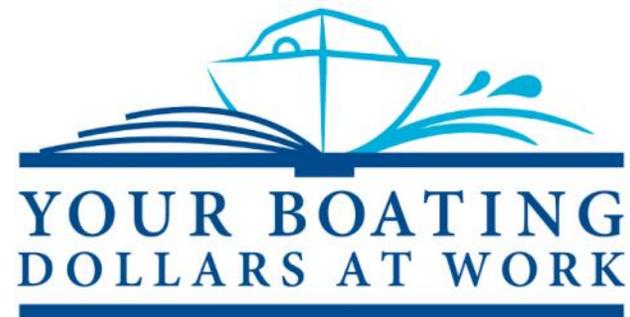


2015 Life Jacket Wear Rate Observation Study

featuring

National Wear Rate Data from 1999 to 2015



Produced under a grant from the Sport Fish Restoration and Boating Trust Fund, administered by the U.S. Coast Guard.

2015 Life Jacket Wear Rate Observation Study

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National Wear Rate Data from 1999 to 2015

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JSI Research & Training Institute, Inc.

Promoting and Improving Health

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I. INTRODUCTION

This report provides data and analysis on the 2015 National Life Jacket Wear Rate Observation Study with comparison information from the previous sixteen years' of studies (1999-2014). 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 2014 Recreational Boating Statistics report, published by the United States Coast Guard (USCG), shows that among the 401 drowning deaths in 2014 where life jacket use or nonuse was known, 84% (337) 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 2015 marked the seventeenth 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.

This year we continued the section we added last year reporting the impact of various site and boat characteristics on wear rates. These tables provide insights into the factors which influence wear rates. The tables show these relationships separately for powerboats, paddlecraft, and sailboats.

A new chapter in this report focuses on the experience and quality of the new partnership with the Coast Guard Auxiliary in helping to conduct this year's study. The Auxiliary conducted observations in ten states. In this new section of the report we compare JSI results with the Auxiliary results.

Most information in this report is presented separately for adults (18+ years old) and youth (0 to 17 years old) since wear rates are substantially different for these two groups. Over the seventeen 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 1999-2015 period of data collection.

II. NATIONAL CORE DATA RESULTS

Adult Life Jacket Wear Rates on Open Motorboats 2006 to 2015

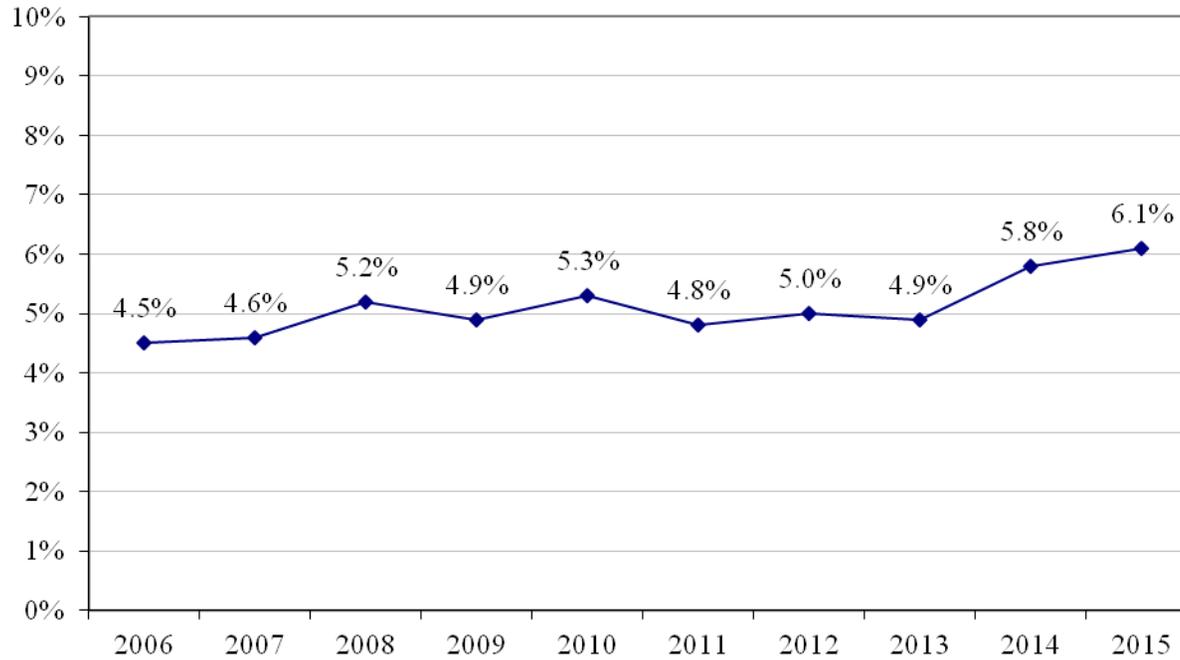
The National Boating Safety Advisory Council (NBSAC) recommended the creation of a strategic plan for the National Recreational Boating Safety Program in 2005. The goals, objectives, and strategies in this Plan can help all partners in boating safety work together to reduce the incidents of preventable deaths, injuries, and property damage. One of the objectives of the 2012-2016 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 since the wear rates for skiffs are generally greater than those for speedboats. 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 adult wear rate for open motorboats in 2015 is 6.1% and represents a generally improving trend since 2011. (See Figure A for a chart showing these trends and also Table 2.2 on page 11.) This rate is the highest observed by the study to date. Since 2013 significant increases have resulted.



Figure A – Adult Wear Rates on Open Motorboats* 2006-2015
(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 2015

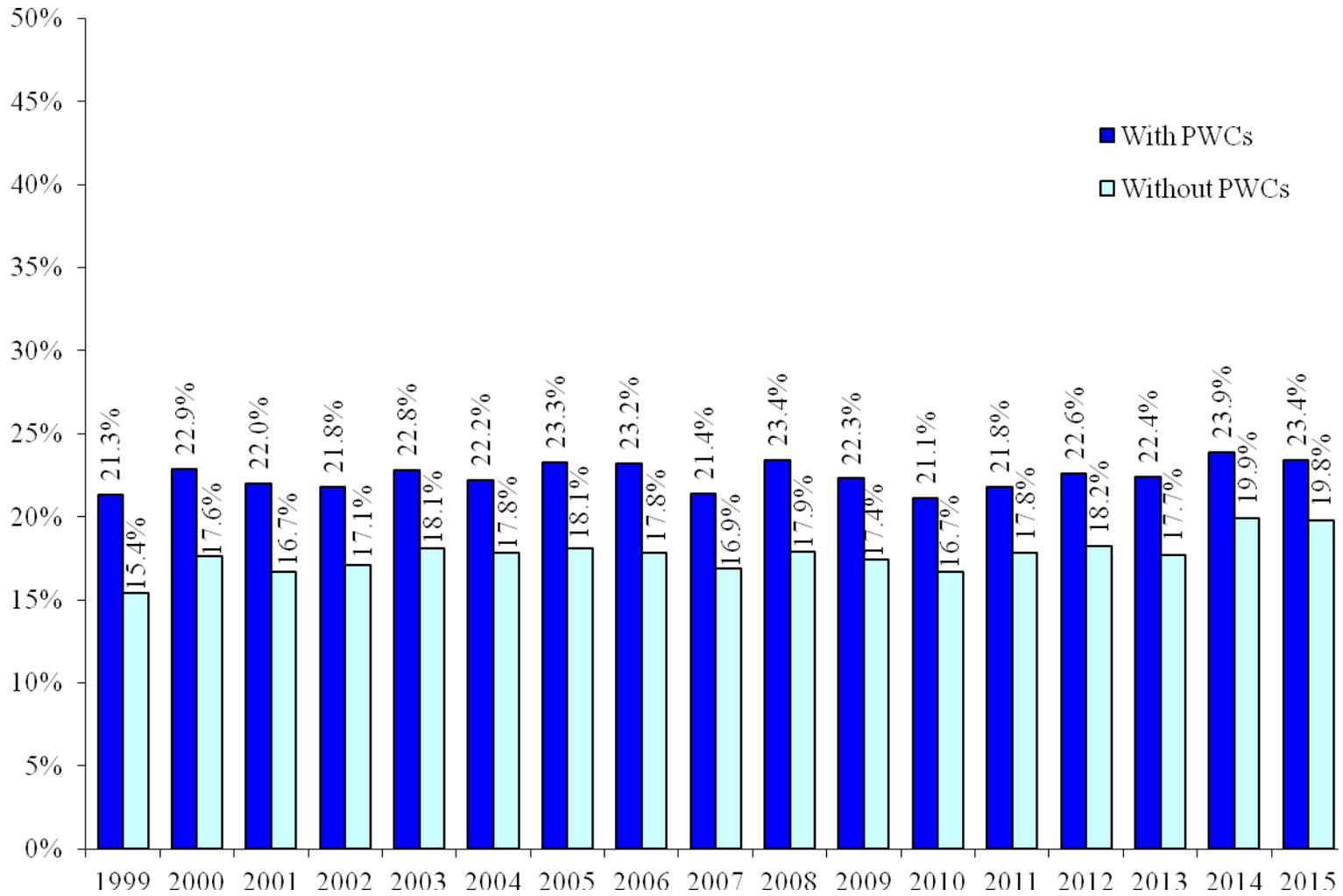
Figure B shows trends for national life jacket wear rates, including all groups of recreational boaters together (youth and adults) for two groups of boats - “all boats” and “all boats except PWCs”. The two sets of data present a clear indication of the impact of PWCs (Personal Watercraft) on the overall 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 operators and passengers of PWCs in almost all the states where observations occur (the exception is Alaska for adults).

The average life jacket wear rate for all boats and boaters combined for 2015 was 23.4%, slightly lower than in 2014.

The 2015 average wear rate excluding PWCs was 19.8% and represents the second highest on record.



Figure B – Life Jacket Wear Rates for ALL Boaters

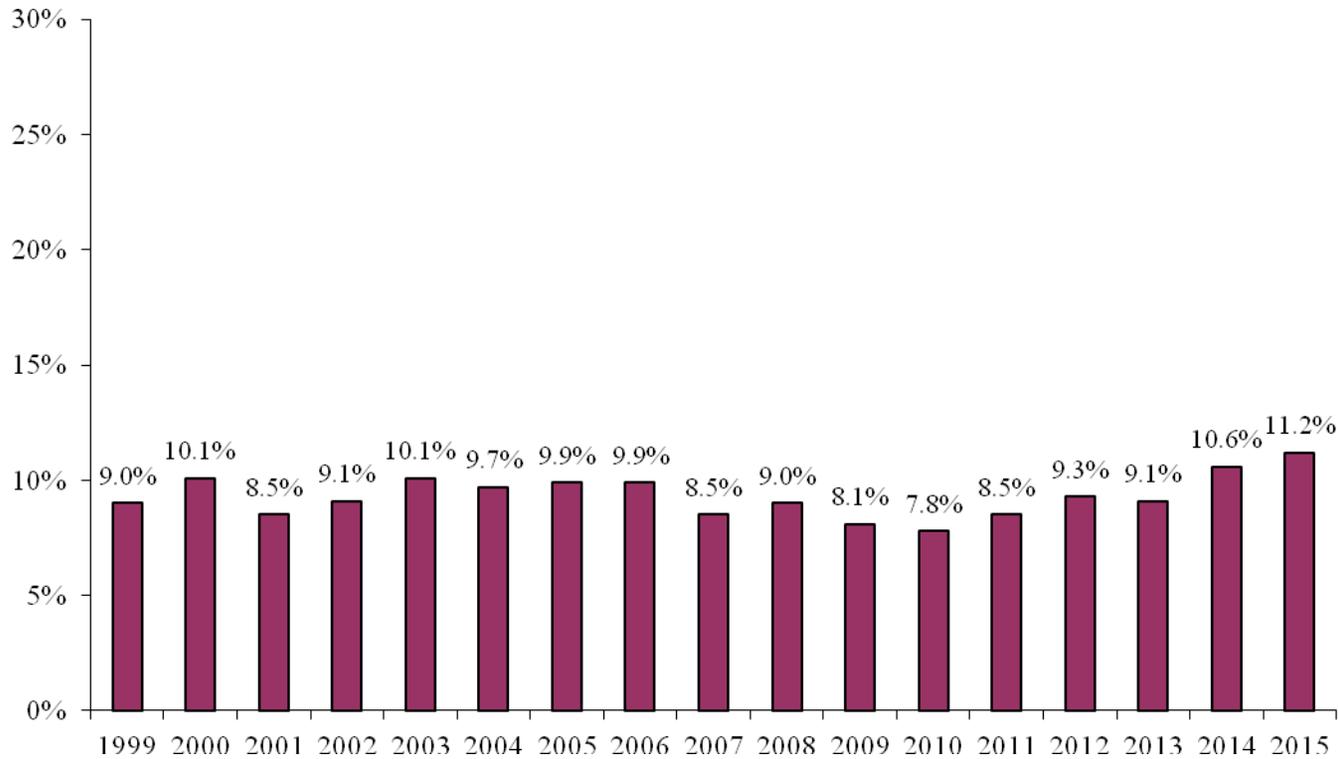


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*Factors controlled for: Age & Boat Type.

National Life Jacket Wear Rates for ADULTS (18 years or older) 1999 to 2015

The national average wear rate for all adults on all boats excluding PWCs in 2015 was 11.2%. This overall adult boater wear rate is the highest rate since the study began in 1999. It represents a continuing upward trend since 2010 (7.8%), the lowest year on record.

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

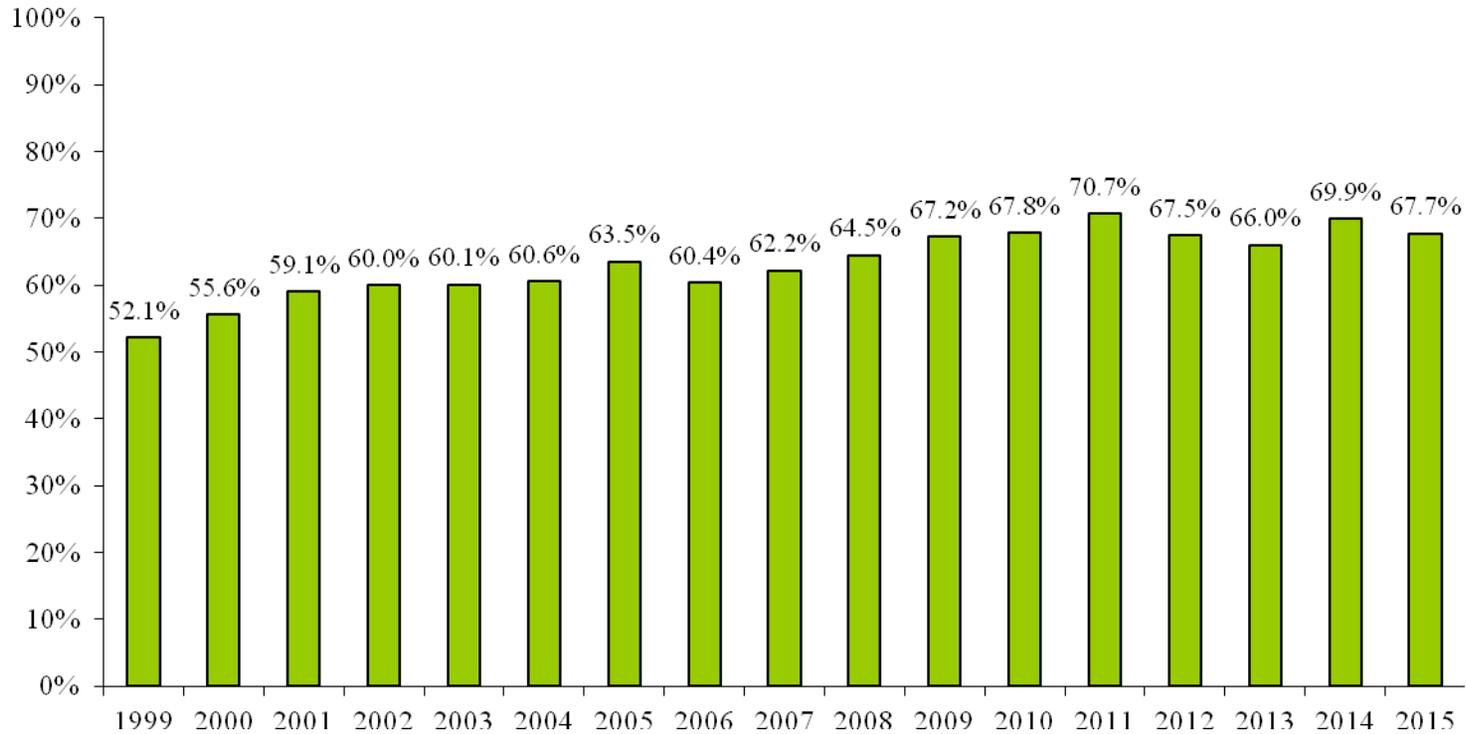


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*Factors controlled for: Age & Boat Type.

National Life Jacket Wear Rates for YOUTH (17 years or younger) 1999 to 2015

Figure D and Table 2.1 show the national wear rate trend for all youth (17 years or younger) on all boats excluding PWCs. These rates are relatively high across the seventeen years of data shown with a general upward trend from 1999 to 2011. The rate for 2015 is 67.7%.

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 2015

Table 2.1 presents wear rates by the different age categories captured in the study.

The youth (0-17) wear rate for 2015 was 67.7% down slightly from last year. For the under 6 year olds, rates were 92.1% in 2015; for those between 6 and 12 years of age rates were 87.2%; and for teens (ages 13 to 17) rates were 37.2%. All of these rates are down slightly from 2014 levels.

For adults ages 18 to 64, the 2015 wear rate data is the highest since the study began (11.1%).

For adults 65 years of age and older, the 2015 data show wear rates of 12.3%.

As previously indicated in Figure C and in Table 2.1, when both adult groups are combined (18+ years), there is an increase from 10.6% in 2014 to 11.2% in 2015.



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

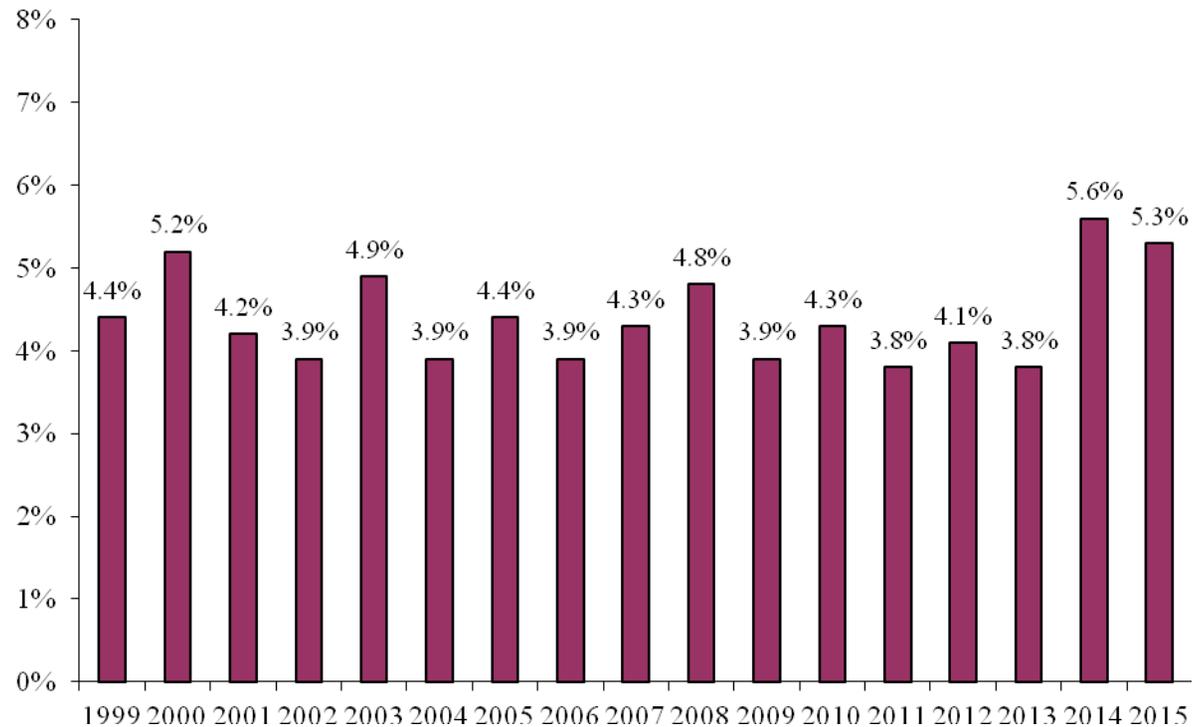
| Age | Observation Year | | | | | | | | | | | | | | | | |
|-----------------------------|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) |
| 0-5 yrs | 80.6% | 89.1% | 91.7% | 90.1% | 90.3% | 94.9% | 93.1% | 94.4% | 92.2% | 93.5% | 93.6% | 94.8% | 96.6% | 94.7% | 93.5% | 94.5% | 92.1% |
| | (500) | (716) | (703) | (676) | (658) | (743) | (714) | (921) | (930) | (938) | (854) | (811) | (874) | (662) | (789) | (804) | (694) |
| 6-12 yrs | 69.1% | 72.1% | 76.6% | 79.2% | 79.7% | 81.6% | 80.6% | 79.1% | 84.1% | 87.3% | 86.5% | 89.1% | 90.7% | 84.9% | 85.4% | 87.3% | 87.2% |
| | (2104) | (2696) | (3122) | (2752) | (2627) | (27411) | (2487) | (2403) | (2819) | (2579) | (2812) | (2809) | (2381) | (2844) | (2494) | (2757) | (2227) |
| 13-17 yrs | 24.1% | 30.5% | 31.2% | 32.4% | 32.0% | 29.8% | 32.8% | 33.5% | 31.5% | 33.2% | 38.9% | 35.1% | 41.4% | 37.6% | 34.9% | 41.6% | 37.2% |
| | (2244) | (2725) | (2893) | (2575) | (2767) | (2572) | (2230) | (2403) | (2652) | (2507) | (2420) | (2127) | (1817) | (2163) | (1933) | (1837) | (1694) |
| 0-17 yrs (all youth) | 52.1% | 55.6% | 59.1% | 60.0% | 60.1% | 60.6% | 63.5% | 60.4% | 62.2% | 64.5% | 67.2% | 67.7% | 70.7% | 67.5% | 66.0% | 69.9% | 67.7% |
| | (4624) | (6094) | (6695) | (5924) | (5970) | (5955) | (5414) | (5713) | (6401) | (6024) | (6086) | (5747) | (5072) | (5669) | (5216) | (5398) | (4615) |
| 18-64 yrs | 8.8% | 10.1% | 8.5% | 9.2% | 10.1% | 9.7% | 9.9% | 10.0% | 8.4% | 9.1% | 8.1% | 7.7% | 8.5% | 9.2% | 9.1% | 10.4% | 11.1% |
| | (24321) | (27100) | (32528) | (31742) | (28551) | (33319) | (30176) | (29591) | (32108) | (30743) | (34632) | (36420) | (33267) | (32298) | (30843) | (33058) | (31012) |
| 65+ yrs | 12.9% | 9.9% | 6.9% | 6.8% | 9.4% | 8.3% | 11.0% | 8.3% | 11.7% | 6.1% | 7.0% | 10.7% | 7.2% | 11.8% | 6.9% | 13.3% | 12.3% |
| | (1147) | (1040) | (1276) | (922) | (1106) | (1331) | (823) | (803) | (881) | (1190) | (1129) | (763) | (951) | (1122) | (1091) | (1634) | (1232) |
| 18+ yrs (all adults) | 9.0% | 10.1% | 8.5% | 9.1% | 10.1% | 9.7% | 9.9% | 9.9% | 8.5% | 9.0% | 8.1% | 7.8% | 8.5% | 9.3% | 9.1% | 10.6% | 11.2% |
| | (25468) | (28140) | (33804) | (32664) | (29657) | (34650) | (30999) | (30394) | (32989) | (31933) | (35761) | (37003) | (34218) | (33420) | (31934) | (34692) | (32244) |

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 *Factors controlled for: Age & Boat Type.

Powerboats for Adults (18 years or older)

Figure E and Table 2.2 present information for all powerboats for adults. The 2015 rate for all powerboats is 5.3%. The 2015 rate for all powerboats is the second highest it has been in the seventeen years of observations. Speedboats, the most popular type of powerboat, showed a wear rate of 4.1%. Open motorboats which included a combination of skiffs and speedboats showed a 2015 wear rate of 6.1%. The 2015 open motorboat rate represents an increase from 2014 (5.8%).

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 | Observation Year | | | | | | | | | | | | | | | | |
|---|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) |
| All Powerboats | 4.4% | 5.2% | 4.2% | 3.9% | 4.9% | 3.9% | 4.4% | 3.9% | 4.3% | 4.8% | 3.9% | 4.3% | 3.8% | 4.1% | 3.8% | 5.6% | 5.3% |
| (no PWC's) | (19894) | (22448) | (27864) | (26304) | (24190) | (28285) | (25741) | (25412) | (27623) | (27315) | (29924) | (30894) | (28954) | (27890) | (26786) | (28766) | (26444) |
| Skiff/Utility | 10.0% | 10.3% | 9.7% | 5.9% | 10.4% | 7.9% | 7.2% | 7.3% | 8.5% | 9.2% | 6.9% | 9.7% | 8.2% | 7.8% | 6.4% | 13.1% | 10.2% |
| | (1867) | (1903) | (2469) | (3177) | (4214) | (4429) | (5038) | (4091) | (5340) | (6633) | (7257) | (6634) | (6530) | (6936) | (7231) | (6776) | (6592) |
| Runabout/Speedboat | 4.2% | 5.3% | 4.5% | 4.3% | 4.6% | 3.9% | 4.7% | 3.7% | 3.6% | 4.1% | 3.5% | 3.2% | 3.0% | 3.3% | 3.5% | 3.5% | 4.1% |
| | (13195) | (14463) | (16985) | (14066) | (13057) | (16633) | (13643) | (14512) | (14414) | (13901) | (14635) | (15093) | (14381) | (13441) | (11686) | (13040) | (11853) |
| Runabout/Speedboat (Excluding Towed Participants) | 3.6% | 4.6% | 3.9% | 3.6% | 3.9% | 3.2% | 3.7% | 2.8% | 2.9% | 3.05 | 2.5% | 2.2% | 2.3% | 2.3% | 2.4% | 2.6% | 3.5% |
| | (13096) | (14364) | (16872) | (13969) | (12963) | (16477) | (13480) | 14376) | (14313) | (13744) | (14481) | (14947) | (14279) | (13294) | (11554) | (12923) | (11766) |
| Open Motorboats** (Skiff/Utility+ Runabout/Speedboat) | 5.5% | 6.4% | 5.6% | 4.7% | 5.9% | 4.8% | 5.3% | 4.5% | 4.6% | 5.2% | 4.9% | 5.3% | 4.8% | 5.0% | 4.9% | 5.8% | 6.1% |
| | (15062) | (16366) | (19454) | (17243) | (17271) | (21052) | (18681) | (18603) | (19754) | (20534) | (21892) | (21727) | (20911) | (20377) | (18917) | (19816) | (18445) |
| Cabin Cruiser | 1.8% | 1.6% | 1.2% | 1.9% | 1.7% | 1.0% | 1.1% | 1.7% | 2.0% | 1.4% | 1.6% | 1.5% | 1.6% | 1.6% | 1.0% | 2.2% | 2.7% |
| | (3396) | (4391) | (6222) | (7111) | (5119) | (5242) | (5054) | (4280) | (5353) | (4430) | (5342) | (5900) | (5085) | (4611) | (4719) | (4669) | (4782) |
| Houseboat | 0.0% | 0.0% | 0.6% | 0.8% | 0.0% | 5.6% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.2% | 0.0% | 0.0% | 0.8% | 1.6% |
| | (151) | (216) | (162) | (124) | (328) | (216) | (219) | (112) | (43) | (51) | (31) | (140) | (309) | (18) | (51) | (131) | (64) |
| Pontoon | 4.0% | 6.2% | 1.9% | 2.7% | 2.9% | 2.9% | 4.1% | 2.4% | 2.7% | 1.1% | 2.1% | 1.5% | 1.4% | 2.3% | 1.4% | 2.4% | 2.6% |
| | (1231) | (1458) | (1929) | (1796) | (1610) | (1770) | (1849) | (2276) | (2150) | (2051) | (2436) | (2922) | (2734) | (2624) | (2917) | (3966) | (2961) |
| PWC | 94.2% | 97.4% | 96.0% | 95.8% | 94.7% | 95.5% | 95.3% | 97.1% | 96.1% | 97.6% | 97.4% | 97.5% | 97.7% | 96.9% | 96.3% | 96.9% | 97.6% |
| | (1899) | (1761) | (2091) | (1798) | (1589) | (1721) | (1858) | (1962) | (1736) | (2009) | (2093) | (1921) | (1524) | (1811) | (1905) | (1856) | (1501) |
| Powered Inflatable/Raft | 15.7% | 22.3% | 13.5% | 27.2% | 14.8% | 9.0% | 1.9% | 11.0% | 19.1% | 17.6% | 11.9% | 16.7% | 14.3% | 14.1% | 27.2% | 22.9% | 12.8% |
| | (205) | (233) | (259) | (154) | (190) | (211) | (157) | (253) | (366) | (228) | (254) | (345) | (224) | (278) | (233) | (315) | (256) |

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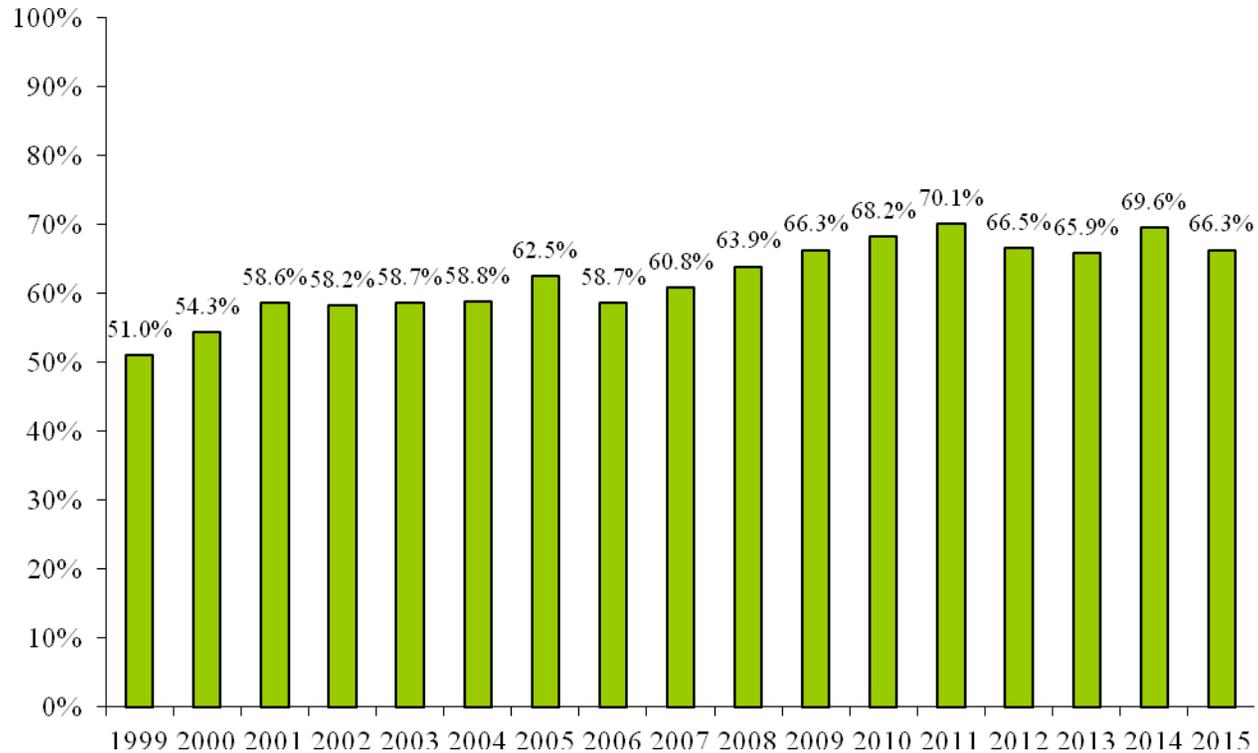
*Factors controlled for: Age & Boat Type.

** 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 proportion.

Powerboats for Youth (17 years or younger)

Figure F and Table 2.3 present data for all powerboats for the three age groups of youth combined (17 years or younger). Wear rates for youth have generally increased from 1999 through 2011, although they have leveled off since 2012. The 2015 wear rate is 66.3%.

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



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2015 National Observational Life Jacket Wear Rate Study
*Factors controlled for: Age & Boat Type.

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

| Boat Type | Observation Year | | | | | | | | | | | | | | | | |
|--|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) |
| All Powerboats | 51.0% | 54.3% | 58.6% | 58.2% | 58.7% | 58.8% | 62.5% | 58.7% | 60.8% | 63.9% | 66.3% | 68.2% | 70.1% | 66.5% | 65.9% | 69.6% | 66.3% |
| (no PWCs) | (3834) | (5179) | (5717) | (5162) | (5170) | (5191) | (4737) | (5043) | (5583) | (5257) | (5451) | (5090) | (4589) | (4846) | (4546) | (4798) | (4028) |
| Skiff/Utility | 52.7% | 49.5% | 68.2% | 54.9% | 63.2% | 60.7% | 63.3% | 58.4% | 63.1% | 68.4% | 70.4% | 68.1% | 75.4% | 65.1% | 66.3% | 70.8% | 68.2% |
| | (338) | (369) | (441) | (557) | (768) | (641) | (781) | (661) | (947) | (988) | (1097) | (862) | (929) | (1022) | (936) | (901) | (948) |
| Runabout/Speedboat | 51.6% | 55.2% | 58.8% | 59.4% | 60.0% | 60.0% | 63.5% | 60.9% | 61.7% | 64.6% | 68.2% | 69.7% | 71.0% | 69.9% | 69.2% | 70.5% | 68.1% |
| | (2744) | (3776) | (3987) | (3479) | (3369) | (3574) | (2966) | (3348) | (3517) | (3256) | (3133) | (2943) | (2624) | (2744) | (2482) | (2696) | (2121) |
| Open Motorboats** | 51.8% | 54.3% | 60.1% | 58.7% | 60.5% | 60.1% | 63.5% | 60.5% | 61.9% | 65.2% | 68.6% | 69.5% | 71.6% | 69.1% | 68.7% | 70.6% | 68.2% |
| (Skiff/Utility+ Runabout/Speedboat) | (3082) | (4145) | (4428) | (4036) | (4137) | (4215) | (3747) | (4009) | (4464) | (4244) | (4230) | (3805) | (3553) | (3766) | (3418) | (3597) | (3069) |
| Cabin Cruiser | 42.6% | 48.2% | 48.3% | 50.7% | 45.3% | 49.6% | 54.6% | 50.7% | 52.0% | 51.0% | 51.2% | 58.8% | 61.6% | 50.6% | 48.9% | 56.6% | 58.9% |
| | (418) | (587) | (774) | (690) | (659) | (529) | (528) | (501) | (639) | (581) | (644) | (524) | (507) | (465) | (505) | (364) | (430) |
| Houseboat | 8.7% | 12.7% | 25.7% | 30.3% | 17.8% | 24.7% | 12.9% | 28.2% | 37.6% | 0.0% | 25.8% | 19.1% | 39.9% | 6.9% | 84.9% | 0.0% | 34.2% |
| | (46) | (64) | (44) | (30) | (63) | (35) | (38) | (40) | (5) | (1) | (4) | (18) | (19) | (3) | (1) | (2) | (10) |
| Pontoon | 38.3% | 46.3% | 54.8% | 55.6% | 51.8% | 48.5% | 64.6% | 50.3% | 64.1% | 65.9% | 66.2% | 68.4% | 65.7% | 67.3% | 66.7% | 71.9% | 63.2% |
| | (272) | (379) | (455) | (399) | (338) | (394) | (440) | (505) | (414) | (392) | (530) | (716) | (494) | (580) | (598) | (787) | (511) |
| PWC | 96.0% | 99.1% | 99.1% | 98.8% | 98.0% | 98.5% | 98.3% | 99.2% | 98.7% | 99.4% | 98.6% | 99.4% | 99.1% | 98.7% | 98.0% | 99.7% | 99.0% |
| | (551) | (649) | (691) | (502) | (562) | (543) | (652) | (580) | (522) | (664) | (572) | (427) | (376) | (401) | (371) | (365) | (292) |
| Powered Inflatable/Raft | 59.3% | 69.7% | 79.5% | 72.8% | 66.8% | 65.8% | 71.2% | 70.6% | 71.1% | 79.7% | 70.3% | 78.2% | 73.1% | 58.5% | 65.4% | 68.9% | 69.5% |
| | (62) | (68) | (60) | (37) | (36) | (53) | (22) | (28) | (66) | (39) | (47) | (45) | (35) | (35) | (25) | (50) | (18) |

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*Factors controlled for: Age & Boat Type.

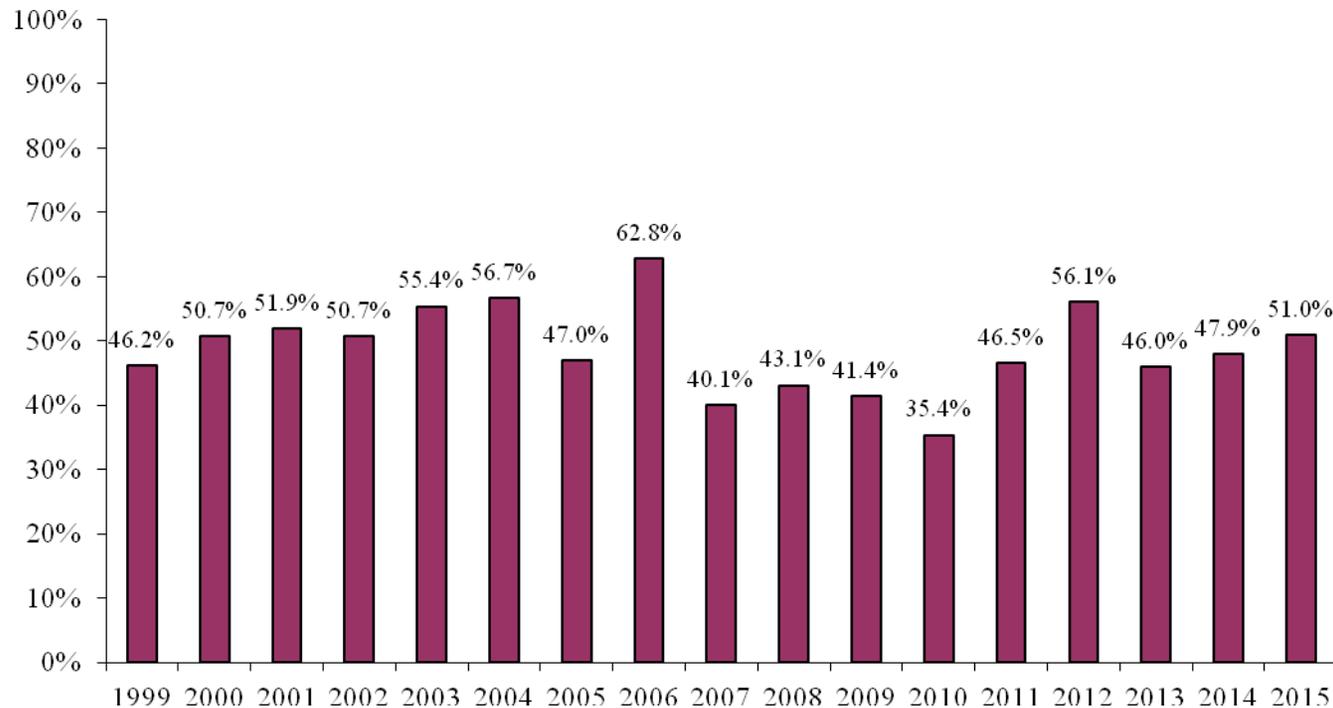
** The Open Motorboat category is created by grouping “Skiffs” and “Speedboat/Runabouts” together. The proportion of Skiffs to Speedboat/Runabouts has been set to reflect the national proportions observed in 2006, the year in which the Strategic Plan goals were first measured. In addition, we control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

All Paddlecraft for Adults (18 years or older)

Table 2.4 presents results for adults in all types of paddlecraft and Figure G shows the trends for all paddlecraft excluding standup paddleboards (since this is a relatively recent type of boat to be seen). The rates for all paddlecraft excluding standup paddleboards increased from last year's rate (47.9% to 51.0%). These changes in rates should be viewed with caution, however, since paddlecraft activity is mostly observed at only a few sites and therefore the overall averages can be highly influenced by local factors such as weather or special events at these sites.

In Table 2.4 we added two rows of data. One for standup paddleboards first observed in 2010 and one for an all paddlecraft rate including standup paddleboards. The number of boaters observed increased since 2010 and wear rates for standup paddleboards have exceeded 50% since 2012.

Figure G – Adult Wear Rates for ALL Paddlecraft (excluding Paddleboards)*



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*Factors controlled for: Age & Boat Type.

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

| Boat Type | Observation Year | | | | | | | | | | | | | | | | |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 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) | 2013 % (N's) | 2014 % (N's) | 2015 % (N's) |
| All Paddlecraft | 46.2% | 50.7% | 51.9% | 50.7% | 55.4% | 56.7% | 47.0% | 62.8% | 40.1% | 43.1% | 41.4% | 35.4% | 46.5% | 56.1% | 46.0% | 47.9% | 51.0% |
| (excluding SUPs) | (1676) | (1676) | (1816) | (1864) | (1672) | (1637) | (1616) | (1456) | (2065) | (1523) | (1939) | (2551) | (1608) | (2015) | (1919) | (2555) | (2531) |
| Paddled Inflatable/Raft | 71.8% | 13.0% | 65.1% | 65.6% | 60.5% | 57.8% | 76.0% | 77.8% | 23.9% | 38.4% | 8.2% | 6.9% | 10.9% | 39.4% | 15.8% | 18.2% | 39.1% |
| | (174) | (198) | (250) | (307) | (290) | (283) | (225) | (308) | (526) | (311) | (340) | (813) | (324) | (485) | (271) | (337) | (455) |
| Rowboat/Dinghy | 24.4% | 37.2% | 18.7% | 27.3% | 22.8% | 10.1% | 59.2% | 26.7% | 15.0% | 23.0% | 35.3% | 34.8% | 34.3% | 60.2% | 17.8% | 29.0% | 22.1% |
| | (82) | (118) | (119) | (193) | (117) | (38) | (71) | (78) | (92) | (65) | (51) | (46) | (87) | (35) | (75) | (79) | (37) |
| Canoe | 17.7% | 33.8% | 23.6% | 15.4% | 30.4% | 26.7% | 14.8% | 29.2% | 19.4% | 19.7% | 25.0% | 19.1% | 37.4% | 32.7% | 35.7% | 24.9% | 30.0% |
| | (809) | (714) | (750) | (701) | (607) | (622) | (679) | (364) | (764) | (481) | (758) | (994) | (386) | (438) | (569) | (744) | (716) |
| Kayak | 82.7% | 85.7% | 84.4% | 85.7% | 81.4% | 87.0% | 74.1% | 77.9% | 72.0% | 65.5% | 72.6% | 75.9% | 68.6% | 74.9% | 67.9% | 74.9% | 70.7% |
| | (611) | (646) | (697) | (663) | (658) | (694) | (675) | (706) | (683) | (648) | (790) | (698) | (811) | (1056) | (1004) | (1395) | (1323) |
| Canoe/Kayak Combined | 45.9% | 58.6% | 53.1% | 49.7% | 56.8% | 58.6% | 44.4% | 61.2% | 44.3% | 46.0% | 49.1% | 47.3% | 49.4% | 52.8% | 50.9% | 51.9% | 51.6% |
| | (1420) | (1360) | (1447) | (1364) | (1265) | (1316) | (1354) | (1070) | (1447) | (1129) | (1548) | (1692) | (1197) | (1494) | (1573) | (2139) | (2039) |
| Paddleboards (SUPs) | | | | | | | | | | | | 27.8% | 41.7% | 52.9% | 58.7% | 53.9% | 52.0% |
| | | | | | | | | | | | | (54) | (84) | (157) | (264) | (397) | (348) |
| All Paddlecraft** | | | | | | | | | | | | 35.5% | 46.0% | 55.0% | 45.4% | 48.7% | 51.1% |
| (including SUPs) | | | | | | | | | | | | (2605) | (1692) | (2171) | (2183) | (2952) | (2879) |

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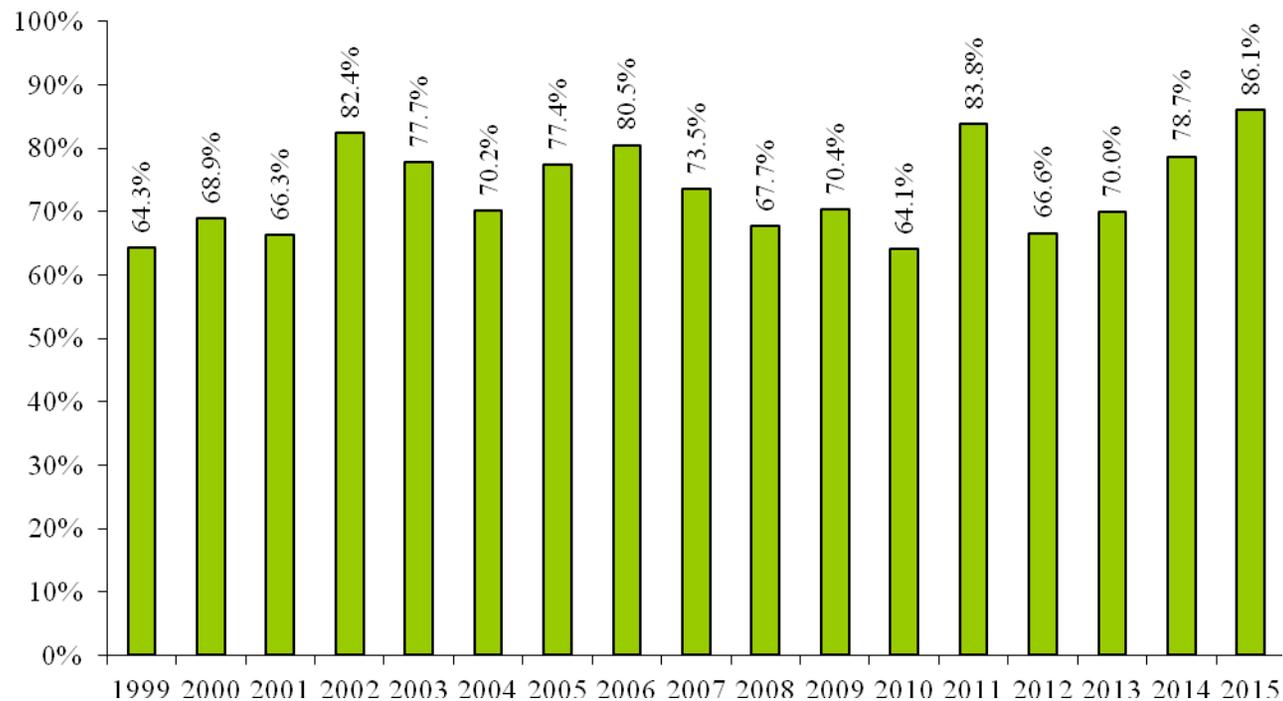
*Factors controlled for: Age & Boat Type.

**Data for this line in the table have been corrected on 5-21-2015 from the earlier published version

All Paddlecraft for Youth (17 years or younger)

Figure H and Table 2.5 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 excluding standup paddleboards wear rates in 2015 were 86.1% which represents an upward trend since 2012. In 2015 wear rates for youth on standup paddleboards was 77.5%, however, this should be viewed with caution since relatively few youth were observed on standup paddleboards.

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 | Observation year | | | | | | | | | | | | | | | | |
|--------------------------------|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) |
| All Paddlecraft | 64.3% | 68.9% | 66.3% | 82.4% | 77.7% | 70.2% | 77.4% | 80.5% | 73.5% | 67.7% | 70.4% | 64.1% | 83.8% | 66.6% | 70.0% | 78.7% | 86.1% |
| (excluding SUPs) | (317) | (457) | (457) | (312) | (372) | (360) | (281) | (225) | (520) | (487) | (319) | (419) | (231) | (476) | (371) | (337) | (340) |
| Paddled Inflatable/Raft | 62.4% | 45.8% | 52.3% | 90.3% | 68.9% | 68.4% | 77.5% | 77.9% | 58.4% | 55.6% | 59.0% | 41.9% | 68.5% | 50.2% | 55.1% | 68.7% | 83.5% |
| | (82) | (124) | (153) | (136) | (113) | (118) | (79) | (87) | (244) | (218) | (76) | (139) | (49) | (192) | (98) | (100) | (112) |
| Rowboat/Dinghy | 11.1% | 47.1% | 60.3% | 54.7% | 88.6% | 58.0% | 77.1% | 67.3% | 61.0% | 77.8% | 91.1% | 98.0% | 94.0% | 88.0% | 90.6% | 74.2% | 78.2% |
| | (9) | (15) | (32) | (31) | (21) | (11) | (17) | (26) | (21) | (25) | (9) | (14) | (15) | (10) | (10) | (23) | (4) |
| Canoe | 57.7% | 74.6% | 62.4% | 71.1% | 75.0% | 60.3% | 69.4% | 68.9% | 81.0% | 78.0% | 70.6% | 68.0% | 95.2% | 66.5% | 78.0% | 78.4% | 82.1% |
| | (142) | (222) | (181) | (98) | (130) | (146) | (101) | (49) | (123) | (158) | (132) | (169) | (82) | (89) | (139) | (87) | (61) |
| Kayak | 83.3% | 89.2% | 94.3% | 83.7% | 91.6% | 91.2% | 88.7% | 89.0% | 90.1% | 83.5% | 85.3% | 85.4% | 89.3% | 84.8% | 77.0% | 90.7% | 91.9% |
| | (84) | (96) | (91) | (47) | (108) | (85) | (94) | (63) | (132) | (86) | (102) | (97) | (85) | (185) | (124) | (127) | (163) |
| Canoe/Kayak Combined | 67.3% | 78.9% | 73.1% | 74.5% | 82.9% | 71.3% | 79.6% | 82.2% | 85.7% | 80.0% | 76.0% | 75.1% | 88.8% | 74.6% | 77.2% | 83.3% | 85.6% |
| | (226) | (318) | (272) | (145) | (238) | (231) | (195) | (112) | (255) | (244) | (234) | (266) | (167) | (274) | (263) | (214) | (224) |
| Paddleboards (SUPs) | | | | | | | | | | 0.0% | 100% | 33.3% | 100% | 92.3% | 51.9% | 75.0% | 77.5% |
| | | | | | | | | | | (3) | (1) | (9) | (5) | (13) | (52) | (44) | (40) |
| All Paddlecraft** | | | | | | | | | | 67.3% | 70.5% | 63.5% | 84.1% | 67.3% | 63.8% | 78.3% | 85.2% |
| (including SUPs) | | | | | | | | | | (490) | (320) | (428) | (236) | (489) | (423) | (381) | (380) |

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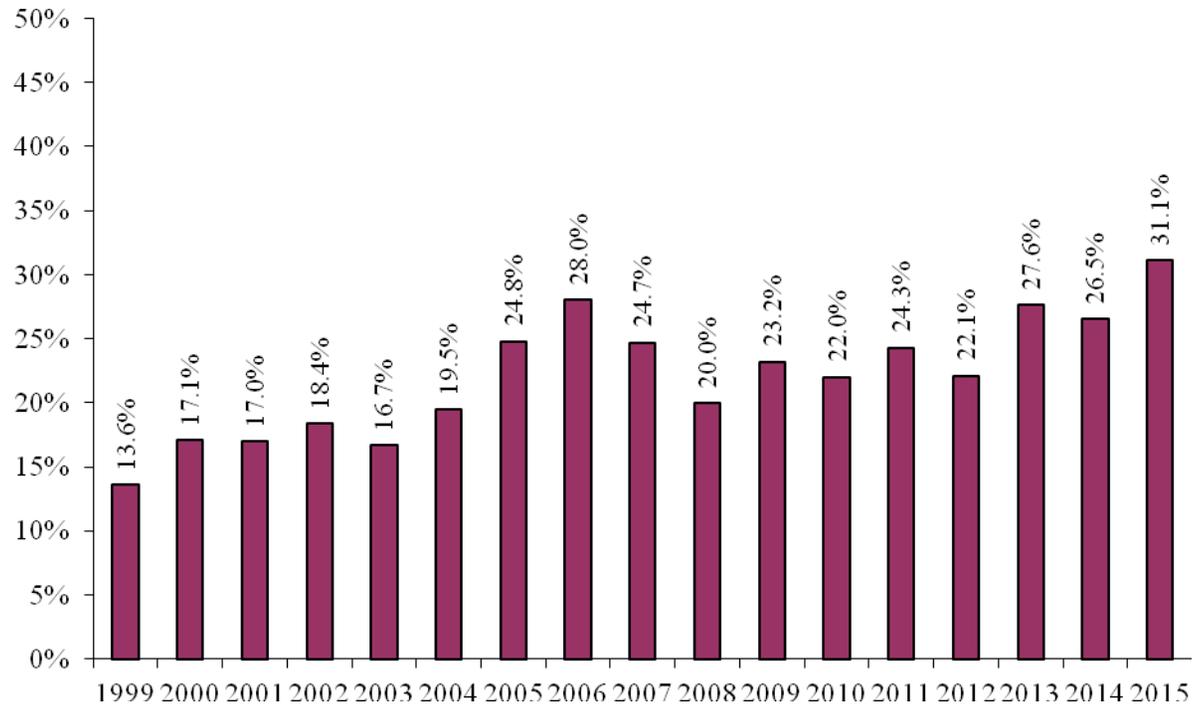
*Factors controlled for: Age & Boat Type.

**Data for this line in the table have been corrected on 5-21-2015 from the earlier published version.

Sail Craft for Adults (18 years or older)

Figure I and Table 2.6 document observations of adults in sail craft. For all sail craft combined, there was an increase in wear rates from 26.5% in 2014 to 31.1% in 2015. The 2015 overall rate is an all time high. 2015 wear rates for day sailors at 69.6% is the highest it has been since the study began. Wear rates for cabin sailboats (20.5%) is also the highest it has ever been since observations began.

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 | Observation Year | | | | | | | | | | | | | | | | |
|-----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 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) | 2013 % (N's) | 2014 % (N's) | 2015 % (N's) |
| All Sail Craft | 13.6% | 17.1% | 17.0% | 18.4% | 16.7% | 19.5% | 24.8% | 28.0% | 24.7% | 20.0% | 23.2% | 22.0% | 24.3% | 22.1% | 27.6% | 26.5% | 31.1% |
| | (3420) | (3565) | (3843) | (4087) | (3149) | (4149) | (3084) | (3279) | (3217) | (3079) | (3733) | (3336) | (3231) | (3297) | (2840) | (2786) | (2800) |
| Sailboard | 16.4% | 94.0% | 80.6% | 83.2% | 96.7% | 92.9% | 53.0% | 92.1% | 83.7% | 94.6% | 71.9% | 83.2% | 100% | 93.3% | 100% | 100% | 94.5% |
| | (46) | (30) | (15) | (55) | (27) | (40) | (20) | (12) | (18) | (17) | (7) | (29) | (9) | (14) | (10) | (3) | (17) |
| Day Sailor | 30.7% | 35.6% | 37.9% | 46.7% | 38.4% | 49.7% | 56.4% | 59.1% | 50.4% | 48.3% | 61.7% | 57.5% | 61.3% | 54.0% | 67.1% | 55.1% | 69.6% |
| | (739) | (791) | (604) | (1124) | (815) | (984) | (736) | (607) | (397) | (649) | (652) | (731) | (736) | (682) | (469) | (630) | (565) |
| Cabin Sailboat | 9.1% | 11.3% | 10.2% | 9.5% | 10.2% | 10.1% | 15.4% | 19.1% | 17.1% | 12.0% | 13.0% | 11.7% | 13.4% | 12.9% | 17.3% | 18.3% | 20.5% |
| | (2635) | (2744) | (3224) | (2908) | (2307) | (3125) | (2328) | (2660) | (2802) | (2413) | (3074) | (2576) | (2486) | (2601) | (2361) | (2153) | (2218) |

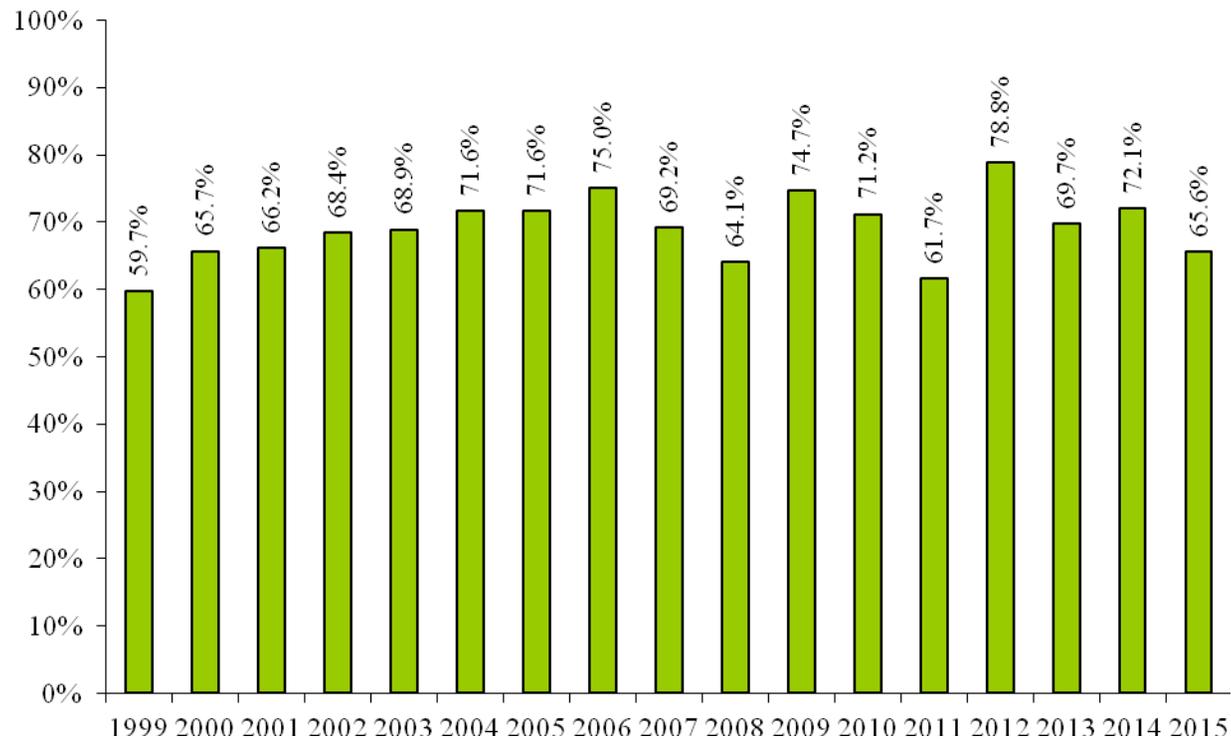
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 *Factors controlled for: Age & Boat Type.



Sail Craft for Youth (17 years or younger)

Figure J and Table 2.7 show that the national average wear rates on all sail craft for all youth decreased from last year (from 72.1% in 2014 to 65.6% in 2017). 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 | Observation Year | | | | | | | | | | | | | | | | |
|-----------------------|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) | % (N's) |
| All Sail Craft | 59.7% | 65.7% | 66.2% | 68.4% | 68.9% | 71.6% | 71.6% | 75.0% | 69.2% | 64.1% | 74.7% | 71.2% | 61.7% | 78.8% | 69.7% | 72.1% | 65.6% |
| | (347) | (329) | (424) | (381) | (323) | (323) | (327) | (371) | (270) | (274) | (305) | (202) | (219) | (313) | (220) | (206) | (170) |
| Sailboard | 0.0% | 100% | 66.7% | 75.0% | -- | 92.1% | 100% | 100% | 82.2% | -- | -- | 100% | -- | 100% | -- | 100% | -- |
| | (3) | (7) | (6) | (4) | (0) | (48) | (1) | (4) | (8) | (0) | (0) | (1) | (0) | (1) | (0) | (1) | (0) |
| Day Sailor | 71.1% | 81.6% | 92.0% | 82.1% | 84.3% | 87.5% | 73.4% | 93.2% | 86.5% | 88.0% | 92.5% | 85.2% | 80.2% | 98.2% | 91.5% | 97.2% | 87.7% |
| | (114) | (81) | (85) | (113) | (107) | (83) | (67) | (122) | (54) | (75) | (80) | (86) | (57) | (166) | (36) | (54) | (27) |
| Cabin Sailboat | 58.3% | 61.5% | 58.2% | 63.5% | 60.6% | 68.3% | 69.4% | 65.7% | 62.4% | 56.4% | 66.4% | 65.9% | 54.9% | 60.3% | 61.7% | 61.0% | 58.6% |
| | (230) | (241) | (333) | (264) | (216) | (192) | (259) | (245) | (208) | (196) | (225) | (115) | (162) | (146) | (184) | (152) | (143) |

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 *Factors controlled for: Age & Boat Type.



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

Table 2.8 shows the breakdown of adult wear rates by boat size for three general categories of boat types: powerboats, sailboats, and paddlecraft. Data are presented only for 2004 to 2015, since 2004 was the first year that observations were divided into two size categories of 16 to 21 feet and 21 to 26 feet, from one category (16 to 26 feet was used in prior years).

As might be expected, wear rates and boat size show a dependent relationship: wear rates decrease as the size of the boat increases. However, the general level of wear is also highly influenced by the type of boat. Powerboat wear rates using an 11 year average go from 8.8% for boats less than 16 feet to 1.6% for boats over 26 feet in length. For sailboats, the 11 year average goes from 74.2% for sailboats less than 16 feet to 12.0% for sailboats over 26 feet in length. For paddlecraft, the 11 year average for boats less than 16 feet is 51.9% and for boats in the 16 to 21 foot category it is 43.0%.



**Table 2.8 – Life Jacket Wear Rates by Boat Type and Size for Adults*
2004 to 2015**

| Boat Type and Size | Observation Year | | | | | | | | | | | | |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| | 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) | 2013 % (N's) | 2014 % (N's) | 2015 % (N's) | Total % (N's) |
| Powerboats (no PWCs) | | | | | | | | | | | | | |
| <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) | 9.3% (2119) | 12.4% (2951) | 6.6% (2174) | 8.8% (28098) |
| 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) | 4.3% (11424) | 7.2% (12217) | 6.9% (11763) | 5.3% (156951) |
| 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) | 2.5% (9364) | 3.4% (9533) | 4.2% (8270) | 2.9% (101846) |
| 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) | 2.1% (3874) | 1.4% (4065) | 2.5% (4234) | 1.6% (47238) |
| 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) | 78.7% (136) | 70.3% (265) | 89.6% (200) | 74.2% (2863) |
| 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) | 66.3% (314) | 43.6% (248) | 63.1% (225) | 53.3% (3936) |
| 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) | 27.6% (736) | 23.8% (593) | 41.1% (654) | 22.4% (10989) |
| 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) | 13.4% (1654) | 17.7% (1644) | 15.1% (1721) | 12.0% (21024) |
| Paddlecraft (excluding SUP) | | | | | | | | | | | | | |
| <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) | 43.0% (1532) | 55.3% (1760) | 52.5% (2126) | 51.9% (17179) |
| 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) | 56.2% (383) | 32.2% (795) | 44.0% (395) | 43.0% (5247) |

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2015 National Observational Life Jacket Wear Rate Study
*Factors controlled for: Age & Boat Type.

III. PARTNERSHIP WITH THE COAST GUARD AUXILIARY

Background

The 2015 National Life Jacket Observation study was an effort carried out by a partnership of JSI and the Coast Guard Auxiliary. Although in 2013 and 2014 some limited testing was done to determine the feasibility of training Auxiliary personnel to carry out the observations, 2015 represented the first year of sizeable involvement by the Auxiliary. The Auxiliary was responsible for collecting data in 40 sites covering 10 states in different regions of the country. JSI retained responsibility for conducting observations in 84 sites covering 20 states (California has 8 sites, of which 4 were done by the Auxiliary and 4 by JSI).

We compared information gathered from the 10 states (40 sites) by the Auxiliary in 2015 with the same 10 states (40 sites) observed by JSI in 2013. We decided not to use JSI 2014 data because in that year, among the 40 sites, some were done by the Auxiliary and some by JSI. By using 2013 data for comparison, all sites were done by JSI.

Both the Auxiliary and JSI observed approximately the same number of boats (~4,000) but JSI observed a few more occupants in total on those boats (10,275 for JSI versus 9,708 for the Auxiliary). In terms of boat characteristics, each boat required five pieces of information to be recorded (boat type, length, propulsion, current operation, and activity engaged in). Out of 4,021 boats JSI had a total of 9 missing pieces of information whereas for the Auxiliary out of 3,988 boats there were a total of 463 missing pieces of information. In general, this means about 99% of the time the Auxiliary filled in all boating information. This is a reasonable level of quality, but the comparison to JSI performance means that there is room for improvement. In particular, there were many places where propulsion was missing (e.g. canoes with “paddles” left blank). Luckily many of these types of errors can be figured out and corrected. Another common piece of information left blank was “operation” (e.g. “paddling or drifting or anchored” for canoes, etc.) Again, good guesses sometimes can be made to fill in the missing information. Finally, the “activity” was frequently missing.

We also compared the amount of missing information between JSI and the Auxiliary for the boaters observed (gender, age, or life jacket wearing status). Of the 10,275 boaters observed by JSI, there were a total of 60 missing data points; of the 9,708 boaters observed by the Auxiliary, there were a total of 498 missing data points. For these data, it is more difficult to make reasonable guesses as to what information should have been checked usually resulting in that boater not being included in some of the analyses. They also collected information on the number of life jackets observed and whether those life jackets were of the inflatable kind or inherently buoyant kind. Of concern, was the difference in the identification of inflatable versus inherently buoyant when someone was wearing a life jacket. The Auxiliary observed a much higher proportion categorized as “inflatable” than JSI (25% versus 5%). We feel this is an indication that some of the Auxiliarists were confused about the form because the life jacket categories were “new” (meaning inflatable) and “old” (meaning inherently buoyant). We think some of the Auxiliarists were classifying the more slimmer, modern vest style life jackets (as seen on PWC operators) as “new” when they were indeed “old” style (inherently buoyant). This view is supported by the fact that many of the “new” (inflatable) life jackets were marked for children under 12 and for people on PWCs, canoes, or kayaks. All of these boats/boaters are extremely unlikely to wear a “new” style life jacket.

The key issue of comparability however, was how did the wear rates compare between the two organizations. Tables 3A through 3E show wear rates for the Auxiliary compared to JSI broken out by age and boat type.

Table 3A shows overall life jacket wear rates, including how many are wearing inflatable versus inherently buoyant. Two sets of data are presented, all boaters on all types of boats and all boaters on all types of boats excluding PWCs and persons being towed (since these are mandated to wear). For all boaters on all types of boats, JSI's wear rate was 20.6% and the Auxiliary's was 17.0%. For all boaters on all types of boats excluding PWCs and persons being towed, the resulting wear rate was 14.2% for JSI and 13.6% for the Auxiliary. The wear rates are closer between the two organizations when PWCs and persons being towed are removed. The explanation for the original difference was that JSI observed a greater portion of these types of boats than the Auxiliary and when looking at the overall results the total wear rate for JSI is somewhat higher.

Also, as mentioned above, the Auxiliary classified more life jackets as “new” (inflatable) than JSI among those wearing life jackets. The Auxiliary classified about 25% of those wearing life jackets as wearing “new”. Closer inspection shows that about 7% of boaters under the age of 12 and 10% of adult PWC boaters were classified as wearing the “new” style life jackets, both of which are highly unlikely. This leads to the conclusion that some Auxiliary observers were confused by the “old” versus “new” category labels on the forms.

Table 3A: Overall Wear Rates

| Category | Observed Life Jacket Status | | | | | | | | | |
|-----------------------------|-----------------------------|-------------------------|------------------------|----------------|-----------------|---------------|-------------------------|------------------------|----------------|-----------------|
| | JSI | | | | | Auxiliary | | | | |
| | JSI's N's | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket | Auxiliary N's | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket |
| All Boaters | 10253 | 19.7% | 0.9% | 79.4% | 20.6% | 9894 | 13.8% | 3.2% | 83.0% | 17.0% |
| All Boaters (NO PWCS or WS) | 9474 | 13.2% | 1.0% | 85.8% | 14.2% | 9465 | 10.6% | 3.0% | 86.4% | 13.6% |

Table 3B shows wear rates by age groups excluding PWCs and persons being towed. For youth under 13, JSI's wear rate was 84.6% and the Auxiliary's was 83.6% (very close). (The misclassification in the Auxiliary data for youth wearing "new" style was corrected in this data run.) For teens (ages 13 to 17), JSI's wear rate was 26.9% and the Auxiliary's was 31.3%. The Auxiliary's wear rate for teens (ages 13 to 17) was somewhat higher, but also showed higher "new" style wear rates which is unlikely for this age group. For adults, JSI's wear rate was 7.4% and the Auxiliary's was 8.0% (very close). Table 3B also shows that JSI observed somewhat more children under 13 years of age, which also influenced the overall wear rate differences since youth wear life jackets at a high rate.

Table 3B: Overall Wear Rates by Age Groups (No PWC or Tow Behind)

| Category | Observed Life Jacket Status | | | | | | | | | | | |
|-----------|-----------------------------|----------------|-------------------------|------------------------|----------------|-----------------|---------------|----------------|-------------------------|------------------------|----------------|-----------------|
| | JSI | | | | | | Auxiliary | | | | | |
| | JSI's N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket | Auxiliary N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket |
| Age 0-12 | 733 | 7.7% | 84.6% | 0.0% | 15.4% | 84.6% | 555 | 5.9% | 83.6% | 0.0% | 16.4% | 83.6% |
| Age 13-17 | 428 | 4.5% | 26.9% | 0.0% | 73.1% | 26.9% | 448 | 4.7% | 25.9% | 5.4% | 68.8% | 31.3% |
| Age 18+ | 8313 | 87.7% | 6.3% | 1.1% | 92.6% | 7.4% | 8462 | 89.4% | 5.0% | 3.0% | 91.9% | 8.0% |
| All Age | 9474 | 100.0% | 13.2% | 1.0% | 85.8% | 14.2% | 9465 | 100.0% | 10.6% | 3.0% | 86.4% | 13.6% |

Table 3C shows wear rates for youth under age 13 by boat type. Generally speaking, wear rates were similar between the two organizations recognizing that certain boat types had few observations for this age group.

Table 3C: Youth (0-12) Wear Rates by Boat Types

| Category | Observed Life Jacket Status | | | | | | | | | | | |
|--------------------|-----------------------------|----------------|-------------------------|------------------------|----------------|-----------------|---------------|----------------|-------------------------|------------------------|----------------|-----------------|
| | JSI | | | | | | Auxiliary | | | | | |
| | JSI's N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket | Auxiliary N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket |
| Skiff/Utility | 206 | 27.0% | 88.8% | 0.0% | 11.2% | 88.8% | 95 | 16.9% | 92.6% | 0.0% | 7.4% | 92.6% |
| Runabout/Speedboat | 242 | 31.7% | 86.4% | 0.0% | 13.6% | 86.4% | 261 | 46.4% | 86.6% | 0.0% | 13.4% | 86.6% |
| Cabin Cruiser | 142 | 18.6% | 73.9% | 0.0% | 26.1% | 73.9% | 102 | 18.1% | 75.5% | 0.0% | 24.5% | 75.5% |
| Houseboat | 0 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1 | 0.2% | 0.0% | 0.0% | 100.0% | 0.0% |
| Pontoon | 93 | 12.2% | 84.9% | 0.0% | 15.1% | 84.9% | 60 | 10.7% | 71.7% | 0.0% | 28.3% | 71.7% |
| PWC | 33 | 4.3% | 100.0% | 0.0% | 0.0% | 100.0% | 8 | 1.4% | 87.5% | 0.0% | 12.5% | 87.5% |
| | | | | | | | | | | | | |
| Sailboard | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Day Sailor | 2 | 0.3% | 100.0% | 0.0% | 0.0% | 100.0% | 5 | 0.9% | 100.0% | 0.0% | 0.0% | 100.0% |
| Cabin Sailboat | 32 | 4.2% | 81.3% | 0.0% | 18.8% | 81.3% | 19 | 3.4% | 78.9% | 0.0% | 21.1% | 78.9% |
| | | | | | | | | | | | | |
| Paddled Inflatable | 0 | 0.0% | -- | -- | -- | -- | 1 | 0.2% | 0.0% | 0.0% | 100.0% | 0.0% |
| Powered Inflatable | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Rowboat & Dinghy | 2 | 0.3% | 100.0% | 0.0% | 0.0% | 100.0% | 0 | 0.0% | -- | -- | -- | -- |
| Canoe | 0 | 0.0% | -- | -- | -- | -- | 1 | 0.2% | 100.0% | 0.0% | 0.0% | 100.0% |
| Kayak | 10 | 1.3% | 100.0% | 0.0% | 0.0% | 100.0% | 4 | 0.7% | 75.0% | 0.0% | 25.0% | 75.0% |
| Paddle Board | 2 | 0.3% | 100.0% | 0.0% | 0.0% | 100.0% | 5 | 0.9% | 100.0% | 0.0% | 0.0% | 100.0% |

Table 3D shows wear rates for teens (ages 13 to 17) by boat type. In the three most popular boats for this age group (skiffs, runabouts, and cabin cruisers) wear rates were 4% to 10% higher for the Auxiliary. Again, however, a large proportion of those were classified as “new” style when that is very unlikely for this age group and particularly for boats such as PWCs.

Table 3D: Teens (13-17) Wear Rates by Boat Types

| Category | Observed Life Jacket Status | | | | | | | | | | | |
|--------------------|-----------------------------|----------------|-------------------------|------------------------|----------------|-----------------|---------------|----------------|-------------------------|------------------------|----------------|-----------------|
| | JSI | | | | | | Auxiliary | | | | | |
| | JSI's N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket | Auxiliary N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket |
| Skiff/Utility | 114 | 23.8% | 27.2% | 0.0% | 72.8% | 27.2% | 73 | 15.5% | 23.3% | 11.0% | 65.8% | 34.3% |
| Runabout/Speedboat | 117 | 24.4% | 24.8% | 0.0% | 75.2% | 24.8% | 174 | 37.0% | 28.7% | 6.3% | 64.9% | 35.0% |
| Cabin Cruiser | 77 | 16.0% | 14.3% | 0.0% | 85.7% | 14.3% | 116 | 24.7% | 18.1% | 0.0% | 81.9% | 18.1% |
| Houseboat | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Pontoon | 41 | 8.5% | 14.6% | 0.0% | 85.4% | 14.6% | 31 | 6.6% | 41.9% | 0.0% | 58.1% | 41.9% |
| PWC | 52 | 10.8% | 98.1% | 0.0% | 1.9% | 98.1% | 24 | 5.1% | 91.7% | 8.3% | 0.0% | 100.0% |
| | | | | | | | | | | | | |
| Sailboard | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Day Sailor | 12 | 2.5% | 83.3% | 0.0% | 16.7% | 83.3% | 4 | 0.9% | 75.0% | 0.0% | 25.0% | 75.0% |
| Cabin Sailboat | 42 | 8.8% | 28.6% | 0.0% | 71.4% | 28.6% | 27 | 5.7% | 14.8% | 18.5% | 66.7% | 33.3% |
| | | | | | | | | | | | | |
| Paddled Inflatable | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Powered Inflatable | 1 | 0.2% | 100.0% | 0.0% | 0.0% | 100.0% | 4 | 0.9% | 25.0% | 0.0% | 75.0% | 25.0% |
| Rowboat & Dinghy | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Canoe | 0 | 0.0% | -- | -- | -- | -- | 0 | 0.0% | -- | -- | -- | -- |
| Kayak | 17 | 3.5% | 64.7% | 0.0% | 35.3% | 64.7% | 5 | 1.1% | 40.0% | 0.0% | 60.0% | 40.0% |
| Paddle Board | 7 | 1.5% | 57.1% | 0.0% | 42.9% | 57.1% | 12 | 2.6% | 41.7% | 0.0% | 58.3% | 41.7% |

Table 3E shows wear rates for adults by boat type. For boat types with a reasonable number of observations, the wear rates were similar. However, when comparing the proportion of skiffs (higher wear rates) to runabouts (lower wear rates), it can be seen that JSI observed almost equal proportions of these two boat types, whereas the Auxiliary classified three times as many boats as runabouts rather than as skiffs. This indicates there were likely some differences in understanding what types of boats to classify as a skiff.

Table 3E: Adults (18+) Wear Rates by Boat Types

| Category | Observed Life Jacket Status | | | | | | | | | | | |
|--------------------|-----------------------------|----------------|-------------------------|------------------------|----------------|-----------------|---------------|----------------|-------------------------|------------------------|----------------|-----------------|
| | JSI | | | | | | Auxiliary | | | | | |
| | JSI's N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket | Auxiliary N's | Column Percent | Traditional Life Jacket | Inflatable Life Jacket | No Life Jacket | Any Life Jacket |
| Skiff/Utility | 2291 | 25.8% | 4.9% | 2.1% | 93.1% | 7.0% | 1193 | 13.6% | 7.2% | 4.4% | 88.3% | 11.6% |
| Runabout/Speedboat | 2311 | 26.0% | 1.9% | 0.1% | 98.1% | 2.0% | 3155 | 36.0% | 2.7% | 3.0% | 94.4% | 5.7% |
| Cabin Cruiser | 1940 | 21.9% | 0.4% | 0.5% | 99.1% | 0.9% | 2249 | 25.7% | 1.7% | 1.3% | 97.0% | 3.0% |
| Houseboat | 11 | 0.1% | 0.0% | 0.0% | 100.0% | 0.0% | 11 | 0.1% | 0.0% | 0.0% | 100.0% | 0.0% |
| Pontoon | 528 | 6.0% | 2.3% | 0.0% | 97.7% | 2.3% | 653 | 7.5% | 0.8% | 0.5% | 98.8% | 1.3% |
| PWC | 565 | 6.4% | 97.5% | 0.4% | 2.1% | 97.9% | 321 | 3.7% | 87.5% | 10.6% | 1.9% | 98.1% |
| Sailboard | 3 | 0.0% | 100.0% | 0.0% | 0.0% | 100.0% | 0 | 0.0% | -- | -- | -- | -- |
| Day Sailor | 187 | 2.1% | 48.7% | 1.1% | 50.3% | 49.8% | 156 | 1.8% | 50.0% | 10.3% | 39.7% | 60.3% |
| Cabin Sailboat | 717 | 8.1% | 12.7% | 2.1% | 85.2% | 14.8% | 690 | 7.9% | 5.5% | 3.9% | 90.6% | 9.4% |
| Paddled Inflatable | 1 | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 3 | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% |
| Powered Inflatable | 64 | 0.7% | 35.9% | 3.1% | 60.9% | 39.0% | 89 | 1.0% | 4.5% | 14.6% | 80.9% | 19.1% |
| Rowboat & Dinghy | 7 | 0.1% | 14.3% | 14.3% | 71.4% | 28.6% | 10 | 0.1% | 0.0% | 0.0% | 100.0% | 0.0% |
| Canoe | 2 | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 42 | 0.5% | 16.7% | 2.4% | 81.0% | 19.1% |
| Kayak | 184 | 2.1% | 58.7% | 0.0% | 41.3% | 58.7% | 136 | 1.6% | 55.9% | 3.7% | 40.4% | 59.6% |
| Paddle Board | 62 | 0.7% | 37.1% | 25.8% | 37.1% | 62.9% | 55 | 0.6% | 18.2% | 25.5% | 56.4% | 43.7% |

Conclusion

The Tables in this section generally show similar wear rates (inflatables and inherently buoyant) which is encouraging. What differences were observed can be attributed to the observations containing different proportions of boat types and age groups. In order to test this, JSI ran an additional analysis that statistically adjusted the distribution of boat types and age groups to create a match between JSI and the Auxiliary on the distribution of boat types and age groups. When that analysis was run, it provided the results in the below table.

| Age Groups | JSI | Auxiliary |
|-------------------|------------|------------------|
| 0-12 years | 84.3% | 84.0% |
| 13-17 years old | 26.6% | 31.5% |
| Adults | 7.6% | 7.8% |

Fundamentally the adult wear rates and youth wear rates were identical between the two organizations when adjusted for the proportion of boat types and age groups. Teens were still higher for the Auxiliary which may mean that some 12 year olds were misclassified as teens.

IV. ENVIRONMENTAL AND SITUATIONAL INFLUENCES ON LIFE JACKET WEAR RATES

This section of the report looks at influences of environmental and situational factors on wear rates. The tables present information separately for powerboats, sailboats, and paddlecraft. Statistical significance of the relationships are reported in the footnotes at the bottom of each table.

Wave Height. The roughness of the water that the boating activity is taking place in might be expected to affect wear rates. The study classified wave heights as “calm” (< 6 inches), “choppy” (6 inches to 2 feet), and “rough” (over 2 feet). There is relatively little impact for powerboats until wave heights are 2 feet or greater. Sailboats show increases in wear rates as wave height increases (19.9% to 25.2%). Paddlecraft are the most influenced by wave height increasing from 41.2% in calm water to 73.8% in choppy waters and 89.5% in rough waters.

Table 4.1 – Wear Rates by Wave Height 1999-2015 – Adult Only

| Condition | Boat Type | | |
|-----------------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Calm (less than 6 in) | 3.9% (352292) | 19.9% (37238) | 41.2% (26191) |
| Choppy (6 in to 2 ft) | 3.8% (95064) | 25.1% (18394) | 73.8% (6157) |
| Rough (over 2 ft) | 6.1% (3491) | 25.2% (984) | 89.5% (917) |

Powerboats (p=.0001) Sailboats (p<.0001) Paddlecraft (p<.0001)

Visibility. As visibility worsens it would seem sensible if wear rates increased. For all three general types of boats, we see increases in wear rates as visibility decreases from good visibility to poor visibility. Powerboats increase from 3.9% to 5.7%; sailboats from 21.5% to 24.3%; and paddlecraft from 47.3% to 77.7%.

Table 4.2 – Wear Rates Observed by Visibility 1999-2015 – Adult Only

| Condition | Boat Type | | |
|-----------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Good Visibility | 3.9% | 21.5% | 47.3% |
| | (414491) | (49718) | (31719) |
| Fair Visibility | 4.8% | 23.1% | 62.8% |
| | (32047) | (6432) | (1292) |
| Poor Visibility | 5.7% | 24.3% | 77.7% |
| | (2827) | (305) | (203) |

Powerboats (p<.0001) Sailboats (p=.0065) Paddlecraft (p<.0001)

Weather Conditions. As weather conditions worsen from sunny to stormy weather we might expect to see wear rates increase. For all three general types of boats, wear rates increase as weather conditions worsen. Powerboats move from 3.9% to 8.1%; sailboats move from 20.7% to 29.3% and paddlecraft move from 50.2% to 72.8%.

Table 4.3 – Wear Rates Observed by Weather Conditions 1999-2015 – Adult Only

| Condition | Boat Type | | |
|----------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Sunny | 3.9% | 20.7% | 50.2% |
| | (243482) | (29467) | (16590) |
| Partly Cloudy | 3.5% | 22.8% | 44.4% |
| | (131007) | (17467) | (11657) |
| Cloudy | 4.3% | 22.3% | 50.3% |
| | (63194) | (8258) | (4252) |
| Raining | 7.2% | 25.0% | 65.3% |
| | (10063) | (1062) | (680) |
| Stormy Weather | 8.1% | 29.3% | 72.8% |
| | (2245) | (365) | (114) |

Powerboats (p<.0001) Sailboats (p<.0001) Paddlecraft (p<.0001)

Water Temperature. As water temperatures get colder, we might expect that wear rates would increase. This turns out to be true for all three general types of boats—wear rates increase as water temperatures decrease. Powerboats move from 2.8% when water temperatures are 80 degrees or greater to 12.4% when water temperatures are below 60 degrees. Sailboats move from 16.5% in warmer waters to 38.4% in the cooler temperature. Paddlecraft move from 28.2% in warm waters to 79.8% in cooler water.

Table 4.4 – Wear Rates Observed by Water Temperature 1999-2015 – Adult Only

| Condition | Boat Type | | |
|----------------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Water Temp Below 60° | 12.4% | 38.4% | 79.8% |
| | (19133) | (1583) | (2165) |
| 60-69° | 7.0% | 24.3% | 61.8% |
| | (46453) | (14753) | (8243) |
| 70-79° | 3.4% | 20.8% | 49.1% |
| | (185344) | (25188) | (13846) |
| 80° or Above | 2.8% | 16.5% | 28.2% |
| | (192921) | (12864) | (8686) |

Powerboats (p<.0001) Sailboats (p<.0001) Paddlecraft (p<.0001)

Air Temperature. Wear rates are affected by air temperatures for all three general types of boats. For powerboats and paddlecraft the highest wear rates are seen when air temperatures are below 60 degrees. For sailboats the highest wear rates are when air temperatures are below 70 degrees.

Table 4.5 – Wear Rates Observed by Air Temperature 1999-2015 – Adult Only

| Condition | Boat Type | | |
|--------------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Air Temp Below 60° | 12.0% (6583) | 27.4% (515) | 78.4% (541) |
| 60-69° | 8.3% (29575) | 31.2% (4371) | 57.0% (2667) |
| 70-79° | 4.9% (105586) | 22.7% (20037) | 55.0% (10087) |
| 80-89° | 3.3% (185520) | 20.0% (23064) | 46.9% (13028) |
| 90-99° | 2.6% (102972) | 17.3% (7732) | 38.7% (6223) |
| 100° or Above | 2.7% (20232) | 13.2% (619) | 22.6% (755) |

Powerboats (p<.0001) Sailboats (p<.0001) Paddlecraft (p<.0001)

Wind Speed. Wind speed does not affect wear rates on powerboats. However, it does affect wear rates on sailboats and paddlecraft. For sailboats the wear rates are lowest when wind speeds are 2 knots or less (20.2%) and when 11 knots or greater (42.3%). For paddlecraft, wear rates are lowest when the winds are 2 knots or less (41.6%) and higher when wind speeds increase.

Table 4.6 – Wear Rates Observed by Wind Speed 1999-2015 – Adult Only

| Condition | Boat Type | | |
|-----------------------------------|------------------------|-----------------------|-------------------------|
| | Powerboats % (N) | Sailboats % (N) | Paddlecraft % (N) |
| Wind Speed Calm (0 to 2 knots) | 4.1% (91751) | 20.2% (7343) | 41.6% (10676) |
| Breezy (sustained 3-10 knots) | 3.8% (131323) | 25.3% (17474) | 53.8% (6939) |
| Windy (11 or more knots) | 3.9% (2904) | 42.3% (284) | 67.5% (391) |

Powerboats (p=.0015) Sailboats (p<.0001) Paddlecraft (p<.0001)

Wear Rates by Activity. Table 4.7 shows the impact of fishing or intent to fish activities on wear rates from 2007 when JSI first began classifying activities as intent to fish (visible fishing gear even though not fishing at the moment). Data are shown separately for both skiffs and speedboats/runabouts. Almost without exception wear rates are higher when boaters are participating in fishing or intent to fish activities compared to any other activity. The role of fishing tournaments that require wearing life jackets may be influencing wear rates not only during the tournament itself, but also when boaters are fishing outside of a tournament.

Table 4.7 – Wear Rates Observed on Skiffs and Runabouts by Activity 2007-2015 – Adult Only

| Boat Type | Activity | Observation Year | | | | | | | | |
|------------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 2007 % (N's) | 2008 % (N's) | 2009 % (N's) | 2010 % (N's) | 2011 % (N's) | 2012 % (N's) | 2013 % (N's) | 2014 % (N's) | 2015 % (N's) |
| Skiff/Utility | Fishing/Intent to Fish | 8.7% | 12.3% | 8.3% | 10.7% | 8.6% | 9.1% | 7.7% | 17.3% | 13.0% |
| | | (1967) | (2944) | (3133) | (3264) | (2689) | (3309) | (3027) | (3163) | (2897) |
| | All other Activities | 8.2% | 6.6% | 5.6% | 8.7% | 7.9% | 6.5% | 5.2% | 9.1% | 7.7% |
| | | (3370) | (3682) | (4116) | (3364) | (3839) | (3620) | (4194) | (3603) | (3684) |
| Runabout/ Speedboat | Fishing/Intent to Fish | 5.2% | 2.5% | 4.9% | 3.4% | 2.5% | 6.2% | 4.5% | 6.0% | 12.2% |
| | | (1313) | (1015) | (862) | (687) | (939) | (671) | (521) | (560) | (797) |
| | All other Activities | 2.7% | 3.1% | 2.3% | 2.2% | 2.3% | 2.0% | 2.3% | 2.4% | 2.8% |
| | | (13000) | (12729) | (13619) | (14260) | (13340) | (12623) | (11033) | (12363) | (10969) |

V. CONCLUSIONS FOR LIFE JACKET WEAR RATES - NATIONAL TREND DATA 1999 TO 2015 (THE NEEDLE IS MOVING IN MANY AREAS OF BOATING)

This report includes observational data collected from 1999 to 2015. The 2015 data show evidence of progress in life jacket use in many sectors of the boating public. There still remains much work to be accomplished, and in some types of boating wear rates are particularly low and seem difficult to change. A summary of key findings are:

1. For children under the age of six wear rates in 2015 were at 92.1%. Rates have steadily increased since 1999 when wear rates were 80.6% for this group.
2. Another long standing trend of increased life jacket use was seen for children between the ages of 6 and 12 with wear rates in 2015 of 87.2%. A steadily increasing trend since 1999 when wear rates were 69.1% for this group.
3. Wear rates for teens (ages 13-17) in 2015 were 37.2% quite a bit better than in 1999 when they were 24.1%.
4. Wear rates for all adults (18+) on all types of boats in 2015 were the highest ever at 11.2%.
5. For open motorboats wear rates were 6.1% in 2015, the highest they have ever been.
6. Cabin sailboat wear rates in 2015 were the highest ever at 20.5%. This is a relative wear rate increase of 125% since 1999 when they were 9.1%.
7. Day sailor wear rates have also climbed dramatically since 1999 when they were 30.7%. In 2015 the wear rate was 69.6%, the highest they have ever been and it represents a relative increase of 127% since 1999.
8. The number of standup paddleboarders has increased each year since 2010 and wear rates have been in excess of 50% since 2012. In 2015 the wear rate was 52.0%.
9. Wear rates on PWCs for both adults and children are almost universal.
10. Boaters participating in fishing or intent to fish activities have higher wear rates compared to all other activities; this finding is true for skiffs as well as speedboats/runabouts.
11. For all types of boats, as boat length decreases, wear rates increase.

12. Adult boaters on powerboats show increased wear rates when weather or water conditions are poorer: wear rates are 3.9% in good visibility and 5.7% in poor visibility; 3.9% in sunny weather and 8.1% in stormy weather; 2.8% in waters above 80 degrees but 12.4% in waters colder than 60 degrees; 2.7% when air temperatures are above 100 degrees but 12.0% when temperatures are below 60 degrees; 3.9% in calm waters and 6.1% in rough waters.
13. Adult boaters on sailboats also respond with increased life jacket wear when weather or water conditions are poorer: in good visibility 21.5% and poor visibility 24.3%; 20.7% in sunny weather and 39.3% in stormy weather; 16.5% when water temperatures are above 80 degrees but 38.4% when water temperatures are below 60 degrees; 13.2% when air temperatures are above 100 degrees but 27.4% when below 60 degrees; 19.9% in calm waters but 25.2% in rough waters; when the wind is calm 20.2% but when wind is greater than 11 knots it is 42.3%.
14. Adult boaters on paddlecraft also respond with increase life jacket use when weather or water conditions are poorer; in good visibility 47.3% but in poor visibility 77.7%; in sunny weather 50.7% but in stormy weather 72.8%; 28.2% when air temperatures are above 80 degrees but 79.8% when water temperatures are below 60 degrees; 22.6% when air temperatures are above 100 degrees but 78.4% when temperatures are below 60 degrees; 41.7% in calm waters but 89.5% in rough waters; when wind is calm wear rates are 41.6% and when greater than 11 knots it is 67.5%.

VI. 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, during the same period of time (July and August). 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 U.S. Power Squadrons, 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, 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 15 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.

JSI Data Collection Form: 2015 Boat Form

TIME: 7:59 or earlier 8:00 - 9:59 am 10:00 - 11:59 am 12:00 - 1:59 pm 2:00 - 3:59 pm 4:00 - 5:59 pm 6:00 or later

59293



| POWER BOAT: | | SAIL: | PADDLE: | OTHER: | GENDER | | | AGE(years) | | | | | PFD | | | WS |
|--|--|---|------------------------------------|--|--------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------|
| <input type="radio"/> Skiff/Utility <input type="radio"/> PWC | | <input type="radio"/> Day sailor | <input type="radio"/> Kayak | <input type="radio"/> Inflatable/Raft | M | F | ? | 0-5 | 6-12 | 13-17 | 18-64 | 65+ | Old | New | No | Yes <input type="checkbox"/> |
| <input type="radio"/> Runabout/Speedboat <input type="radio"/> Pontoon | | <input type="radio"/> Cabin sailboat | <input type="radio"/> Canoe | <input type="radio"/> Houseboat | OP | <input type="checkbox"/> | |
| <input type="radio"/> Cabin cruiser | | <input type="radio"/> Sailboard | <input type="radio"/> Rowboat | <input type="radio"/> Other | P1 | <input type="checkbox"/> | |
| | | | <input type="radio"/> Paddle board | | P2 | <input type="checkbox"/> | |
| SIZE (ft): | PROPULSION: | OPERATION: | | ACTIVITY: | | P3 | <input type="checkbox"/> | |
| <input type="radio"/> Under 16 | <input type="radio"/> Outboard | <input type="radio"/> Cruising/Motoring | | <input type="radio"/> Pleasure | <input type="radio"/> Fishing | P4 | <input type="checkbox"/> | |
| <input type="radio"/> 16 - 20.9 | <input type="radio"/> Stemdrive/Inboard | <input type="radio"/> Sailing | | <input type="radio"/> Water skiing | <input type="radio"/> Intent to Fish | P5 | <input type="checkbox"/> | |
| <input type="radio"/> 21 - 25.9 | <input type="radio"/> Sail Only | <input type="radio"/> Rowing/Paddling | | <input type="radio"/> White water | <input type="radio"/> Swimming | P6 | <input type="checkbox"/> | |
| <input type="radio"/> 26 - 45.9 | <input type="radio"/> Sail and Motor | <input type="radio"/> Drifting | | <input type="radio"/> Racing or High Speed | <input type="radio"/> Other | P7 | <input type="checkbox"/> | |
| <input type="radio"/> 46 + | <input type="radio"/> Paddles, Oars/Manual | <input type="radio"/> Anchored | | | | P8 | <input type="checkbox"/> | |
| | <input type="radio"/> Air Thrust | | | | | P9 | <input type="checkbox"/> | |
| | <input type="radio"/> Other | | | | | | <input type="checkbox"/> | |

| POWER BOAT: | | SAIL: | PADDLE: | OTHER: | GENDER | | | AGE(years) | | | | | PFD | | | WS |
|--|--|---|------------------------------------|--|--------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------|
| <input type="radio"/> Skiff/Utility <input type="radio"/> PWC | | <input type="radio"/> Day sailor | <input type="radio"/> Kayak | <input type="radio"/> Inflatable/Raft | M | F | ? | 0-5 | 6-12 | 13-17 | 18-64 | 65+ | Old | New | No | Yes <input type="checkbox"/> |
| <input type="radio"/> Runabout/Speedboat <input type="radio"/> Pontoon | | <input type="radio"/> Cabin sailboat | <input type="radio"/> Canoe | <input type="radio"/> Houseboat | OP | <input type="checkbox"/> | |
| <input type="radio"/> Cabin cruiser | | <input type="radio"/> Sailboard | <input type="radio"/> Rowboat | <input type="radio"/> Other | P1 | <input type="checkbox"/> | |
| | | | <input type="radio"/> Paddle board | | P2 | <input type="checkbox"/> | |
| SIZE (ft): | PROPULSION: | OPERATION: | | ACTIVITY: | | P3 | <input type="checkbox"/> | |
| <input type="radio"/> Under 16 | <input type="radio"/> Outboard | <input type="radio"/> Cruising/Motoring | | <input type="radio"/> Pleasure | <input type="radio"/> Fishing | P4 | <input type="checkbox"/> | |
| <input type="radio"/> 16 - 20.9 | <input type="radio"/> Stemdrive/Inboard | <input type="radio"/> Sailing | | <input type="radio"/> Water skiing | <input type="radio"/> Intent to Fish | P5 | <input type="checkbox"/> | |
| <input type="radio"/> 21 - 25.9 | <input type="radio"/> Sail Only | <input type="radio"/> Rowing/Paddling | | <input type="radio"/> White water | <input type="radio"/> Swimming | P6 | <input type="checkbox"/> | |
| <input type="radio"/> 26 - 45.9 | <input type="radio"/> Sail and Motor | <input type="radio"/> Drifting | | <input type="radio"/> Racing or High Speed | <input type="radio"/> Other | P7 | <input type="checkbox"/> | |
| <input type="radio"/> 46 + | <input type="radio"/> Paddles, Oars/Manual | <input type="radio"/> Anchored | | | | P8 | <input type="checkbox"/> | |
| | <input type="radio"/> Air Thrust | | | | | P9 | <input type="checkbox"/> | |
| | <input type="radio"/> Other | | | | | | <input type="checkbox"/> | |

| POWER BOAT: | | SAIL: | PADDLE: | OTHER: | GENDER | | | AGE(years) | | | | | PFD | | | WS |
|--|--|---|------------------------------------|--|--------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------|
| <input type="radio"/> Skiff/Utility <input type="radio"/> PWC | | <input type="radio"/> Day sailor | <input type="radio"/> Kayak | <input type="radio"/> Inflatable/Raft | M | F | ? | 0-5 | 6-12 | 13-17 | 18-64 | 65+ | Old | New | No | Yes <input type="checkbox"/> |
| <input type="radio"/> Runabout/Speedboat <input type="radio"/> Pontoon | | <input type="radio"/> Cabin sailboat | <input type="radio"/> Canoe | <input type="radio"/> Houseboat | OP | <input type="checkbox"/> | |
| <input type="radio"/> Cabin cruiser | | <input type="radio"/> Sailboard | <input type="radio"/> Rowboat | <input type="radio"/> Other | P1 | <input type="checkbox"/> | |
| | | | <input type="radio"/> Paddle board | | P2 | <input type="checkbox"/> | |
| SIZE (ft): | PROPULSION: | OPERATION: | | ACTIVITY: | | P3 | <input type="checkbox"/> | |
| <input type="radio"/> Under 16 | <input type="radio"/> Outboard | <input type="radio"/> Cruising/Motoring | | <input type="radio"/> Pleasure | <input type="radio"/> Fishing | P4 | <input type="checkbox"/> | |
| <input type="radio"/> 16 - 20.9 | <input type="radio"/> Stemdrive/Inboard | <input type="radio"/> Sailing | | <input type="radio"/> Water skiing | <input type="radio"/> Intent to Fish | P5 | <input type="checkbox"/> | |
| <input type="radio"/> 21 - 25.9 | <input type="radio"/> Sail Only | <input type="radio"/> Rowing/Paddling | | <input type="radio"/> White water | <input type="radio"/> Swimming | P6 | <input type="checkbox"/> | |
| <input type="radio"/> 26 - 45.9 | <input type="radio"/> Sail and Motor | <input type="radio"/> Drifting | | <input type="radio"/> Racing or High Speed | <input type="radio"/> Other | P7 | <input type="checkbox"/> | |
| <input type="radio"/> 46 + | <input type="radio"/> Paddles, Oars/Manual | <input type="radio"/> Anchored | | | | P8 | <input type="checkbox"/> | |
| | <input type="radio"/> Air Thrust | | | | | P9 | <input type="checkbox"/> | |
| | <input type="radio"/> Other | | | | | | <input type="checkbox"/> | |

PFD Study 2014

CODE

| | | | | | |
|-------|------|-------|-------|-------|-------------|
| | | | | | |
| State | Site | Block | Group | Phase | Page Number |

JSI Data Collection Form: 2015 Site Form

PFD Study 2014 **ID**

of Belt Pack PFD's # of Boats Observed 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 | Water Conditions | Current | Visibility | Weather Conditions |
| Wind Speed | <input type="text"/> <input type="text"/> knots | <input type="radio"/> Calm (less than 6") <input type="radio"/> Choppy (6" to 2') <input type="radio"/> Rough (over 2') | <input type="radio"/> Strong <input type="radio"/> Moderate <input type="radio"/> Weak/None | <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor | <input type="radio"/> Sunny <input type="radio"/> Raining <input type="radio"/> Partly Cloudy <input type="radio"/> Stormy <input type="radio"/> Cloudy |

**Actual form provides 3 blocks to record Weather Observations across the 4 hours of data collection

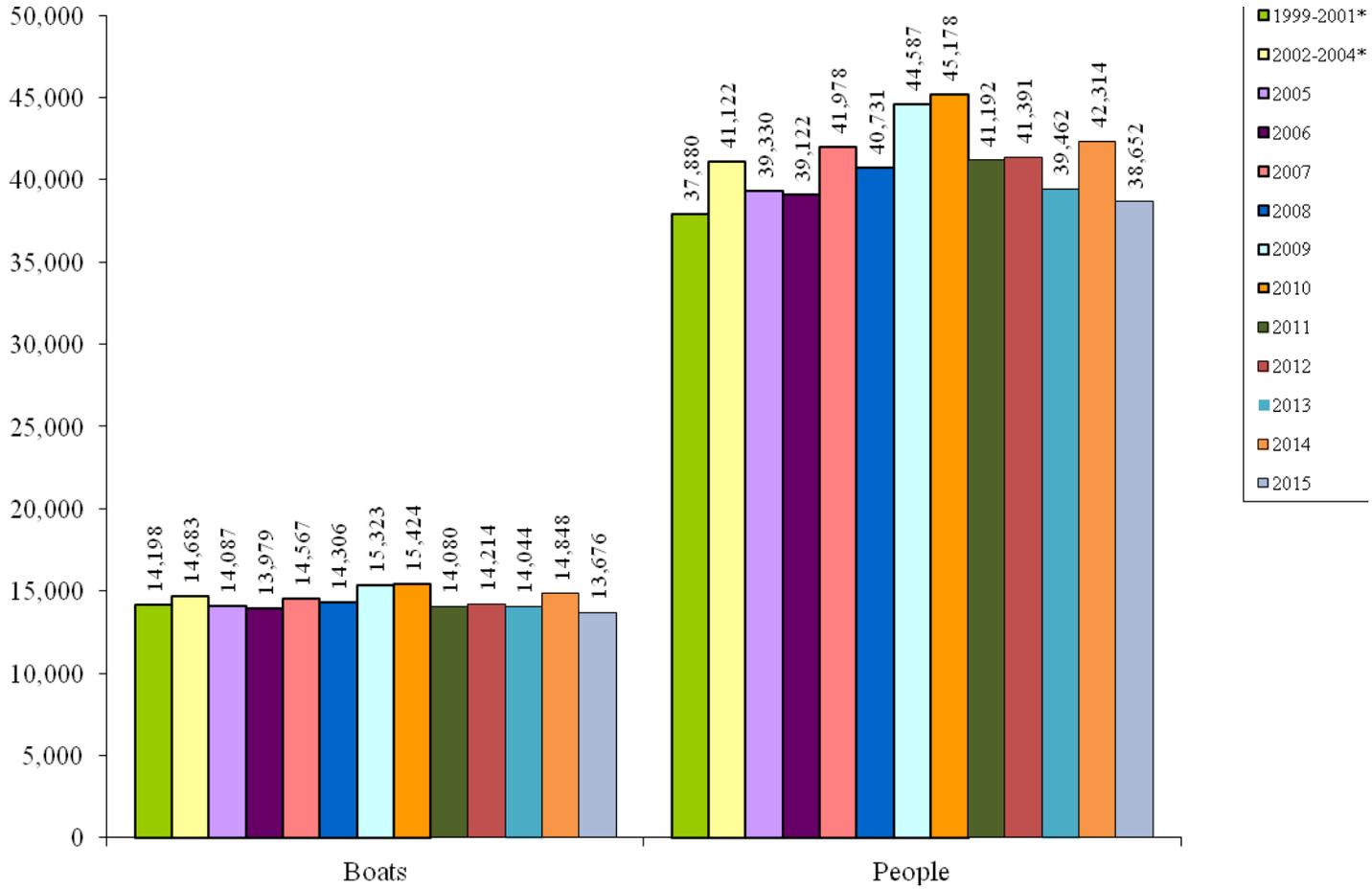
VIII. INFORMATION ON BOATS & PEOPLE OBSERVED

From 1999 to 2015, JSI has observed a total of 245,191 boats and 690,970 boaters (Figure K). This year, 2015, 13,676 boats carrying 38,652 boaters were observed. Across the seventeen 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 L2 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 seventeen year span.

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.

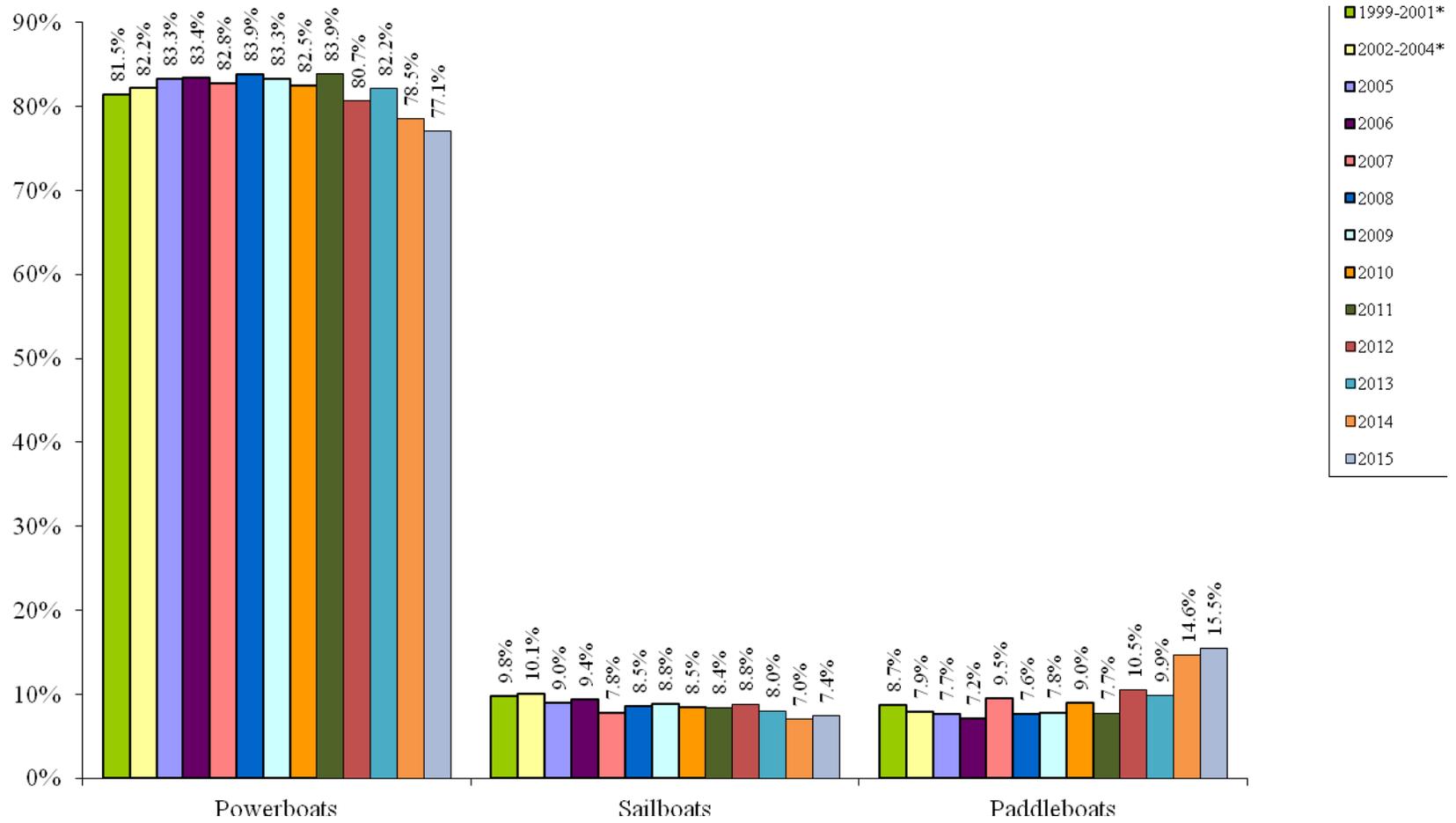
All Figures in this section have been modified slightly from previous years' reports prior to 2011. The percentages now exclude (like the 2011 report) any missing observations on a particular characteristic. Since missing observations are relatively rare, this switch in presentation does not result in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

Figure K – Number of Boats and People



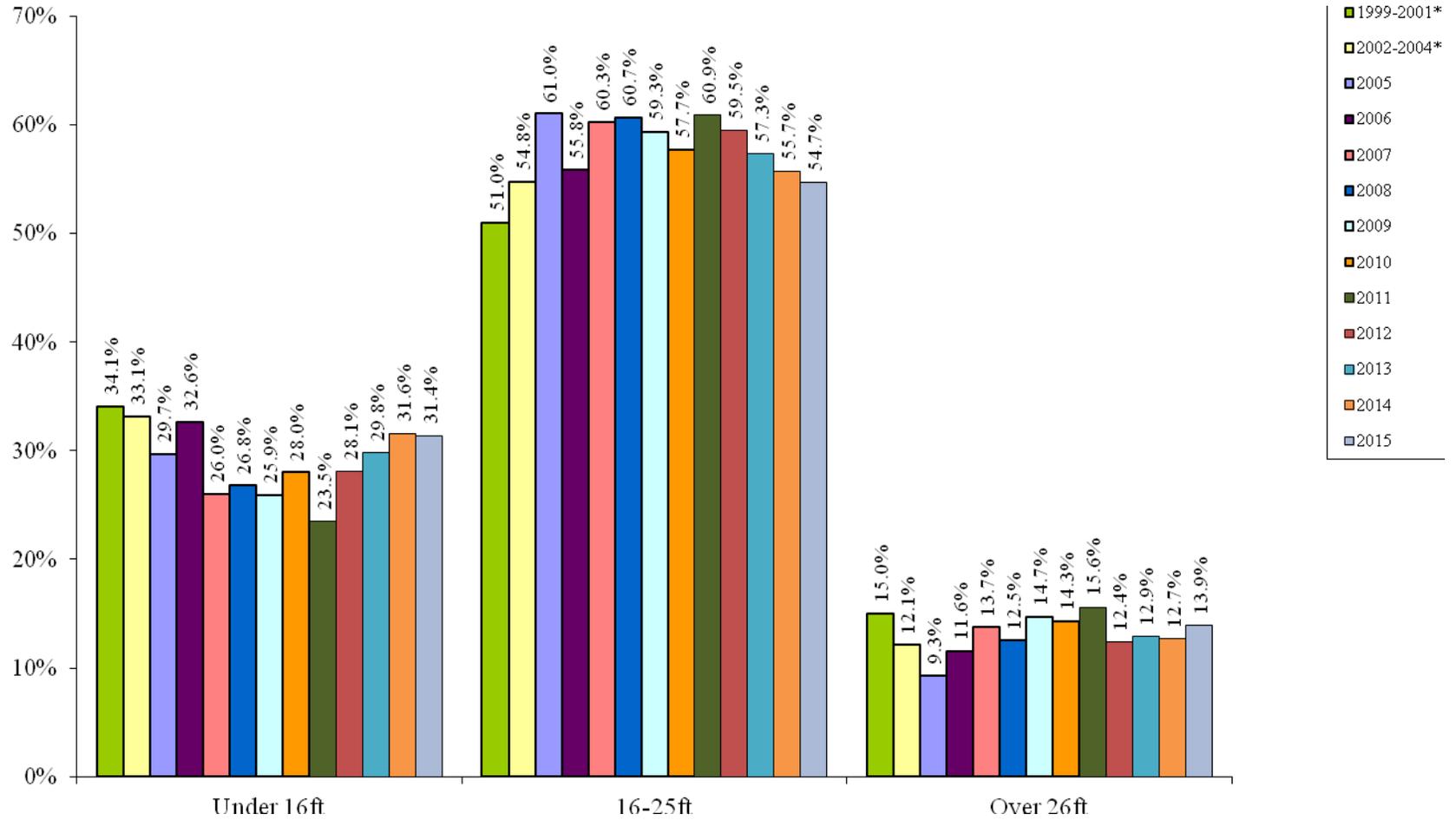
*Three-year average

Figure L – Types of Boats



*Three-year average

Figure M – Length of Boats



*Three-year average

Figure N – Length of Boats 2004-2015 Data Only

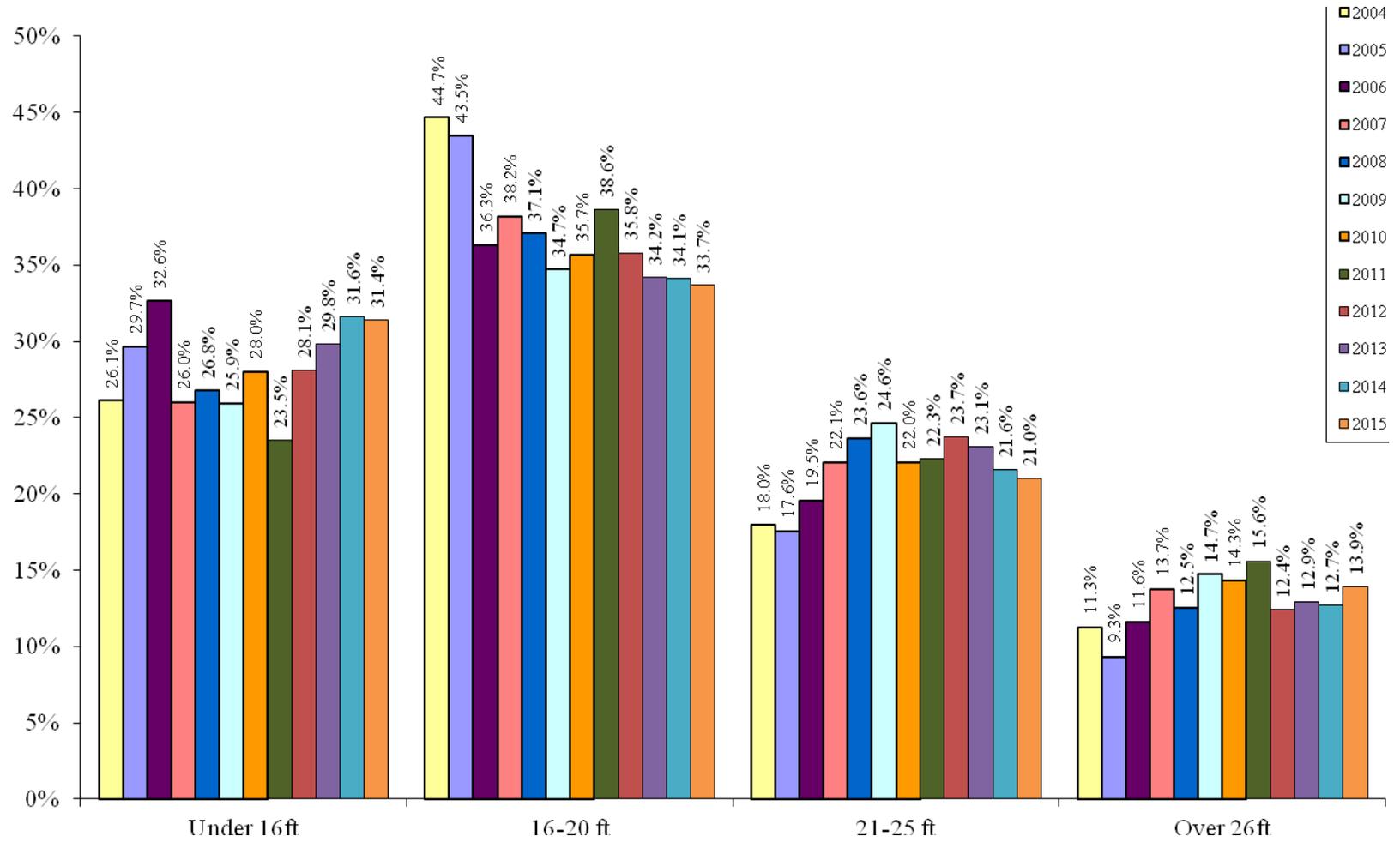
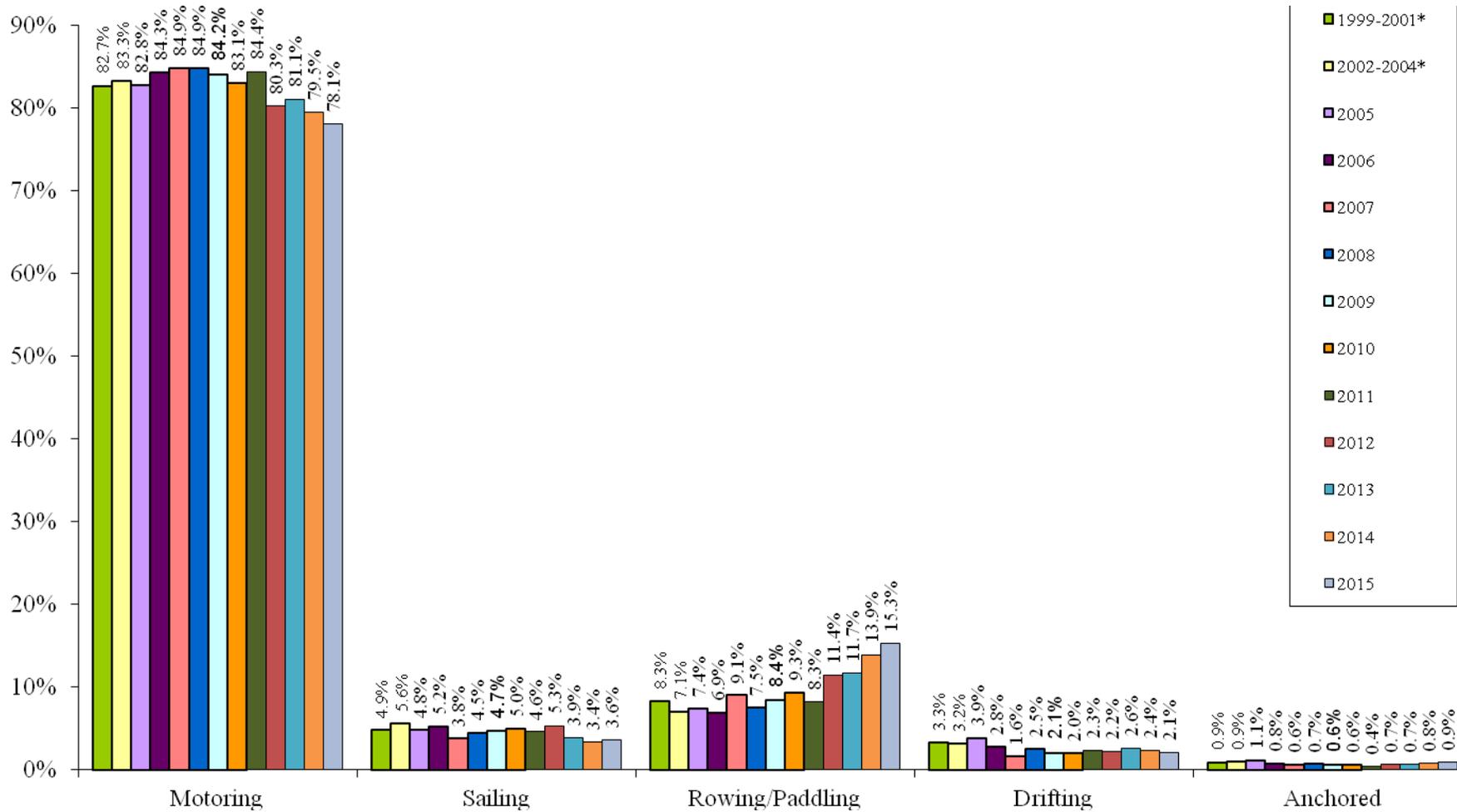
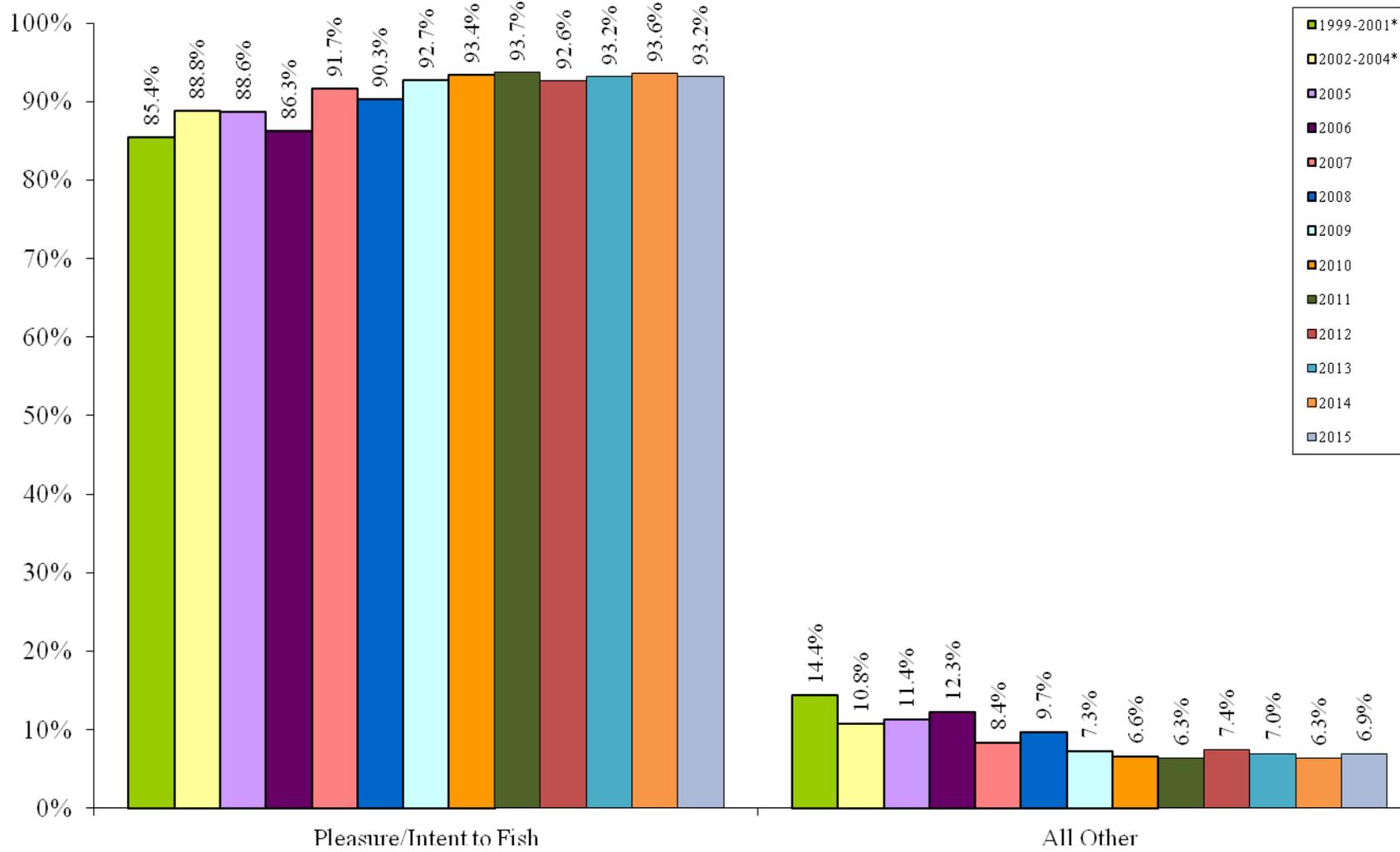


Figure O – Operation of Boats



*Three-year average

Figure P1 – Activity of Boaters—ALL YEARS*



*Three-year average

Figure P2 – Activity of Boaters 2007-2015 Data

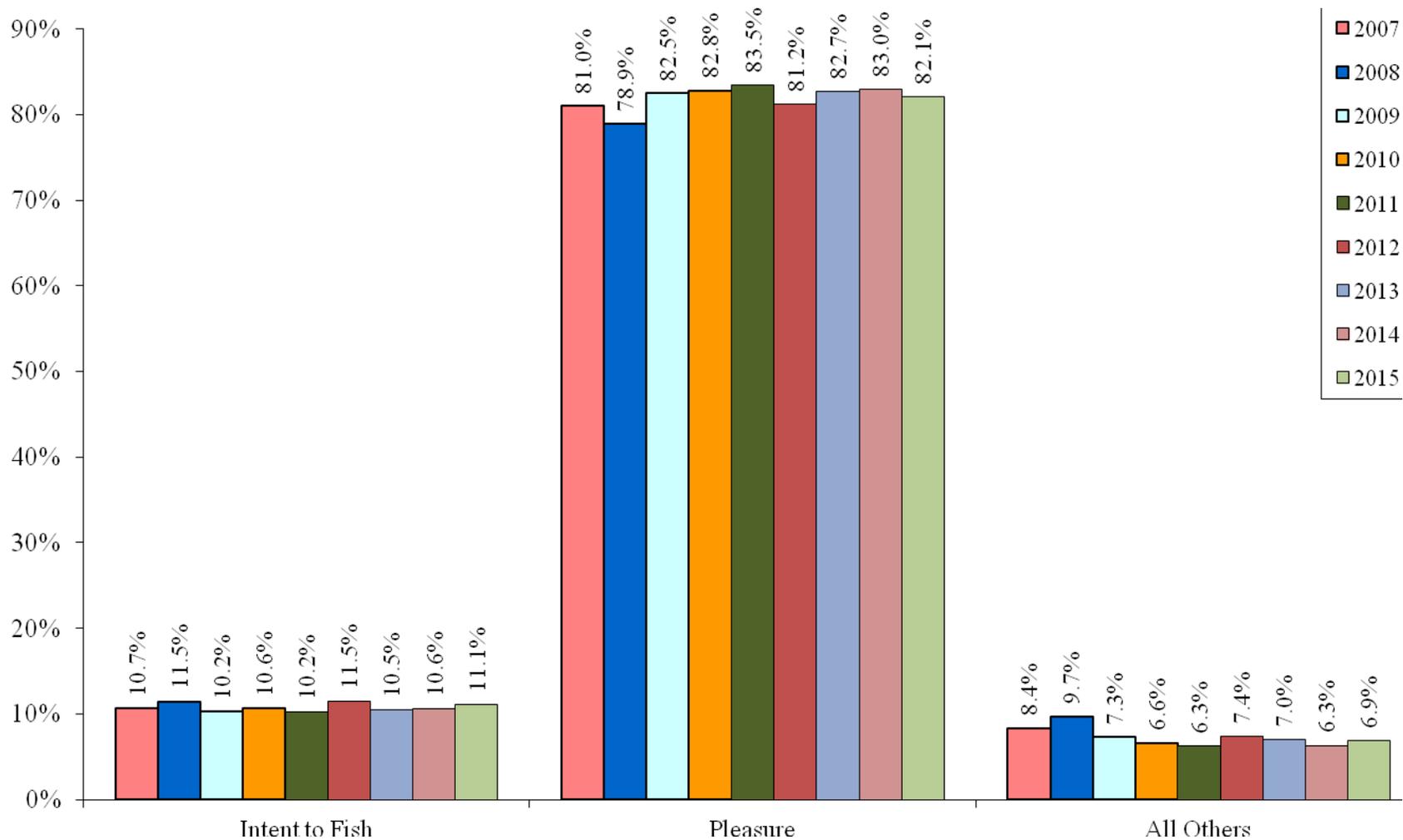
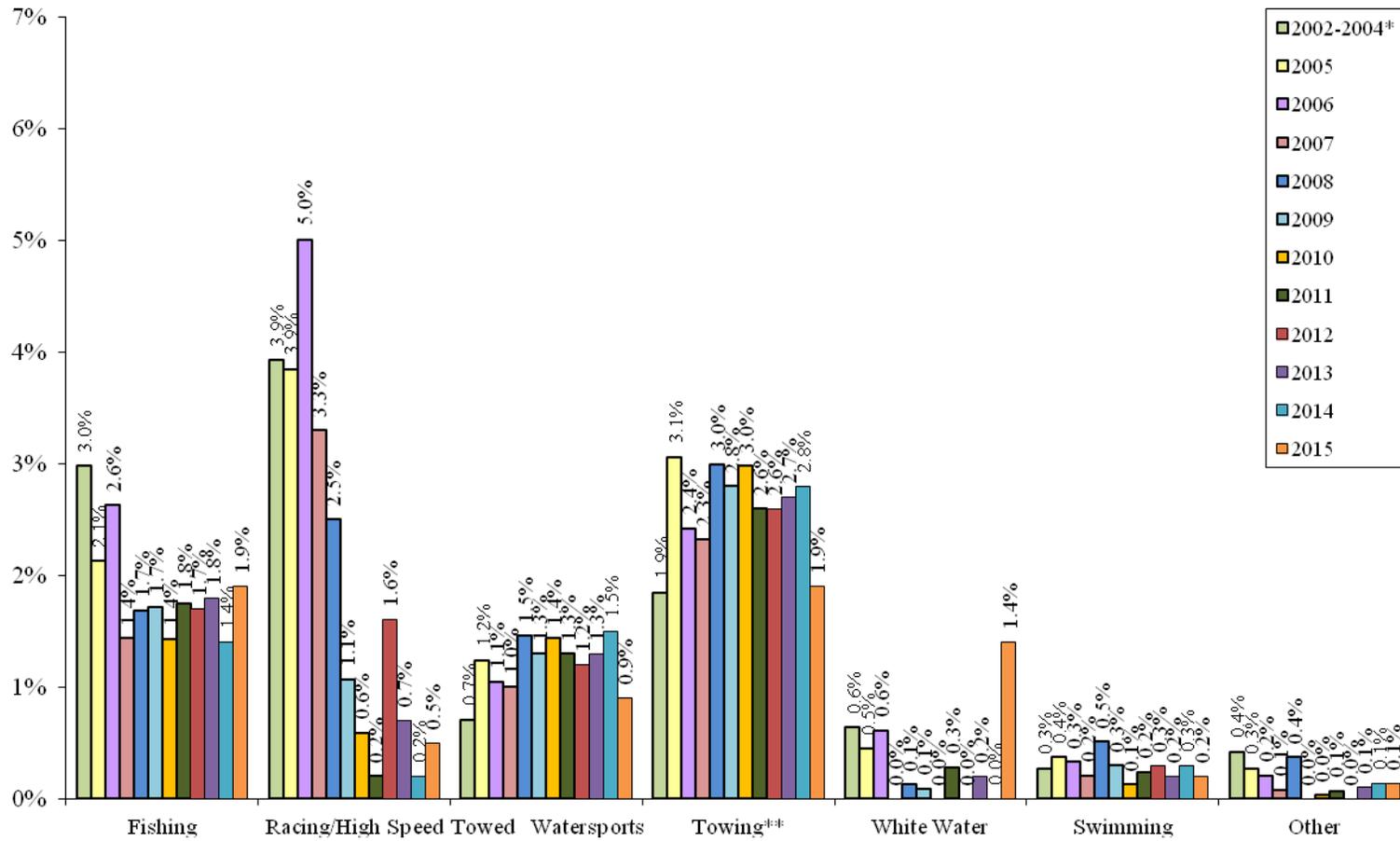


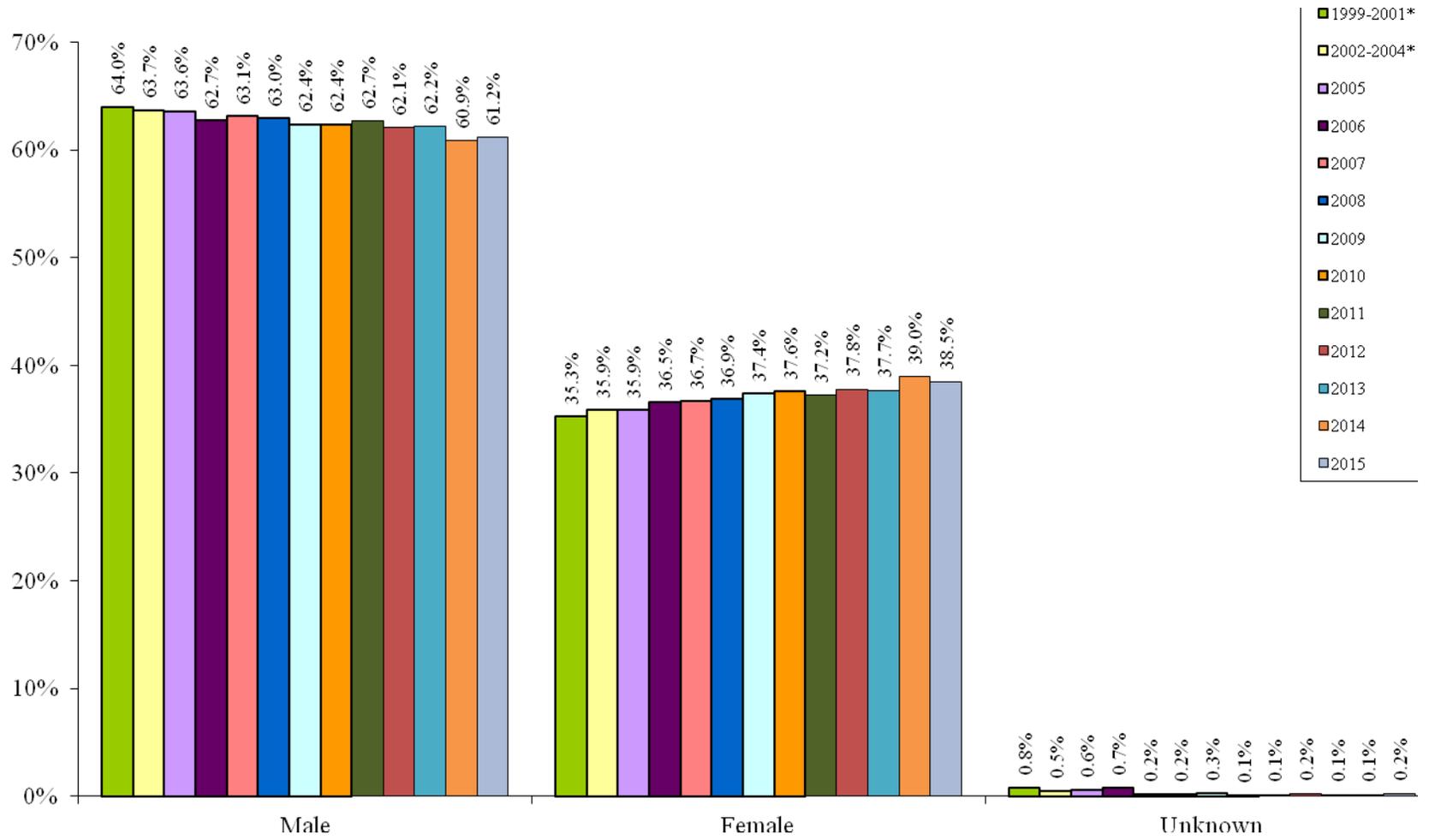
Figure P3 – Activity of Boaters 2002-2015
Detailed Breakdown of ALL OTHER Category from Figure P1



*Three-year average

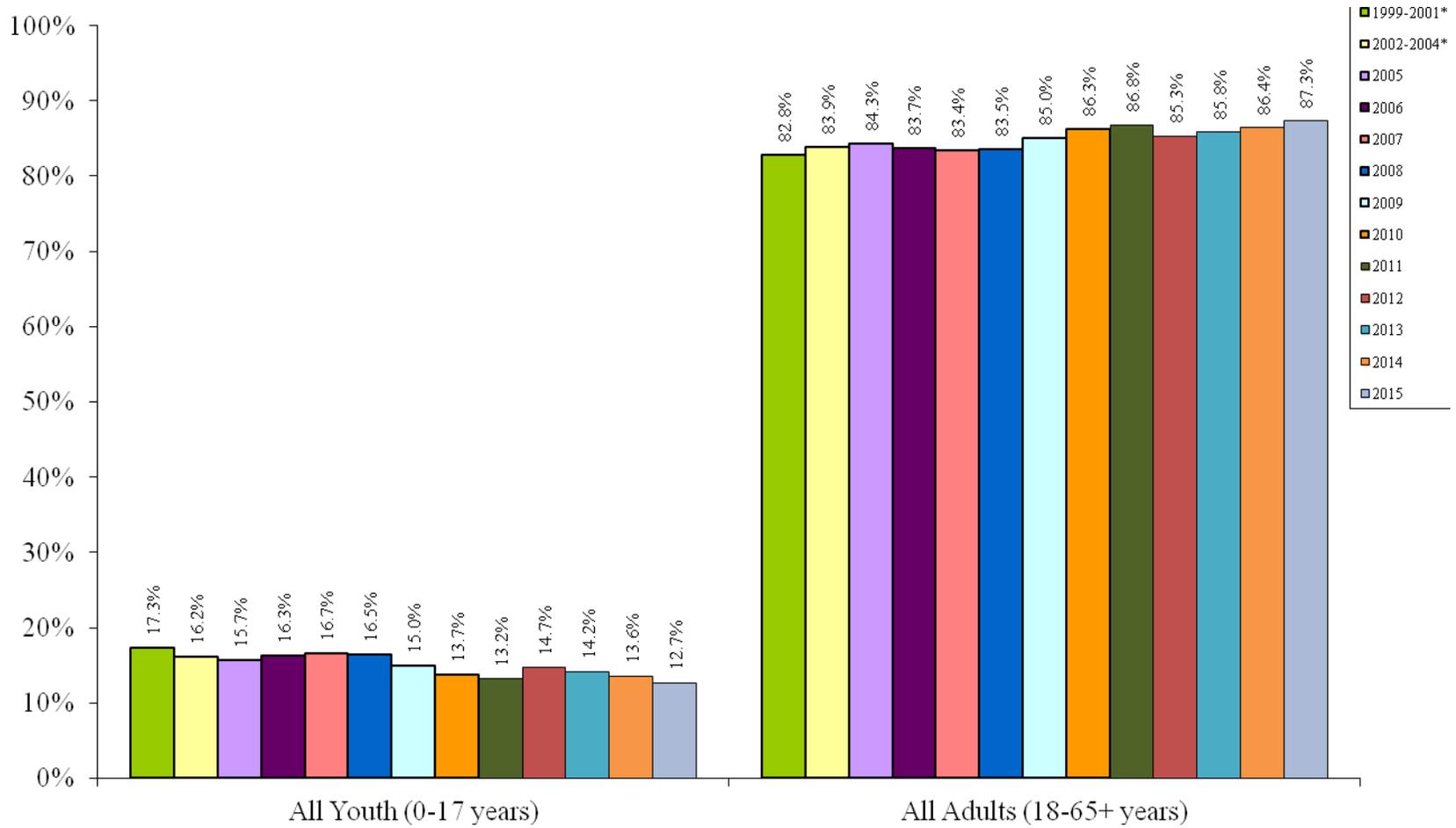
**The activity “Towing” indicates that these boaters were passengers in a boat towing water-skiers or other towing activities. Likewise, “Towed Watersports” includes all towing sports and is reserved for the boaters in the water being towed. The label was changed in April 2010.

Figure Q – Gender of Boaters



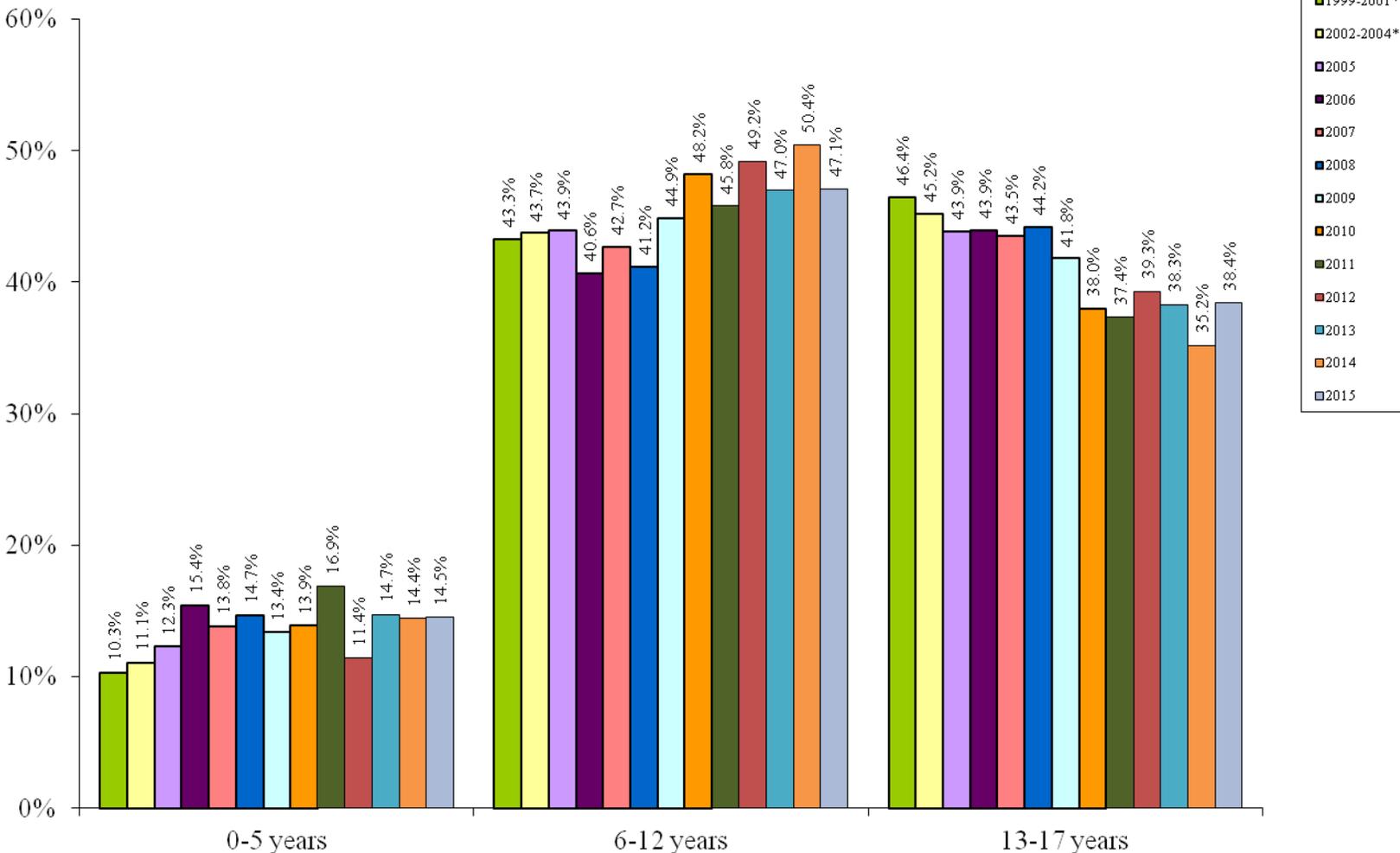
*Three-year average

Figure R1 – Age of Boaters



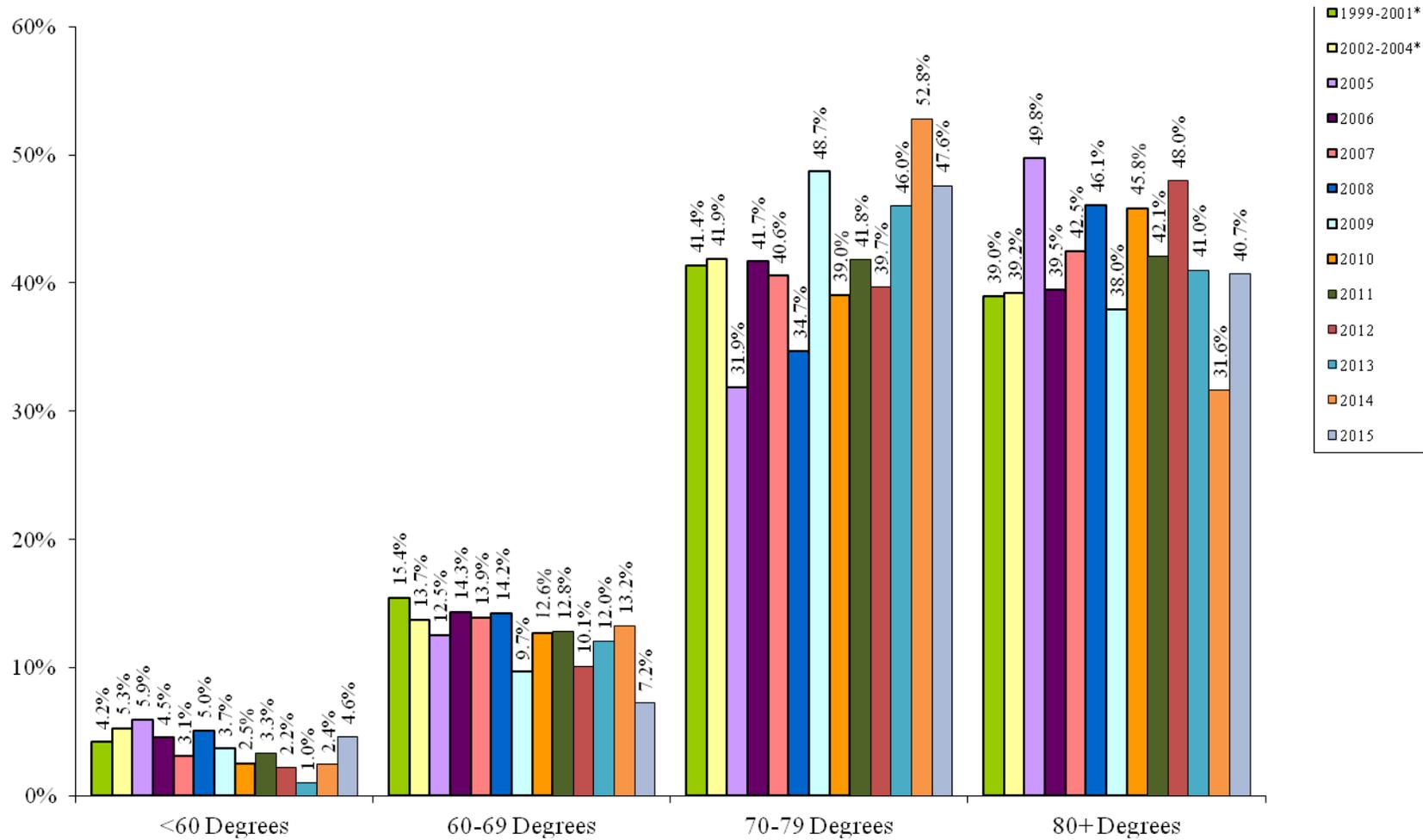
*Three-year average

Figure R2 – Age of Youth Boaters



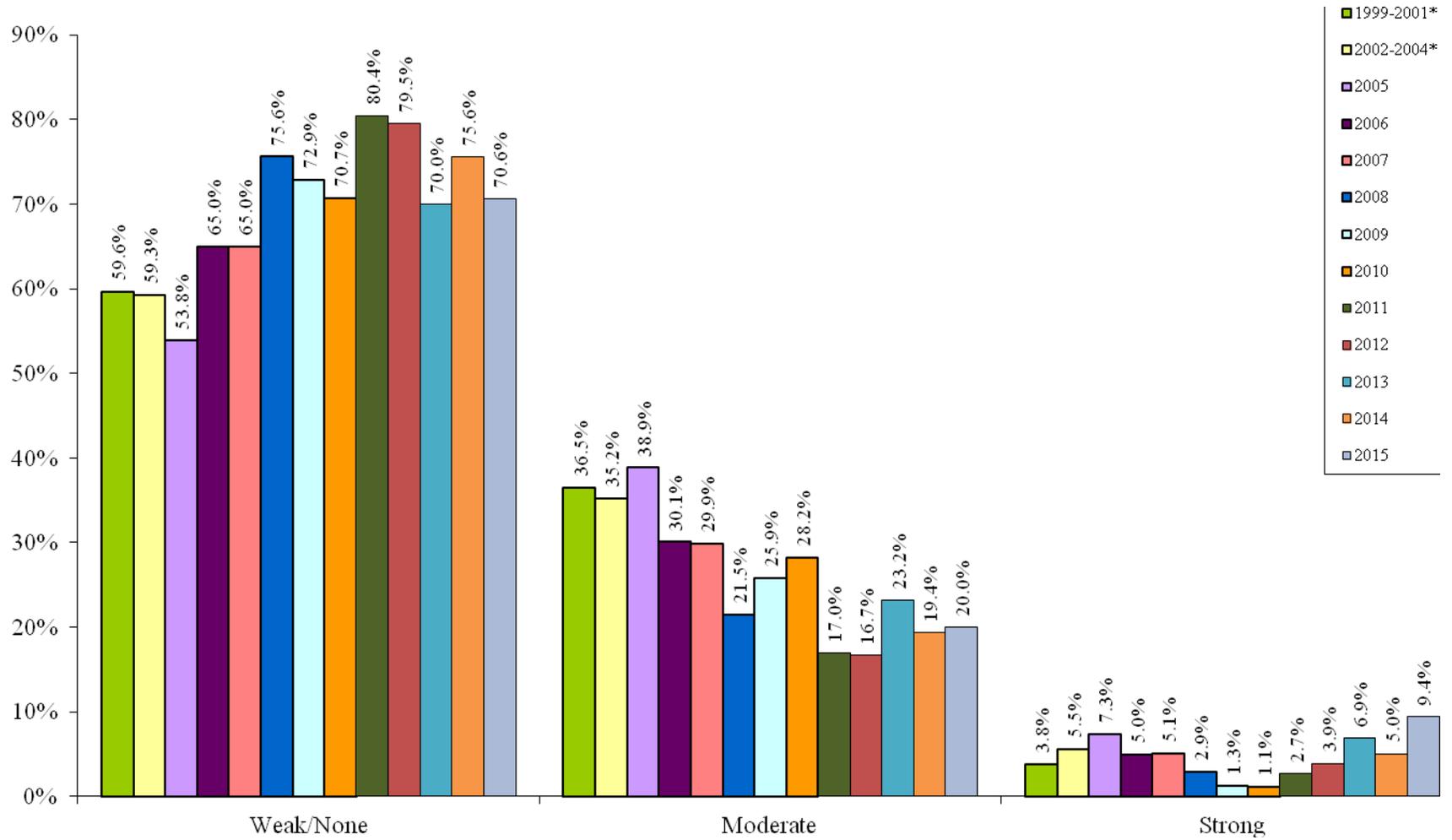
*Three-year average

Figure S – Water Temperature in which ALL Boaters were Observed



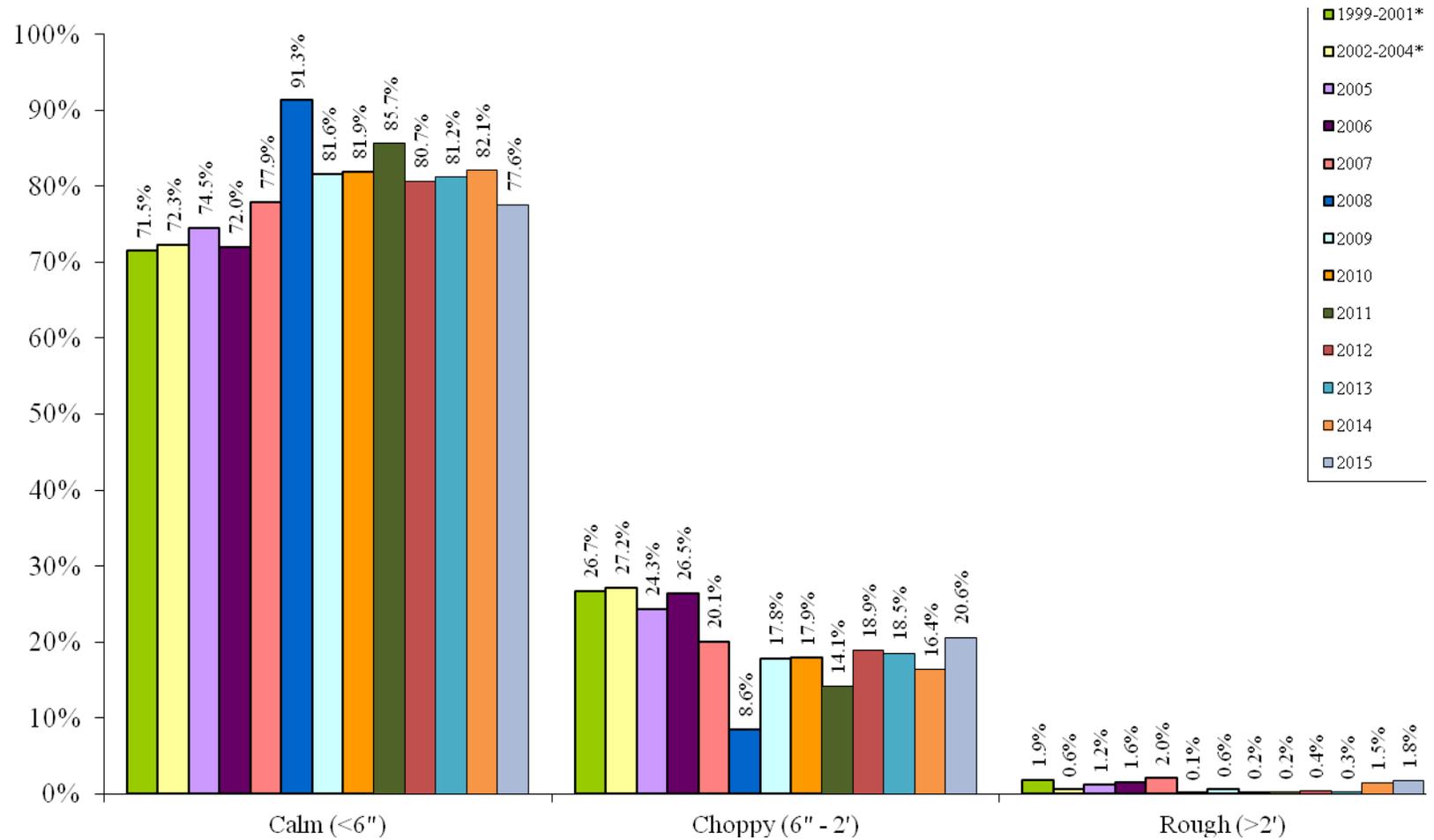
*Three-year average

Figure T – Water Current in which ALL Boaters were Observed



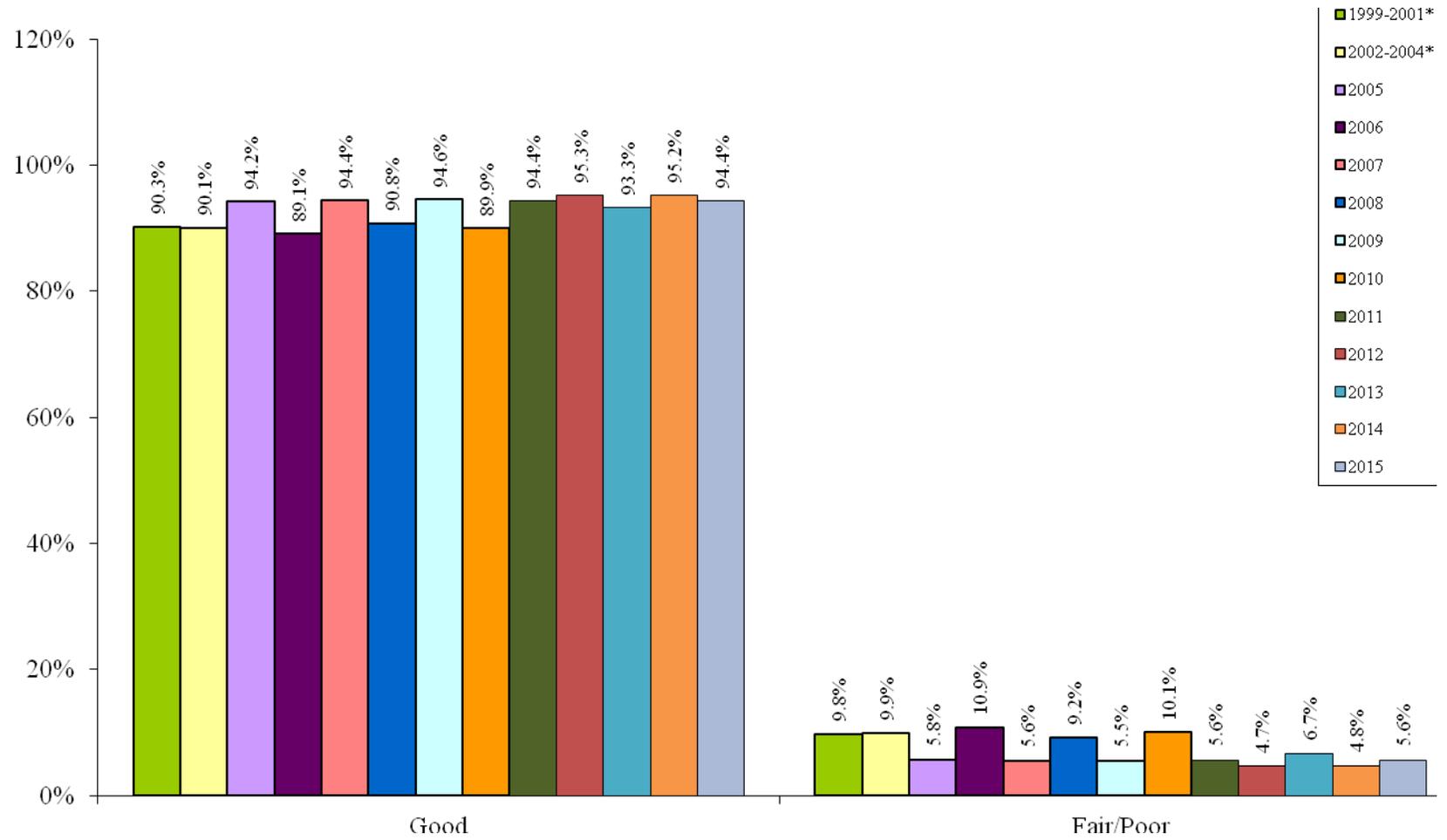
*Three-year average

Figure U – Wave Height in which ALL Boaters were Observed



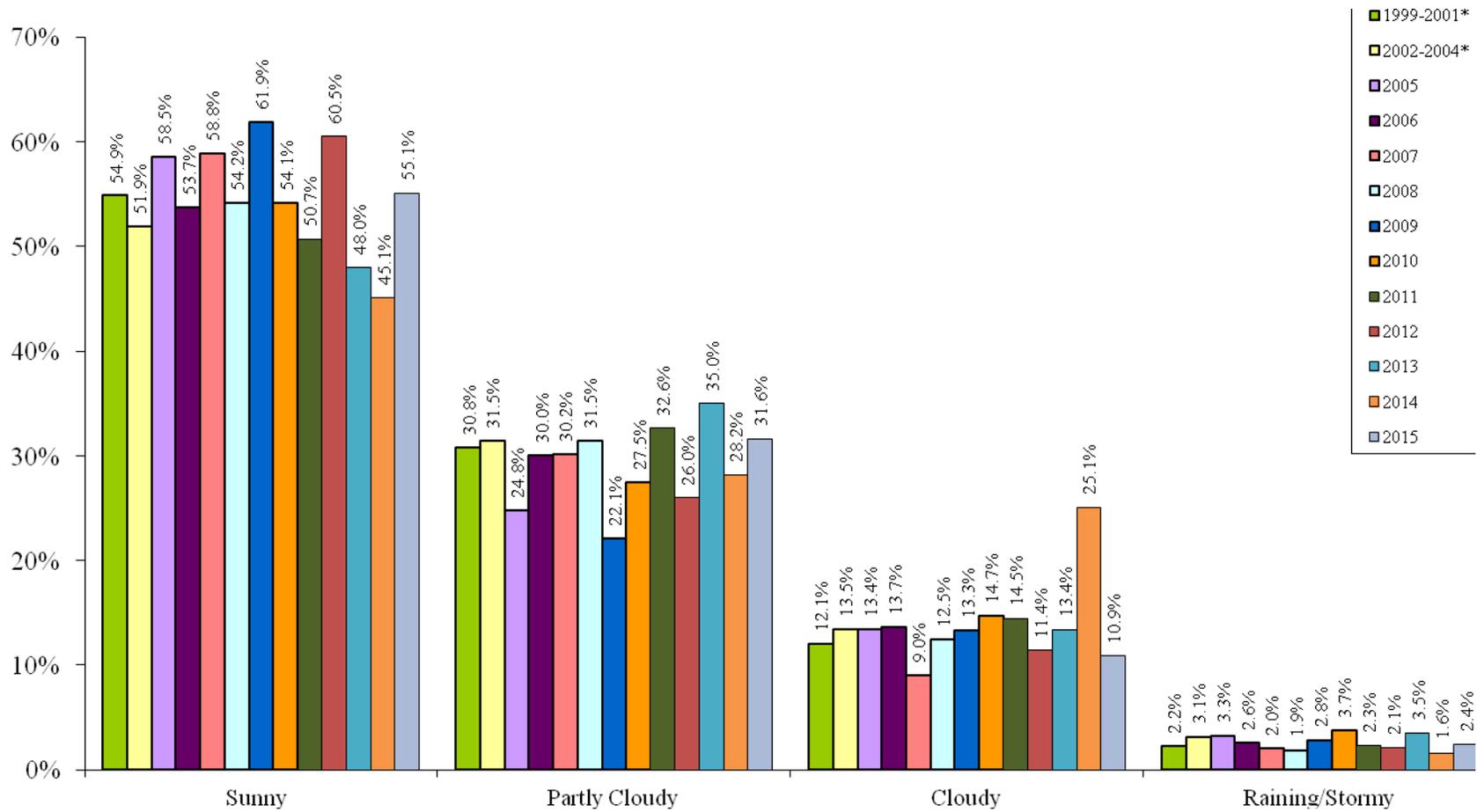
*Three-year average

Figure V – Visibility in which ALL Boaters were Observed



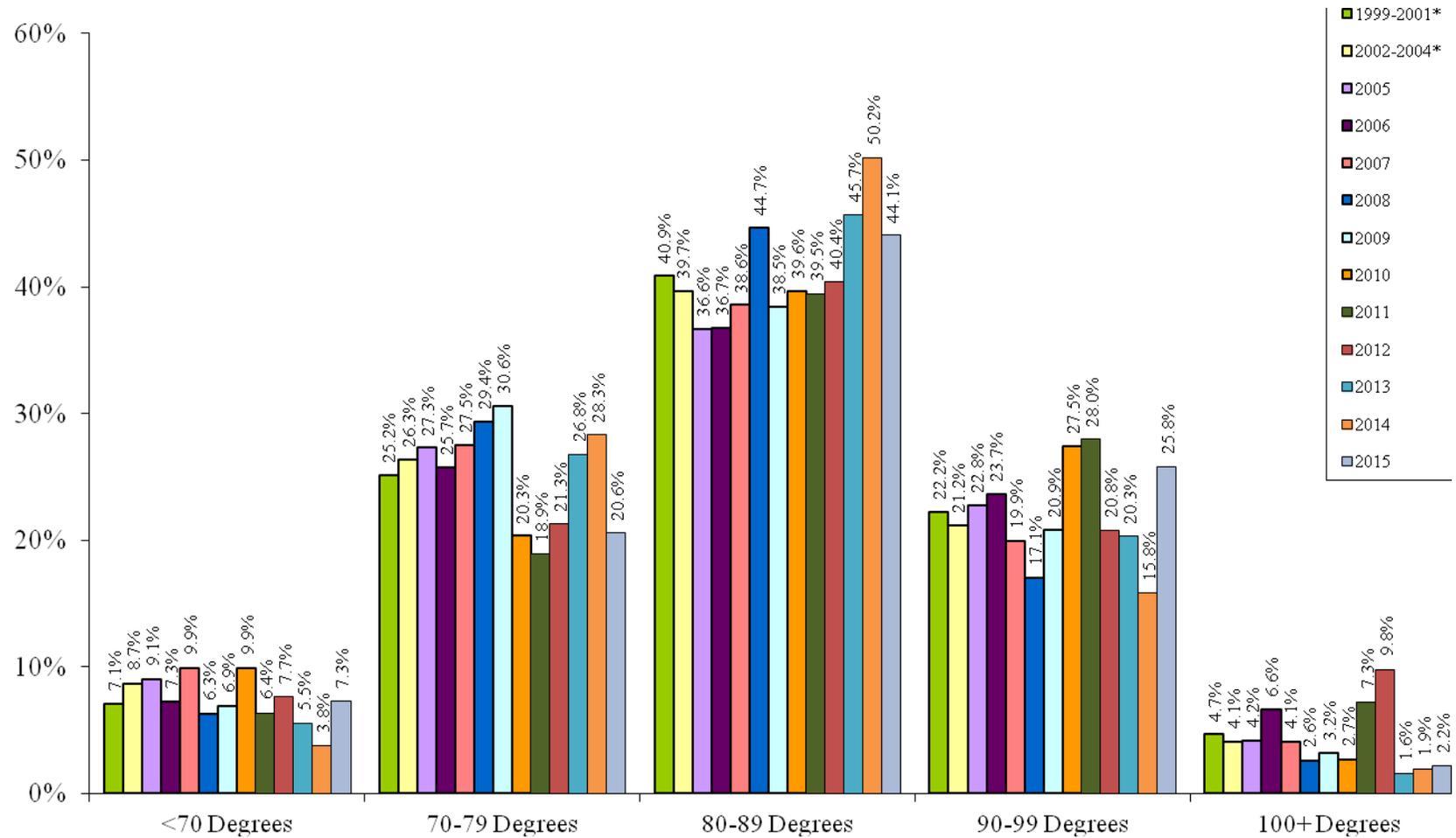
*Three-year average

Figure W – Weather in which ALL Boaters were Observed



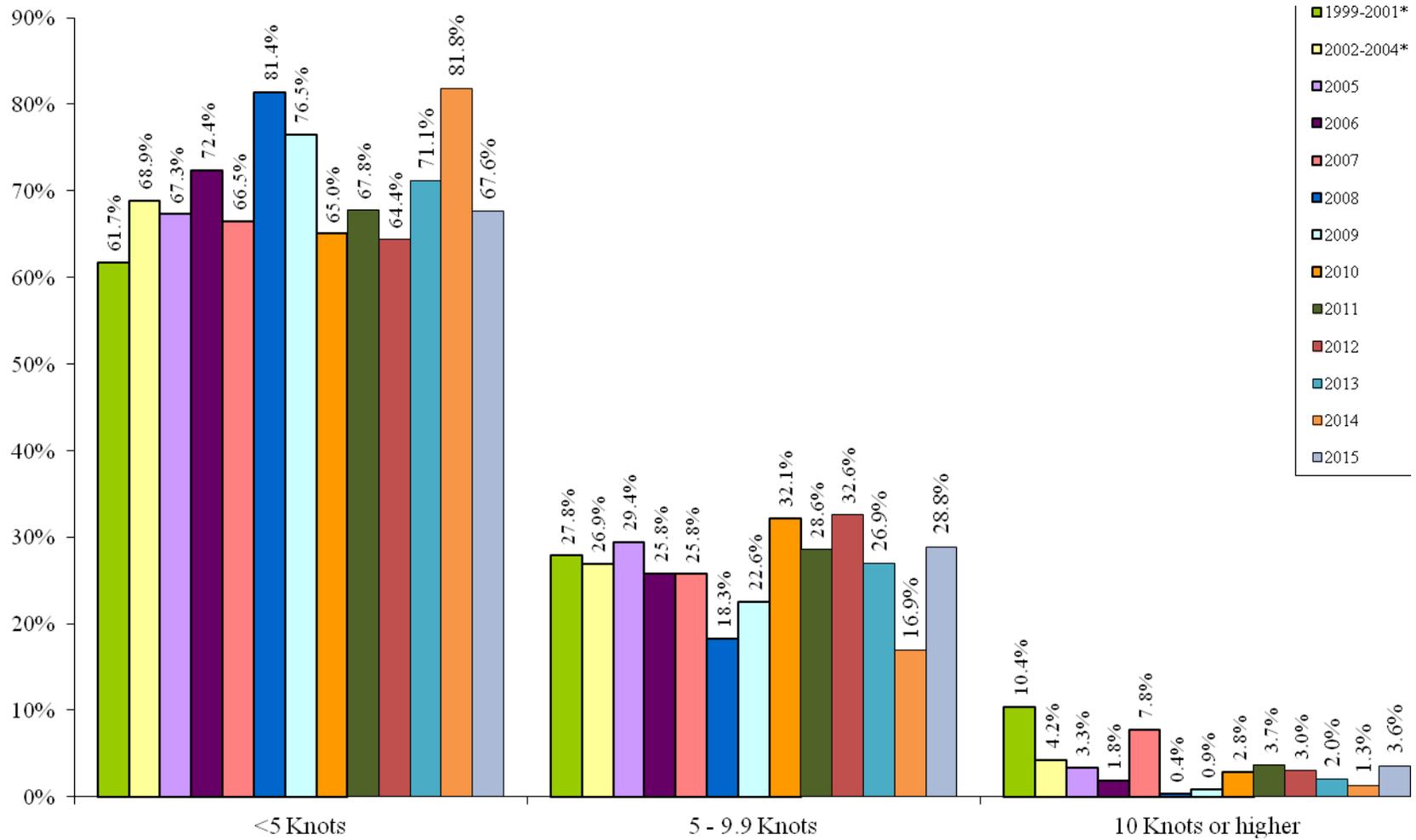
*Three-year average

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