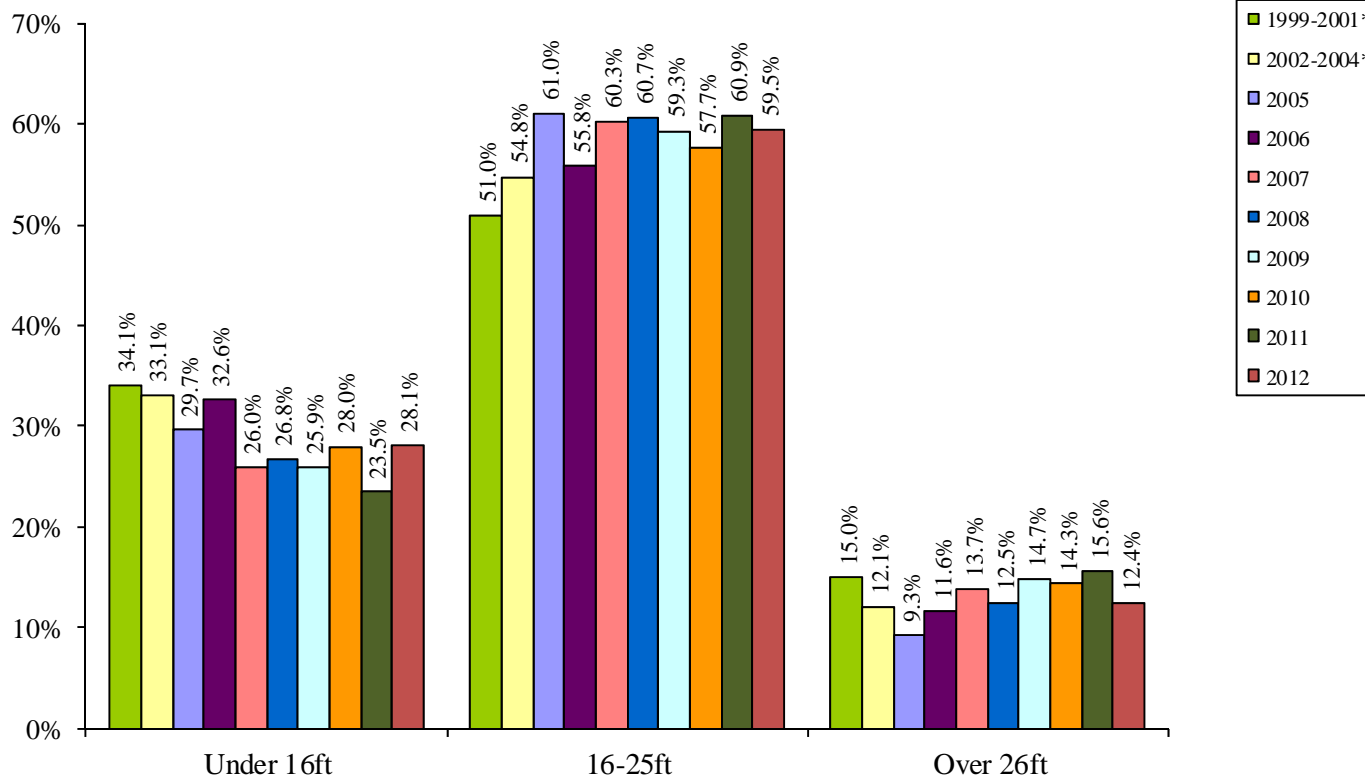
*Three-year average

Figure L – Types of Boats



*Three-year average

Figure M – Length of Boats



*Three-year average

Figure N – Length of Boats 2004-2012 Data Only

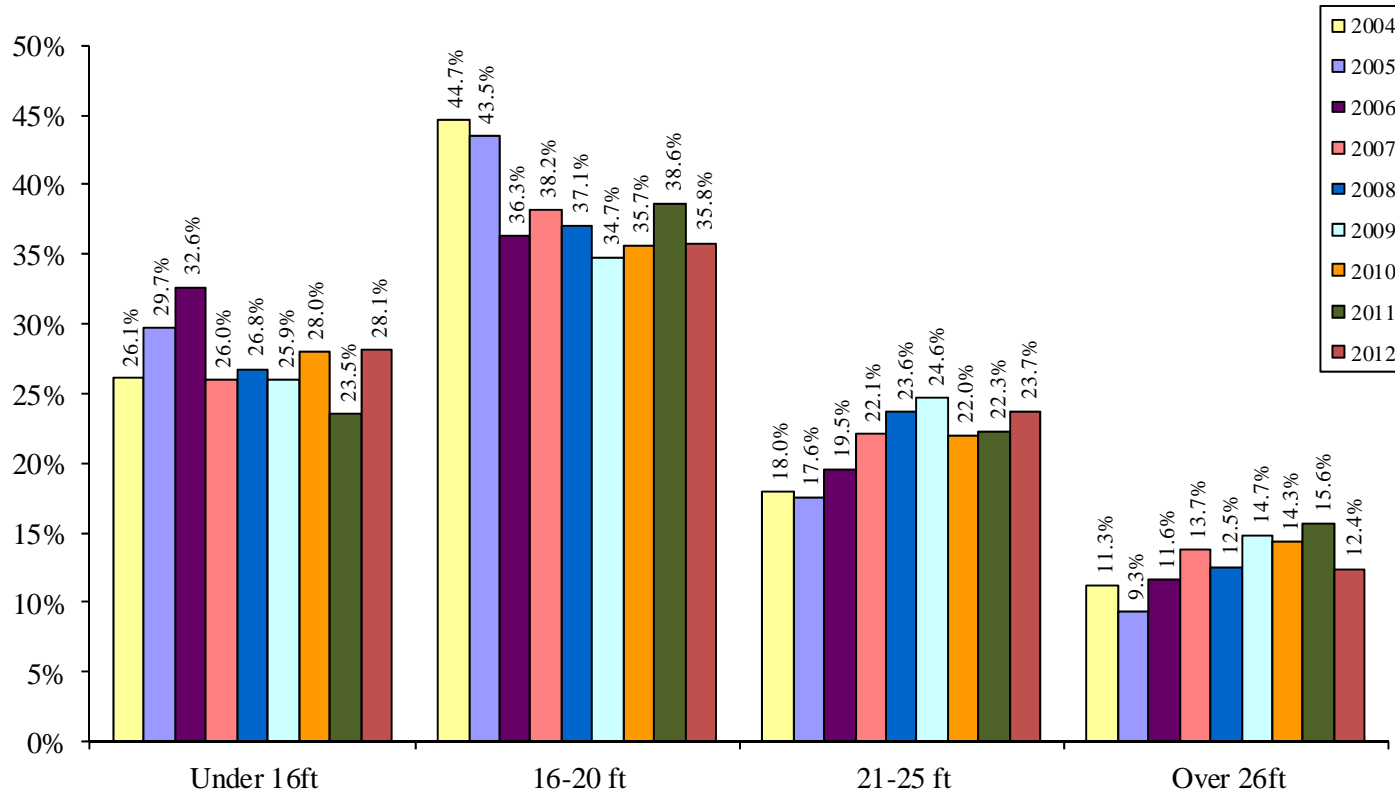
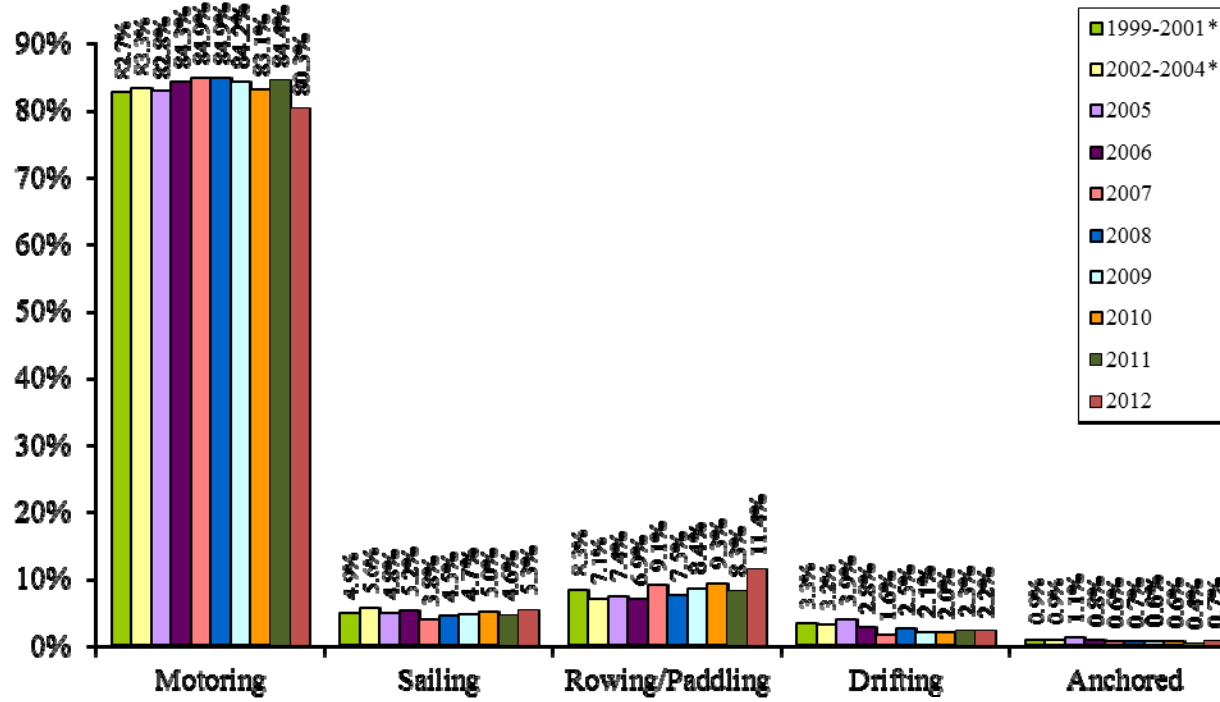
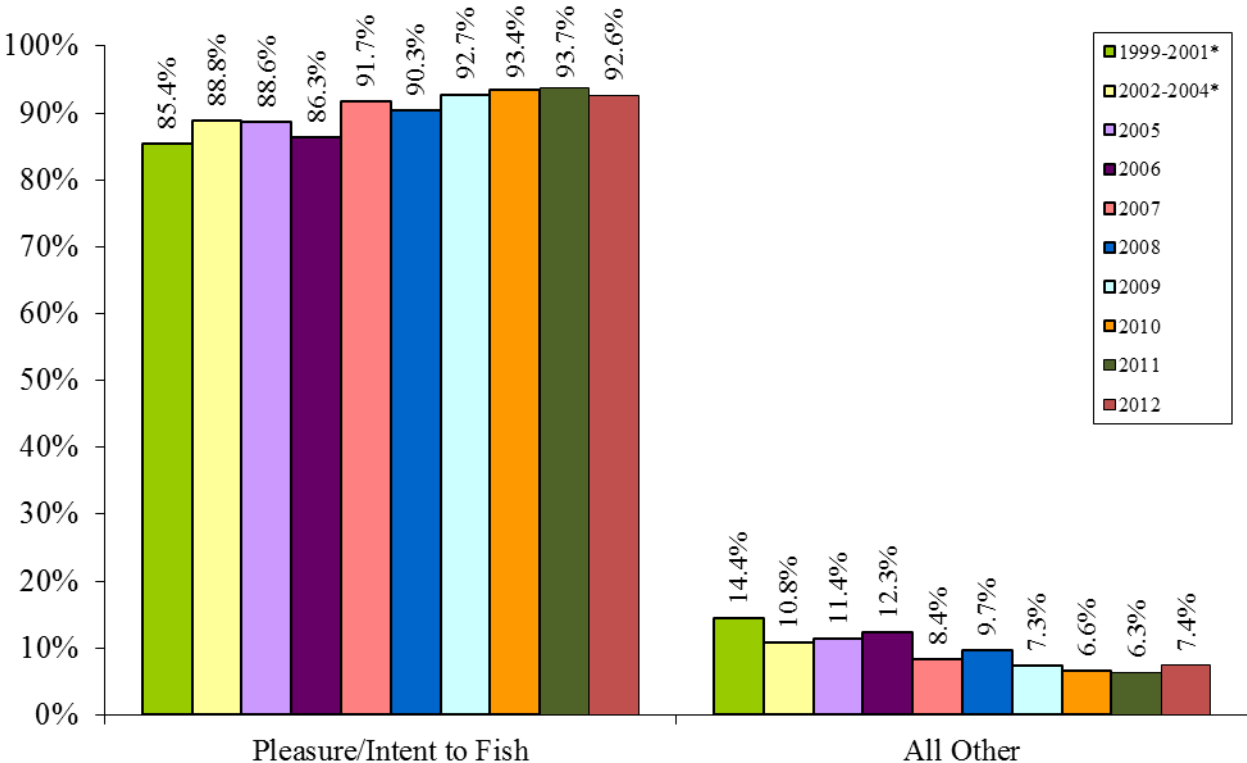


Figure O – Operation of Boats



*Three-year average

Figure P1 – Activity of Boaters—ALL YEARS*



*Three-year average

Figure P2 – Activity of Boaters 2007-2012 Data

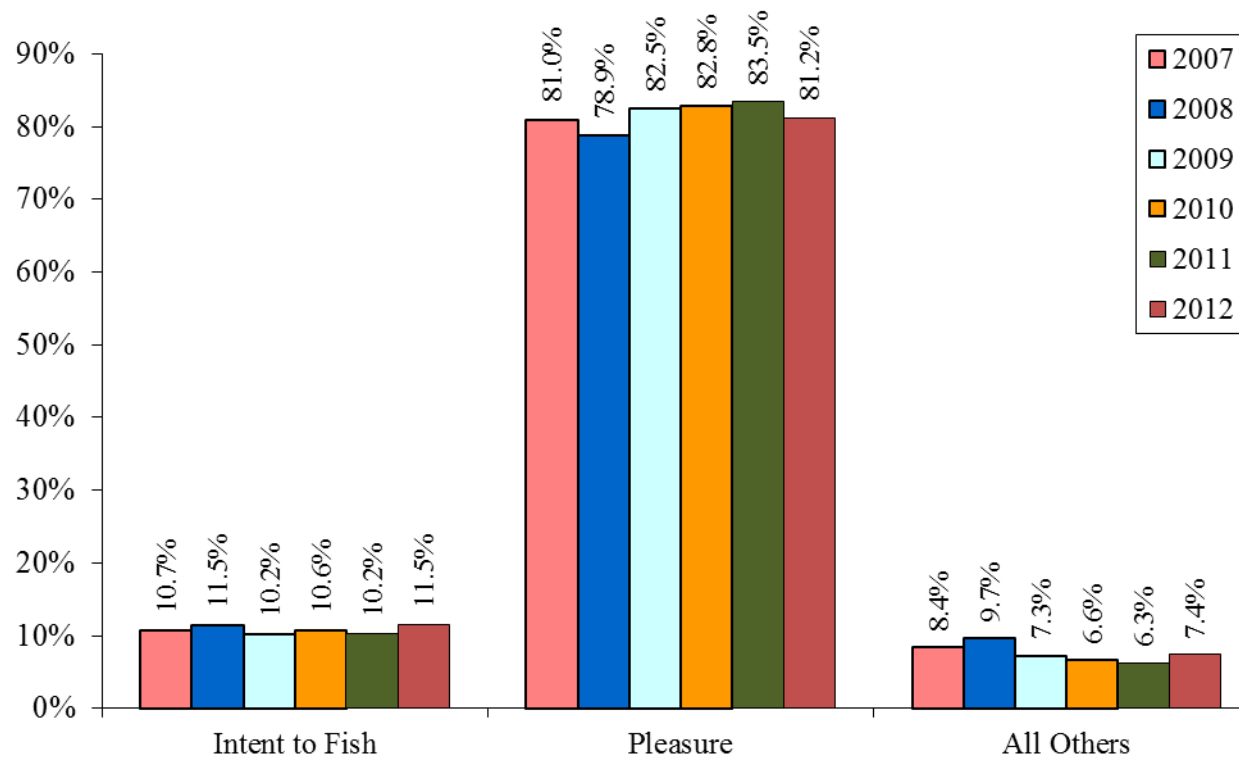
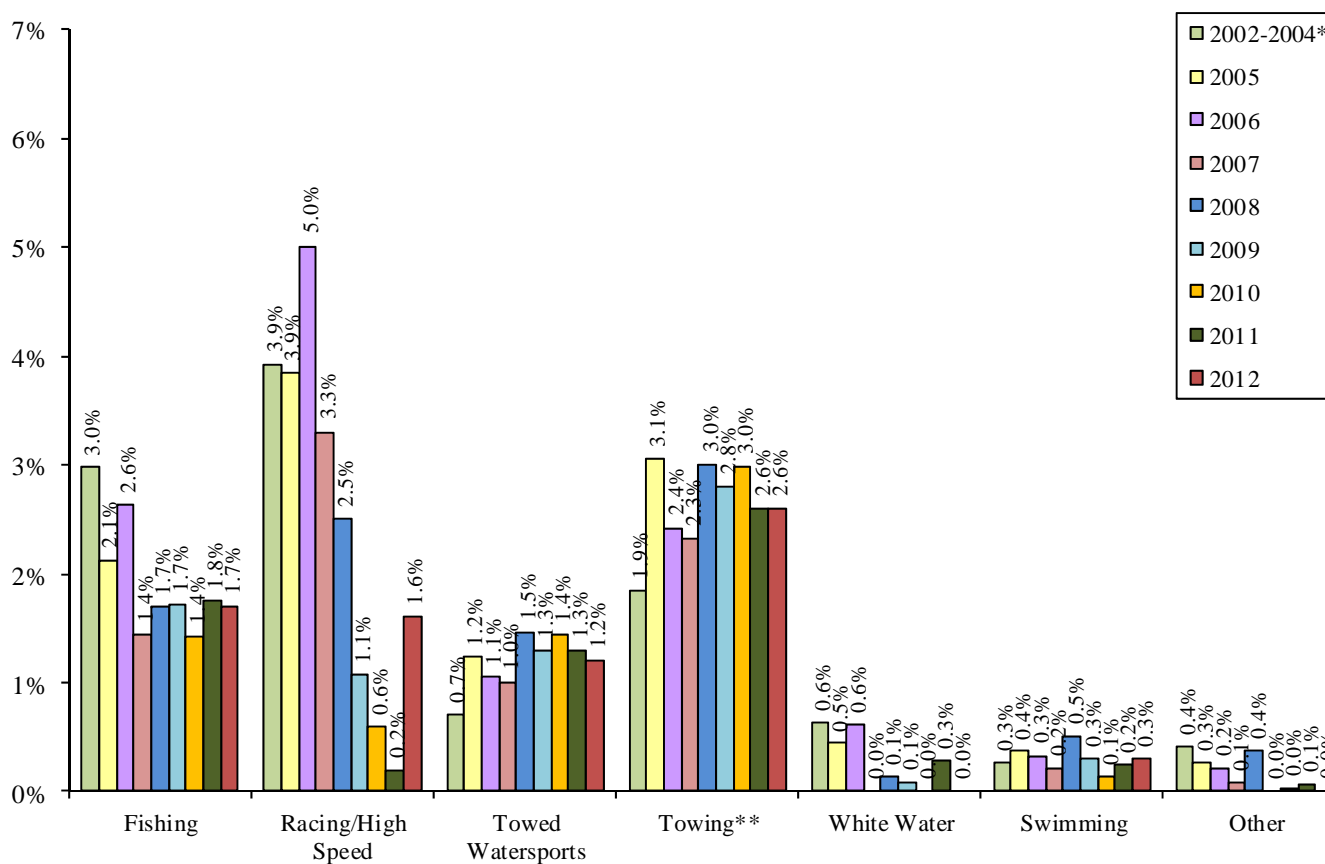


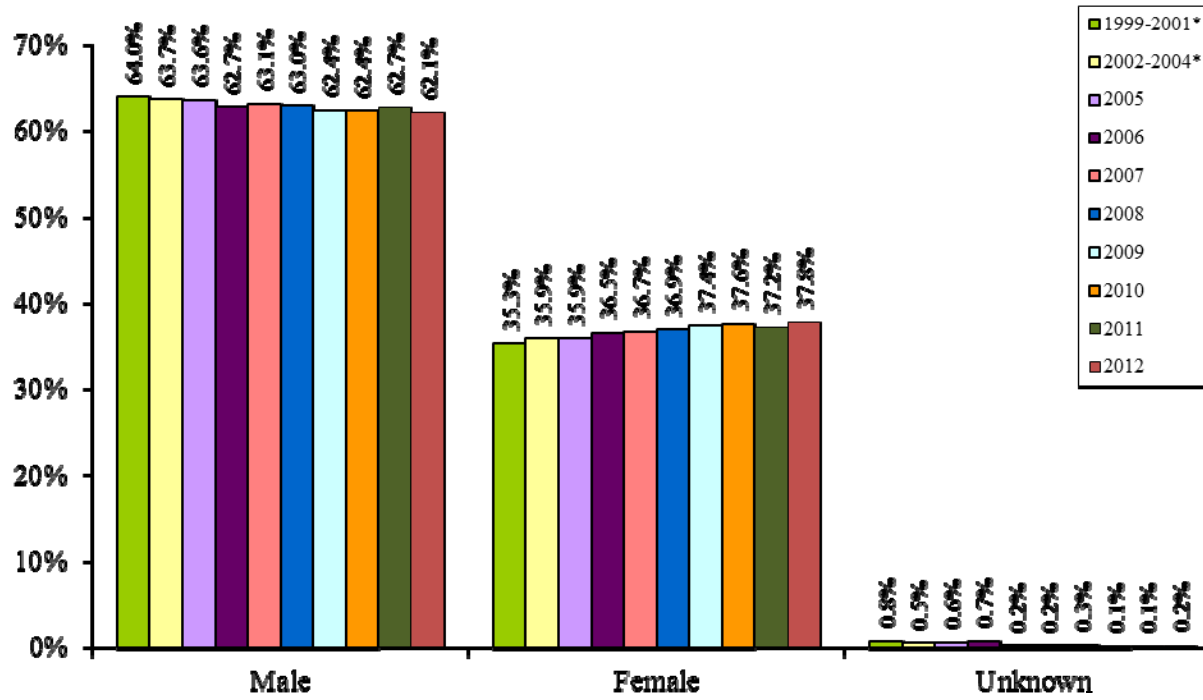
Figure P3 – Activity of Boaters 2002-2012
Detailed Breakdown of ALL OTHER Category from Figure P1



*Three-year average

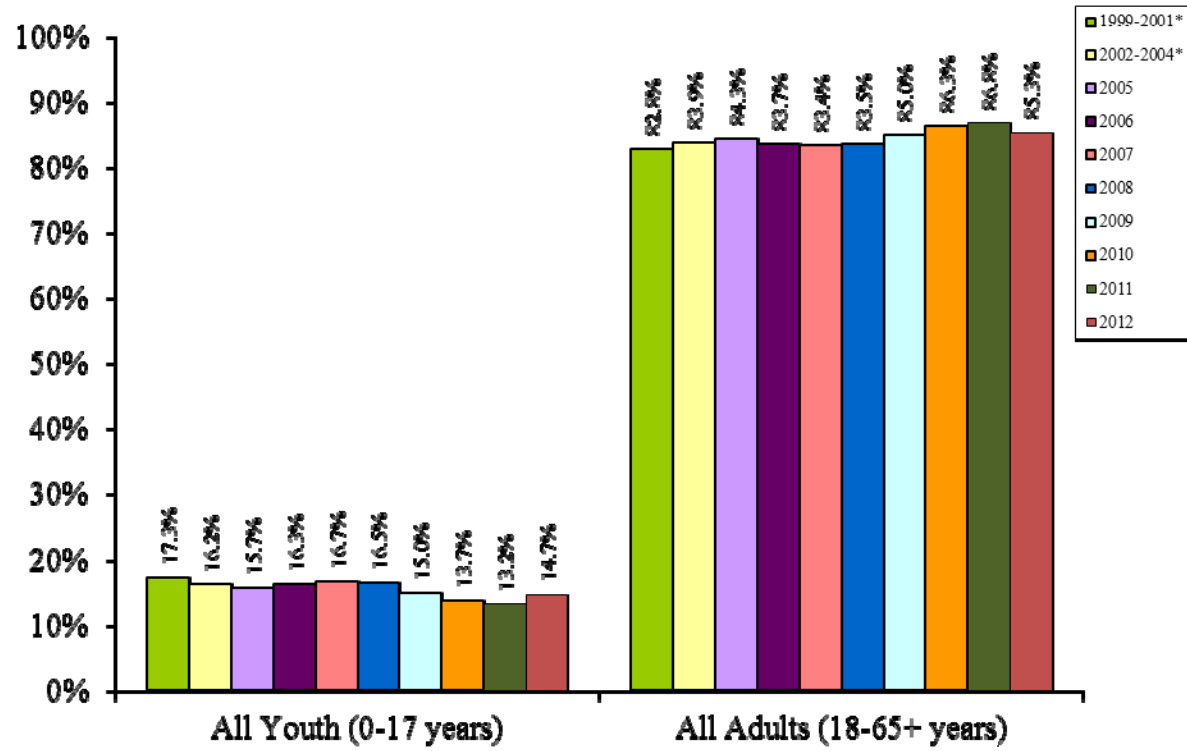
**The activity “Towing” indicates that these boaters were passengers in a boat towing water-skiers or other towing activities. Likewise, “Towed Watersports” includes all towing sports and is reserved for the boaters in the water being towed. The label was changed in April 2010.

Figure Q – Gender of Boaters



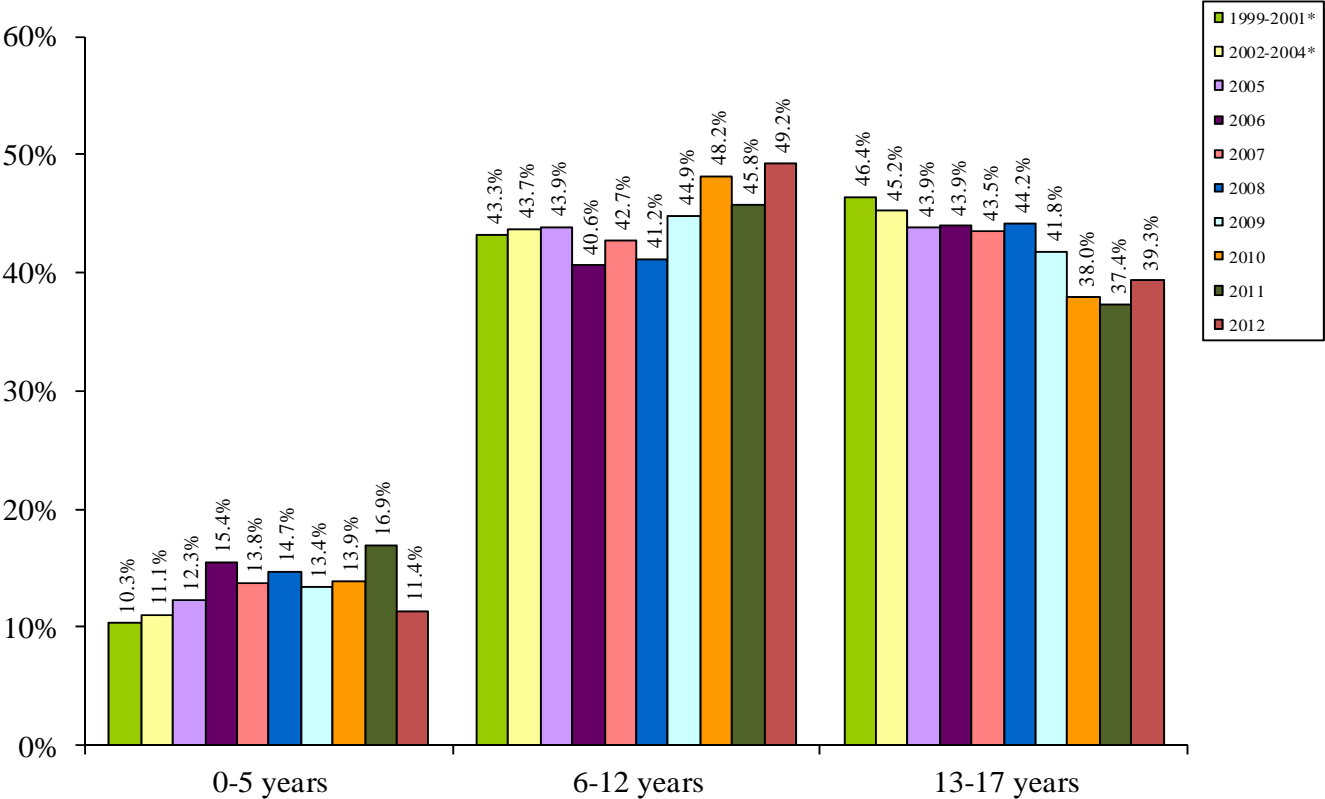
*Three-year average

Figure R1 – Age of Boaters



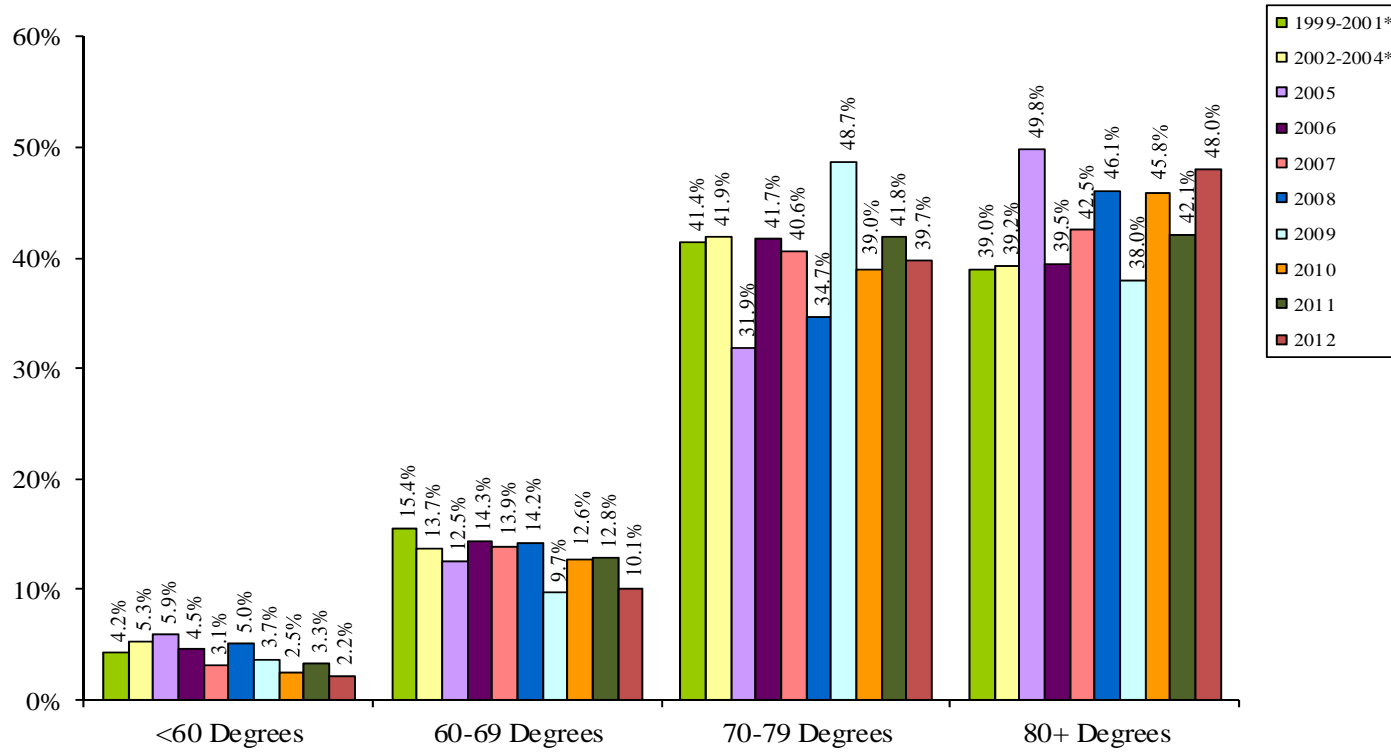
*Three-year average

Figure R2 – Age of Youth Boaters



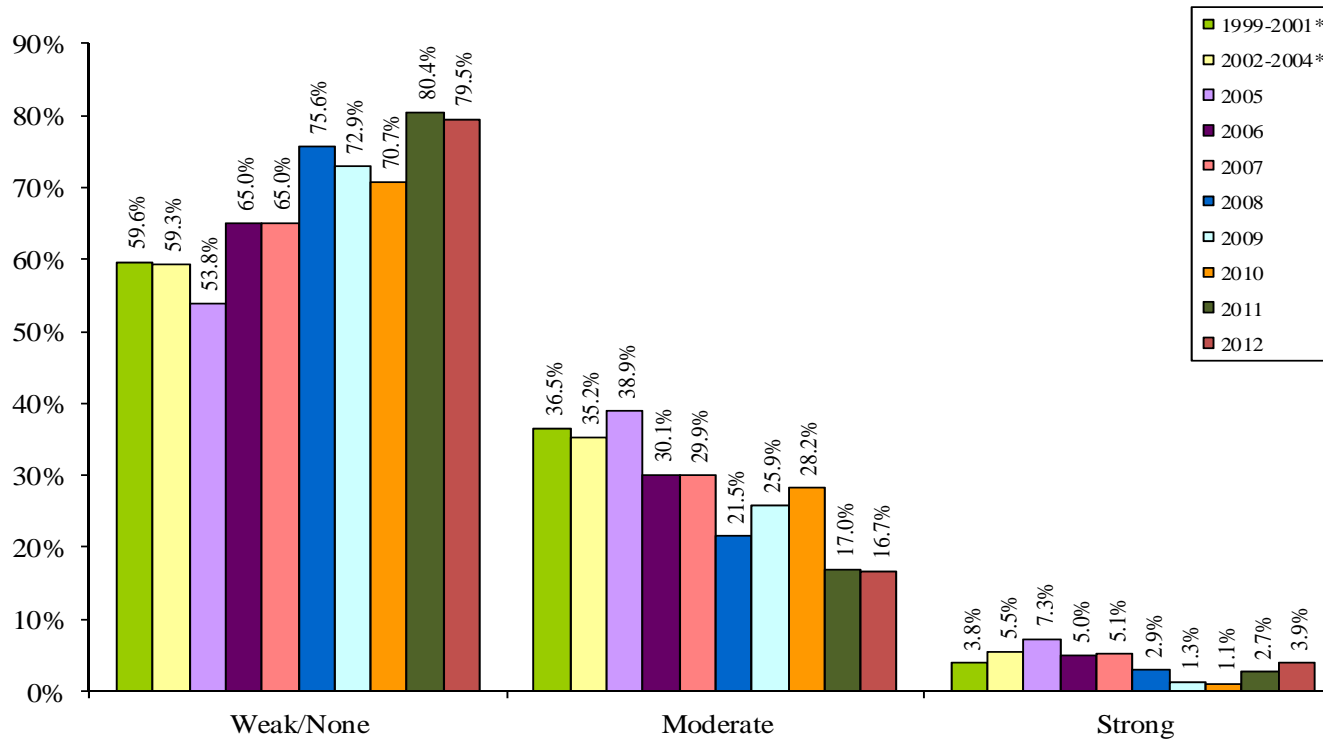
*Three-year average

Figure S – Water Temperature in which ALL Boaters were Observed



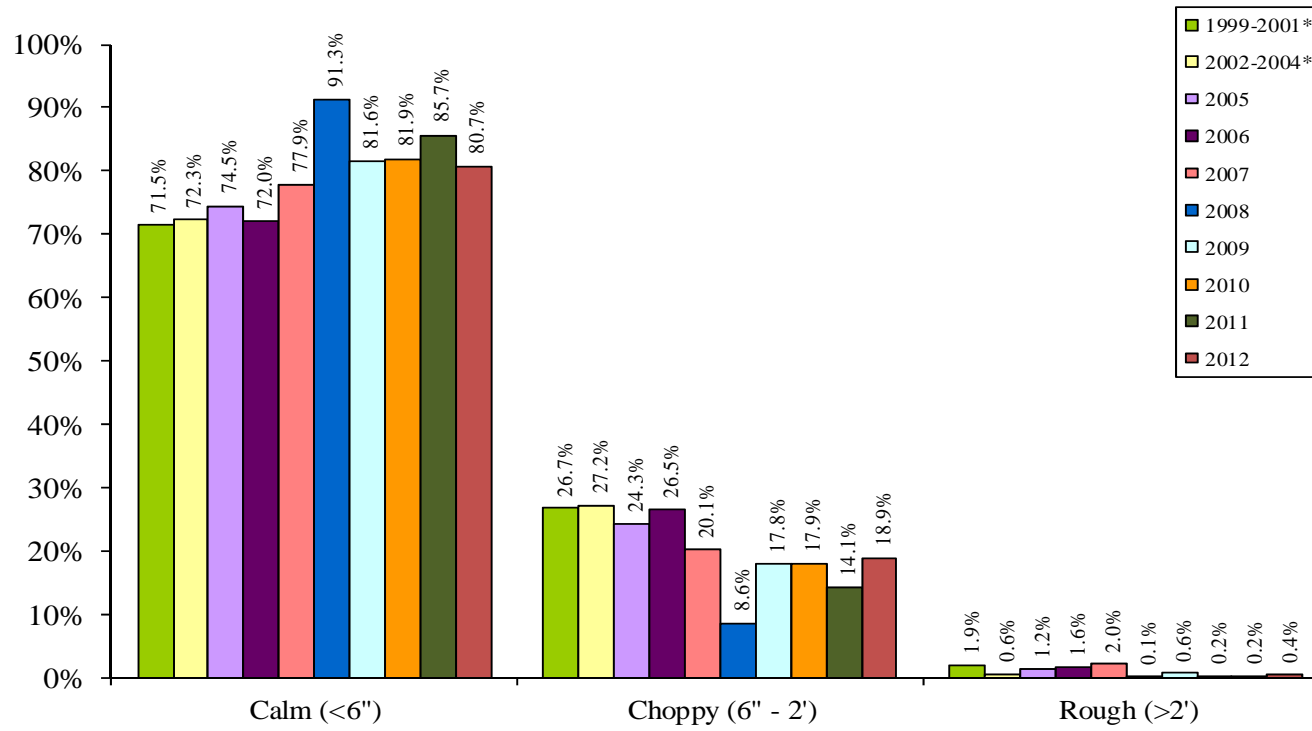
*Three-year average

Figure T – Water Current in which ALL Boaters were Observed



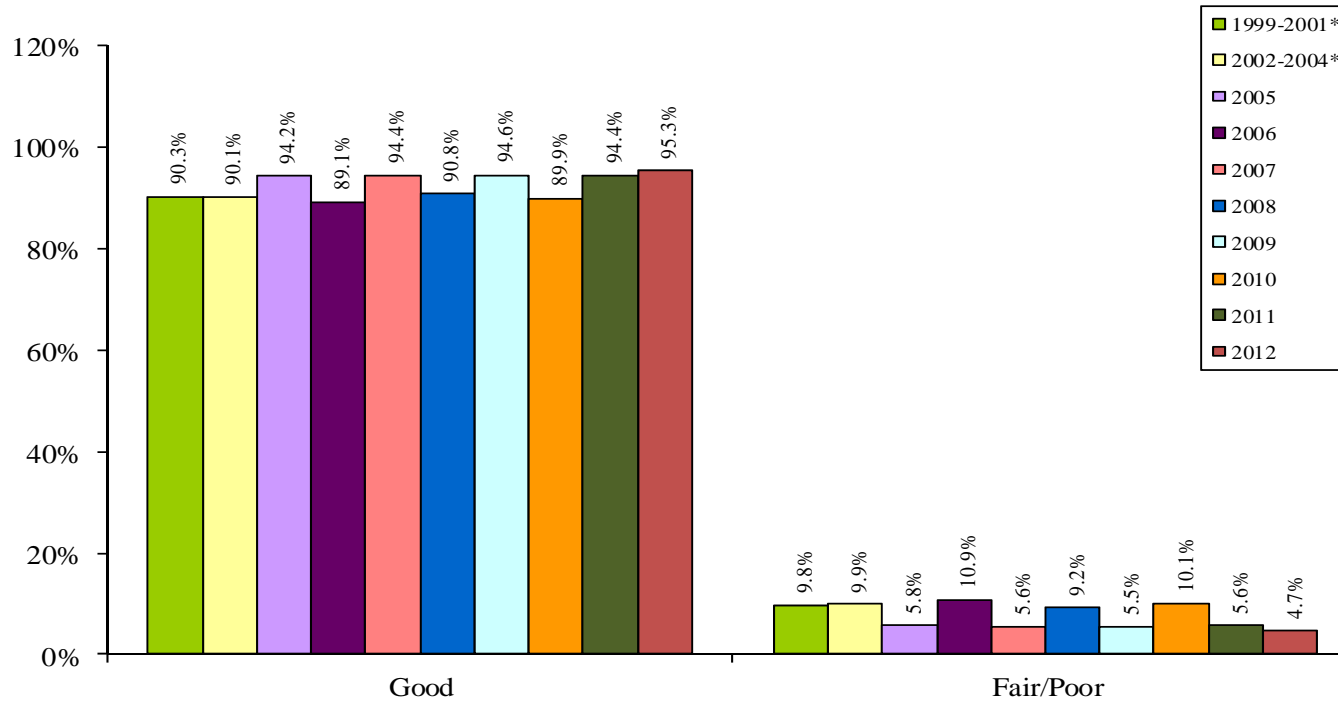
*Three-year average

Figure U – Wave Height in which ALL Boaters were Observed



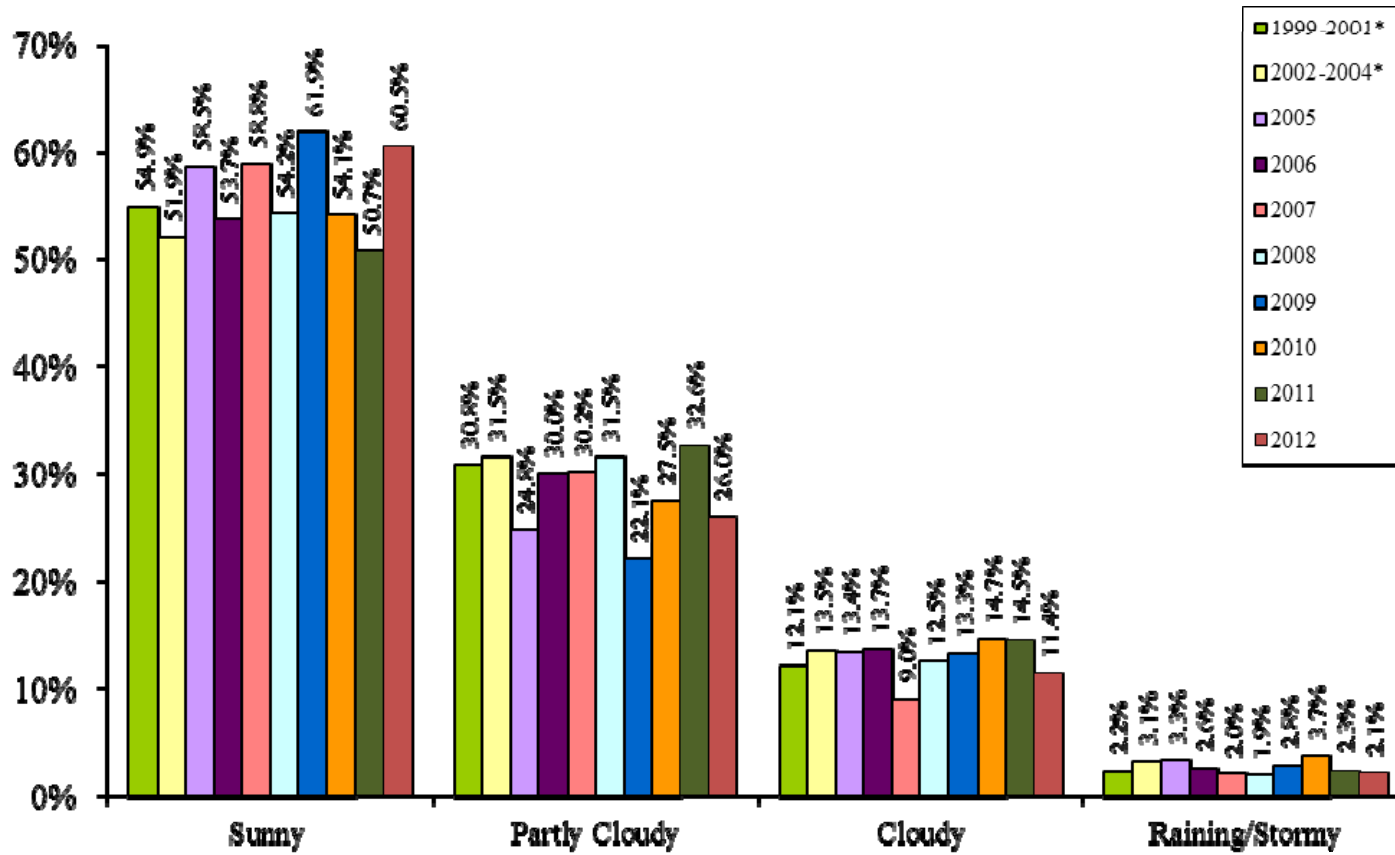
*Three-year average

Figure V – Visibility in which ALL Boaters were Observed



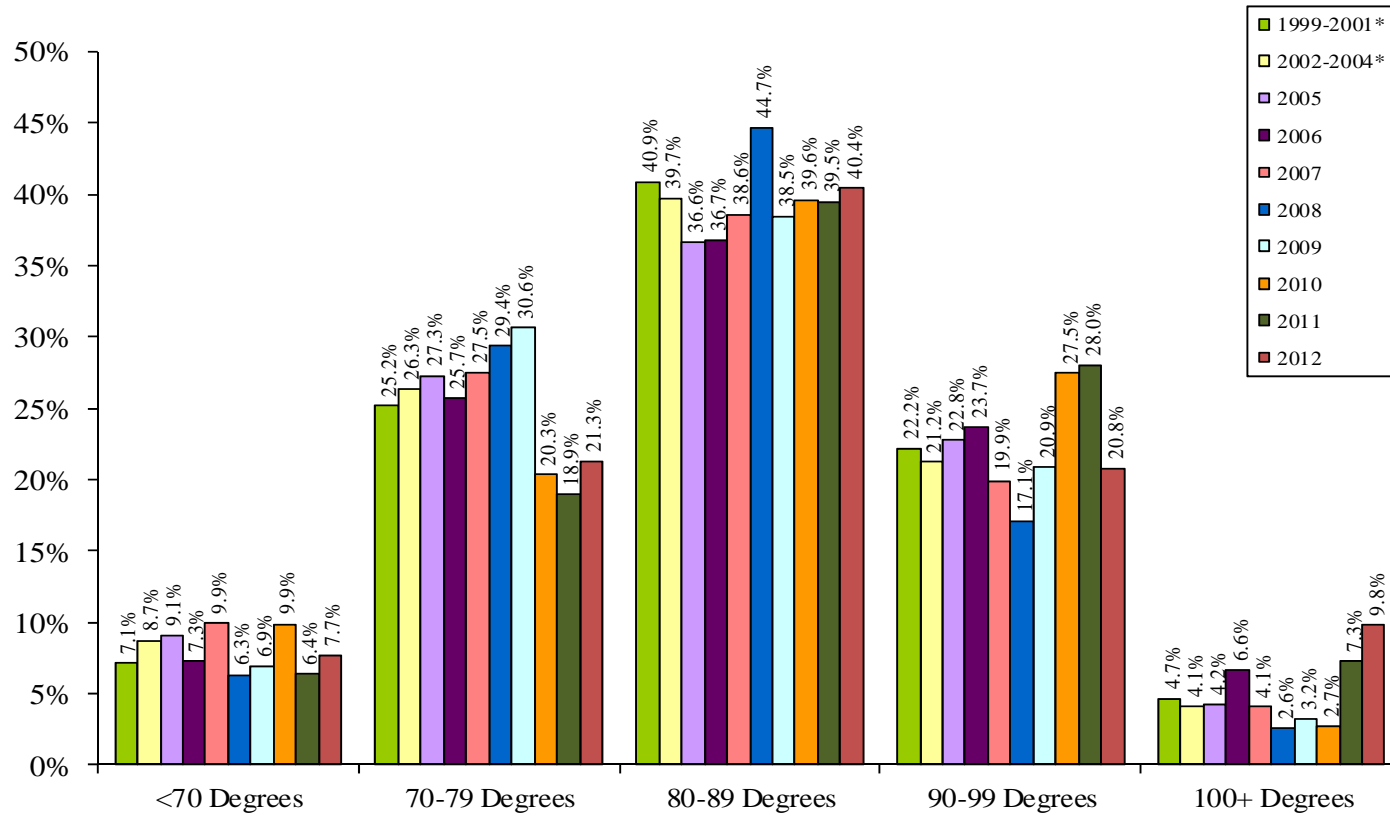
*Three-year average

Figure W – Weather in which ALL Boaters were Observed



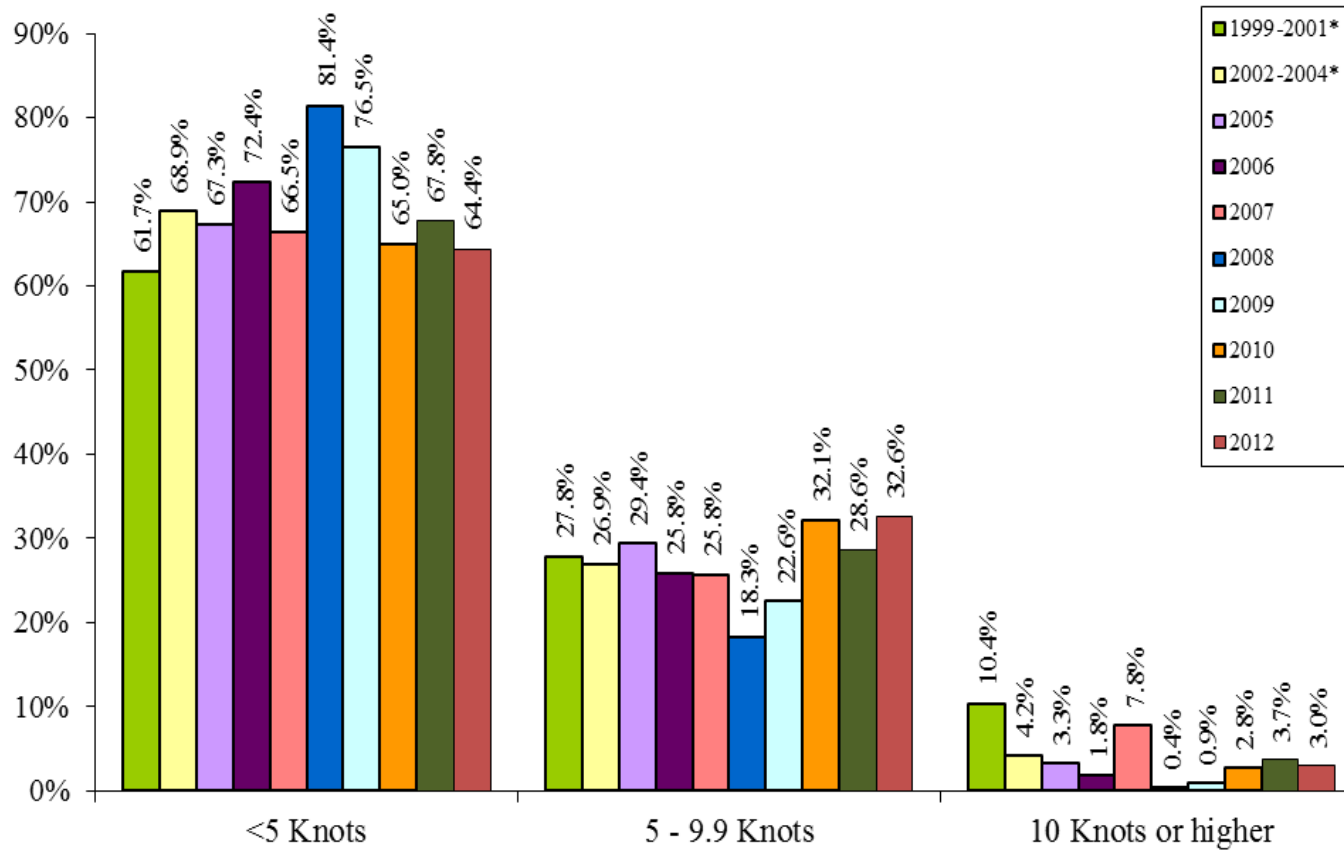
*Three-year average

Figure X – Air Temperature in which ALL Boaters were Observed



*Three-year average

Figure Y – Wind Speed in which ALL Boaters were Observed



*Three-year average