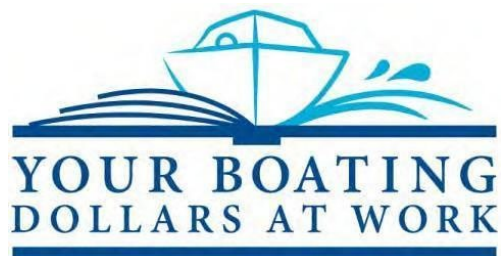


# 2023 Life Jacket Wear Rate Observation Study

Featuring

National Wear Rate Data from 1999 to 2023



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

# 2023 Life Jacket Wear Rate Observation Study

Featuring  
National Wear Rate Data from 1999 to 2023

Thomas W. Mangione

Laura Steere

Rebecca Millock

Sanah Lal

Erin Singer

Mihaly Imre

JSI Research & Training Institute, Inc.

and

U.S. Coast Guard Auxiliary

February, 2024



## AUXLWO

2023 marks the 8<sup>th</sup> year of USCG Auxiliary participation in this data collection effort. The AUXLWO (Auxiliary Life Jacket Wear Observation) program launched officially in 2018 by the Coast Guard Office of Auxiliary & Boating Safety (CG-BSX). To date, 321 individual Auxiliary members in 20 states have contributed to the study.

### Special thanks for multiple years of leadership from:

Jeff Decker, USCG, Grant Technical Manager

Bill Jefferson, USCG Auxiliary National Division Chief, AUXLWO

Scott Thomas, Branch Chief- Special Programs Outreach East

Randy Wesson, Branch Chief- Special Programs Outreach West

**Thank you to all Auxiliary participants in these 20 states: Arizona, California, Florida, Georgia, Kansas, Louisiana, Maryland, Michigan, Minnesota, Missouri, New York, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Virginia, Wisconsin.**

### State Coordinators

Desplaces, David  
Grant, Jeff  
Hetzel, Fred  
Norton, Greg  
Schensky, Ron

Best, Paul  
Gilman, Fred  
Heinz, Janet  
Klacik, Mike  
Pearson, Dennis  
Stuhr, John

Cerverizzo, Vincent  
Grant, Jeff  
Himes, Mark  
Koleszar, Janice  
Schensky, Ron  
Wesson, Randy

Chaffee, Pam  
Heinz, Janet  
Huhs, Jeffrey  
Moquin, Jules  
Statz, M Scott

### Observers

Anderson, Bart  
Anderson, Kevin  
Andreika, Karen  
Behe, John Mark  
Best, Paul  
Bird, David  
Bishop, Timothy  
Bond, Rosemary  
Bonnett, Ben  
Burness, Brad  
Candogan, Ufuk  
Chaffee, Dave  
Chaffee, Pam  
Chichester, Kenneth  
Clark, Jere Buddy  
Clingan, Kathryn  
Clingan, Mark  
Cott, Travis  
Creed, Dean  
Cromley, Robert  
Crosby, Robyn  
Davies, Susan  
DePasquale, Carl  
Desplaces, David  
Dietz, Tom  
Downing, Betty Jean  
Elefonte, Valerie  
Esparza, Dave

Esparza, June  
Everhart, Katrina  
Feinberg, Paul  
Fletcher, Stephen  
Fransanito, John  
Garvey, William  
Gilman, Diane  
Gilman, Frederick  
Glas, Randy  
Gleeson, Edward Jay  
Glover, George  
Goetze, Scott  
Goodman, Mark  
Grant, Jeff  
Hague, Charles  
Hallam, Laura  
Hamill, Jane  
Hartwig, Eric  
Hay, Daniel  
Hay, Sydney  
Heibel, Cathy Nixon  
Heinz, Janet  
Hetzel, Harry Fred  
Houck, Michael  
Huhs, Jeffrey  
Jones, Christopher  
Kent, Kenneth  
Kienle, Daniel  
Klacik, Michael

Koleszar, Janice  
Koleszar, John  
Lai, Edward  
Liming, Daniel  
Long, Miguel  
Loupatty, Willem  
Luciano, Rafael  
Lumsden, Lois  
Martone, Bob  
McIntyre, Dan  
Mendoza, Martin  
Middleton, Amy  
NarKiewicz, Thea  
Norton, Greg  
Olgin, Ron  
Oxer, Bruce  
Palfy, Anthony  
Park, Wendy  
Pearson, Dennis  
Peek, George  
Pittenger, Richard  
Poteralski, Paul  
Rabette, David  
Reichner, Robert  
Rippel, Robert  
Rodriguez, Rene  
Rosenfeld, Isak  
Scamardo, Alexander  
Pete

Scamardo, Alexander  
Pete  
Schensky, Ron  
Scoffin, JamesS  
Scourzo, Grant  
Sims, Ronald  
Steed, Walter  
Stuhr, John  
Swink, John  
Sykes, Carol  
Sykes, Homer  
Tate, George  
Thorn, William  
Tomkins, Jim  
Welsh, Patrick  
Wesson, Randy  
Wong, Anthony  
Yeomans, David  
Yost, Tom  
Yslas, Catherine  
Yslas, Robert  
Zorzi, Alfredo

# Table of Contents

<b>I. INTRODUCTION</b>	<b>1</b>
<b>II. NATIONAL CORE DATA RESULTS</b>	<b>2</b>
ADULT LIFE JACKET WEAR RATES ON OPEN MOTORBOATS 2006 TO 2023	2
<i>Figure A – Adult Wear Rates on Open Motorboats* 2006-2023</i>	3
NATIONAL LIFE JACKET WEAR RATES FOR ALL BOATERS 1999 TO 2023	4
<i>Figure B – Life Jacket Wear Rates for ALL Boaters</i>	5
NATIONAL LIFE JACKET WEAR RATES FOR ADULTS (18 YEARS OR OLDER) 1999 TO 2023	6
<i>Figure C – Life Jacket Wear Among Adult Boaters*</i>	6
NATIONAL LIFE JACKET WEAR RATES FOR YOUTH (17 YEARS OR YOUNGER) 1999 TO 2023	7
<i>Figure D – Life Jacket Wear Among Youth Boaters*</i>	7
LIFE JACKET WEAR RATES BY AGE CATEGORIES 1999 TO 2023	8
<i>Table 2.1 – Life Jacket Wear Rates by Age Excluding Boaters on PWCs*</i>	9
POWERBOATS FOR ADULTS (18 YEARS OR OLDER)	10
<i>Figure E – Adult Wear Rates for ALL Powerboats Except PWCs*</i>	10
<i>Table 2.2 - Life Jacket Wear Rates by Powerboats for Adults*</i>	11
POWERBOATS FOR YOUTH (17 YEARS OR YOUNGER)	12
<i>Figure F – Youth Wear Rates for ALL Powerboats Except PWCs*</i>	12
<i>Table 2.3 – Life Jacket Wear Rates by Powerboats for Youth*</i>	13
PADDLECRAFT FOR ADULTS (18 YEARS OR OLDER)	14
<i>Figure G – Adult Wear Rates for ALL Paddlecraft (excluding Paddleboards)*</i>	14
<i>Table 2.4 – Life Jacket Wear Rates by Paddlecraft for Adults*</i>	15
PADDLECRAFT FOR YOUTH (17 YEARS OR YOUNGER)	16
<i>Figure H – Youth Wear Rates for ALL Paddlecraft (excluding Paddleboards)*</i>	16
<i>Table 2.5 – Life Jacket Wear Rates by Paddlecraft for Youth*</i>	17
SAILBOATS FOR ADULTS (18 YEARS OR OLDER)	18
<i>Figure I – Adult Wear Rates for ALL Sailboats*</i>	18
<i>Table 2.6 – Life Jacket Wear Rates by Sailboats for Adults*</i>	19
SAILBOATS FOR YOUTH (17 YEARS OR YOUNGER)	20
<i>Figure J – Youth Wear Rates for ALL Sailboats*</i>	20
<i>Table 2.7 – Life Jacket Wear Rates by Sailboats for Youth*</i>	21
BOAT TYPE AND SIZE FOR ADULTS (18 YEARS OR OLDER)	22
<i>Table 2.8 – Life Jacket Wear Rates by Boat Type and Size for Adults*</i>	23
<i>Figure K. Life Jacket Wear Rates and Proportions of Boaters on Larger and Smaller Powerboats for Adults*</i>	24
<b>III. ENGINE CUT-OFF SWITCH</b>	<b>25</b>
<i>Table 2.9 – 2021 to 2023 ECOS Use Visibility (Yes) and Actual Use by Boat Type</i>	25
<b>IV. FALL OBSERVATIONS</b>	<b>26</b>
<i>Table 2.11– Summer and Fall Observed Adult Wear Rates by Boat Type</i>	26
<b>V. SUMMARY OF LIFE JACKET WEAR RATES</b>	<b>27</b>
<b>VI. ENVIRONMENTAL IMPACT ON WEAR RATES</b>	<b>28</b>
SECTION 4.1: DIFFERENCES IN LIFE JACKET WEAR RATE BY ENVIRONMENTAL CONDITION	29
<i>Table 4.1. Percentage within Boat Group Observed in “Risky” Environmental Conditions (1999-2023)</i>	29

Table 4.2. <i>Wear Rates for Each Environmental Condition by Boat Group (1999-2023)</i>	30
SECTION 4.2: RELATIVE EFFECT OF EACH ENVIRONMENTAL CONDITION	31
Table 4.3. <i>Adjusted** Logistic Regression Predicting Odds of Wearing a Life Jacket (2004-2023; N=590,224)</i>	31
SECTION 4.3: IMPACT OF MULTIPLE RISKS AT ONE TIME	31
Table 4.4. <i>Percent of Observations within each Boat Group by Number of Risks (1999-2023)</i>	31
Table 4.5. <i>Wear Rates by Cumulative Risk for each Boat Group (1999-2023)</i>	32
Figure 4.1. <i>Wear Rates by Cumulative Risk for each Boat Group (1999-2023)</i>	32
SECTION 4.4: CONCLUSIONS	33
<b>VII. INFORMATION ON BOATS &amp; PEOPLE OBSERVED</b>	<b>34</b>
<b>VIII. APPENDIX A: METHODS &amp; DESCRIPTIVE INFORMATION</b>	<b>35</b>
<i>JSI Data Collection Form: 2023 Boat Form</i>	37
<i>JSI Data Collection Form: 2023 Site Form</i>	38
Figure L. <i>Number of Boats and People</i>	39
Figure M. <i>Types of Boats</i>	40
Figure N. <i>Length of Boats</i>	41
Figure O. <i>Length of Boats 2004-2023 Data Only</i>	42
Figure P. <i>Operation of Boats</i>	43
Figure Q. <i>Activity of Boaters—ALL YEARS*</i>	44
Figure R. <i>Activity of Boaters 2007-2023 Data</i>	45
Figure S. <i>Activity of Boaters 2002-2023</i>	46
Figure T. <i>Gender of Boaters</i>	47
Figure U. <i>Age of Boaters</i>	48
Figure V. <i>Age of Youth Boaters</i>	49
Figure W. <i>Water Temperature in which ALL Boaters were Observed</i>	50
Figure X. <i>Water Current in which ALL Boaters were Observed</i>	51
Figure Y. <i>Wave Height in which ALL Boaters were Observed</i>	52
Figure Z. <i>Visibility in which ALL Boaters were Observed</i>	53
Figure AA. <i>Weather in which ALL Boaters were Observed</i>	54
Figure AB. <i>Air Temperature in which ALL Boaters were Observed</i>	55
Figure AC – <i>Wind Speed in which ALL Boaters were Observed</i>	56

# I. Introduction

This report provides data and analysis on the 2023 National Life Jacket Wear Rate Observation Study with comparison information from the previous twenty-three years of studies (1999-2021). Life jacket wear rate data was not collected during the 2020 observation year due to the COVID-19 pandemic which accounts for the missing year of data collection in the twenty-four-year lifespan of the project. 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 2022 Recreational Boating Statistics report, published by the United States Coast Guard (USCG), shows that among the 636 deaths in 2022 where the cause of death was known, 75% of the victims drowned. Where life jacket use or nonuse was known, 85% of those drowning victims 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 2023 marked the twenty-fourth 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.

Beginning April 1, 2021, Congress passed a law requiring the use of an engine cut-off switch (ECOS) for operators of powered recreational vessels less than 26 feet in length. In order to capture use of ECOS, JSI added an additional ECOS data collection point to the data collection forms in 2021. ECOS status is collected for all powerboats regardless of size. The findings for ECOS data collection are provided in this report.

Although there are notable and important technical differences between "Personal Flotation Devices" (PFD) and "Life Jackets", for the purposes of this report the general term "Life Jackets" will be used. Most data in this report are presented separately for adults (18+ years old) and youth (0 to 17 years old) since wear rates are substantially different for these two groups. This descriptive section of this report provides findings on summer wear rates by age and boat type. Additional sections of the report provide (1) comparison wear rates between fall and summer seasons for a select number of sites and (2) the relationships between environmental and site characteristics and wear rates. Over the twenty-four years of the project, the general distributions of age, 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 1999-2023 period of data collection. In order to efficiently present findings throughout all years of the study, tables combine years 2000-2002, 2003-2005, and 2006-2008 and use the average value for these years.

## II. National Core Data Results

### Adult Life Jacket Wear Rates on Open Motorboats 2006 to 2023

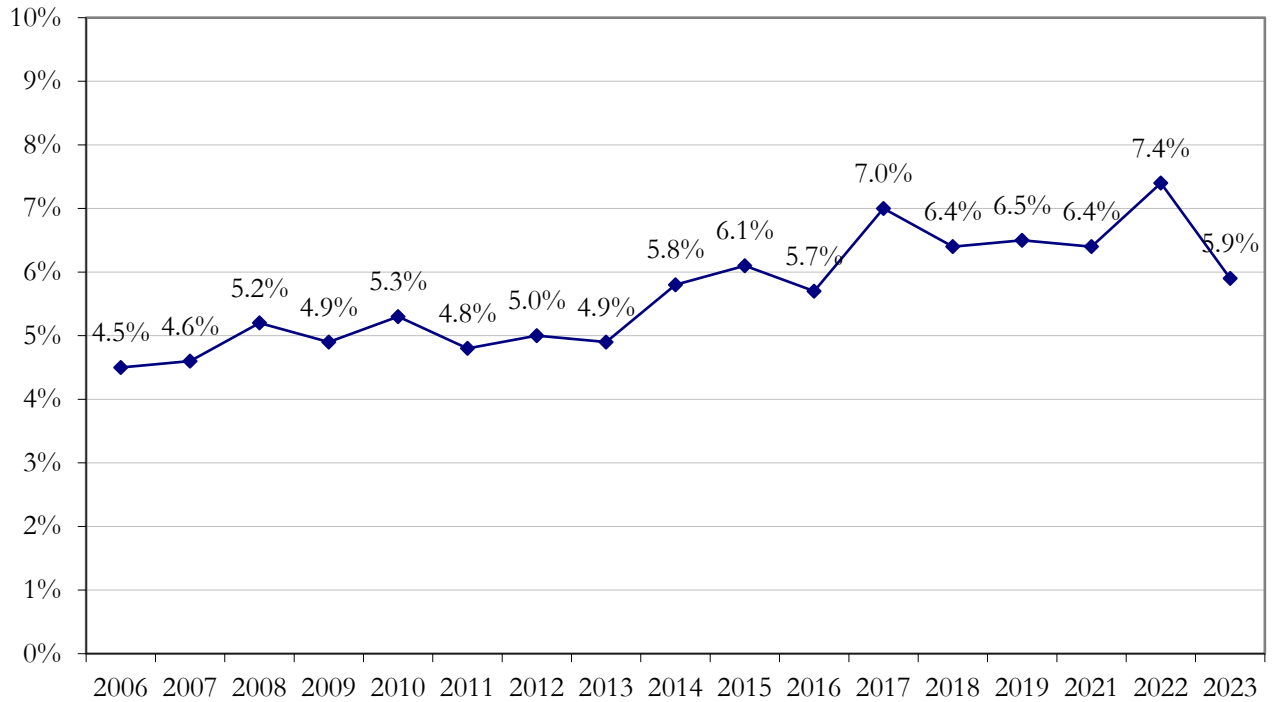
The National Boating Safety Advisory Council (NBSAC) recommended the creation of a strategic plan for the National Recreational Boating Safety Program in 2005. The goals, objectives, and strategies in this Plan can help all partners in boating safety work together to reduce the incidents of preventable deaths, injuries, and property damage. One of the objectives of all of the Strategic Plans, since the 2005 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 and each subsequent year 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 that 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 2023 is 5.9% and it represents a downturn from the highest wear rates recorded for this type of craft from 2021. (See Figure A for a chart showing these trends and Table 2.2 on page 14.) Since 2006 the wear rates for open motorboats have shown a relative increase by 31.1% going from 4.5% to 5.9% in 2023.



**Figure A – Adult Wear Rates on Open Motorboats\* 2006-2023**  
 (Weighted to 2006 Skiff-Speedboat Proportions for Each State)



JSI Research & Training Institute, Inc.

2023 National Observational Life Jacket Wear Rate Study

\* 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.

\*\*Note that lifejacket wear of towed participants are included in the wear rates.



## National Life Jacket Wear Rates for ALL Boaters 1999 to 2023

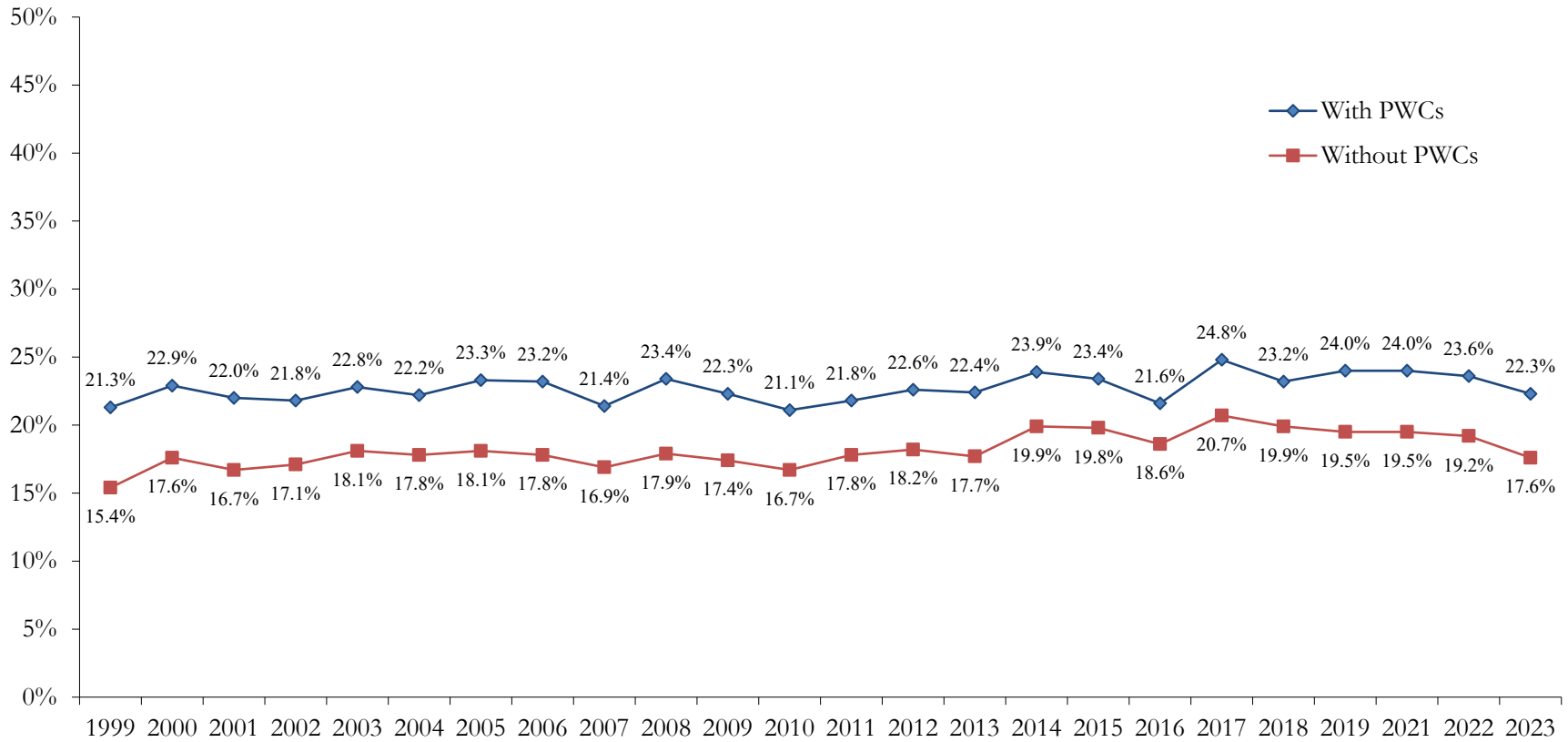
Figure B shows trends for national life jacket wear rates, including all groups of recreational boaters together (youth and adults) for two groups of boats - “all boats” and “all boats except PWCs”. The two sets of data present a clear indication of the impact of PWCs (personal watercraft) on the overall average wear rates. In subsequent tables in this report JSI removed PWCs from the findings since this provides 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 2023 was 22.3%. This is a relative increase of 4.7% since the beginning of the study in 1999 (21.3%).

The 2023 average wear rate excluding PWCs was 17.6%, which represents a relative increase of 14.3% since 1999 (15.4%). However, since the highest wear rate in 2017 there has been a slow but steady decline in wear rates from 20.7% to this year’s 17.6%.



**Figure B – Life Jacket Wear Rates for ALL Boaters**

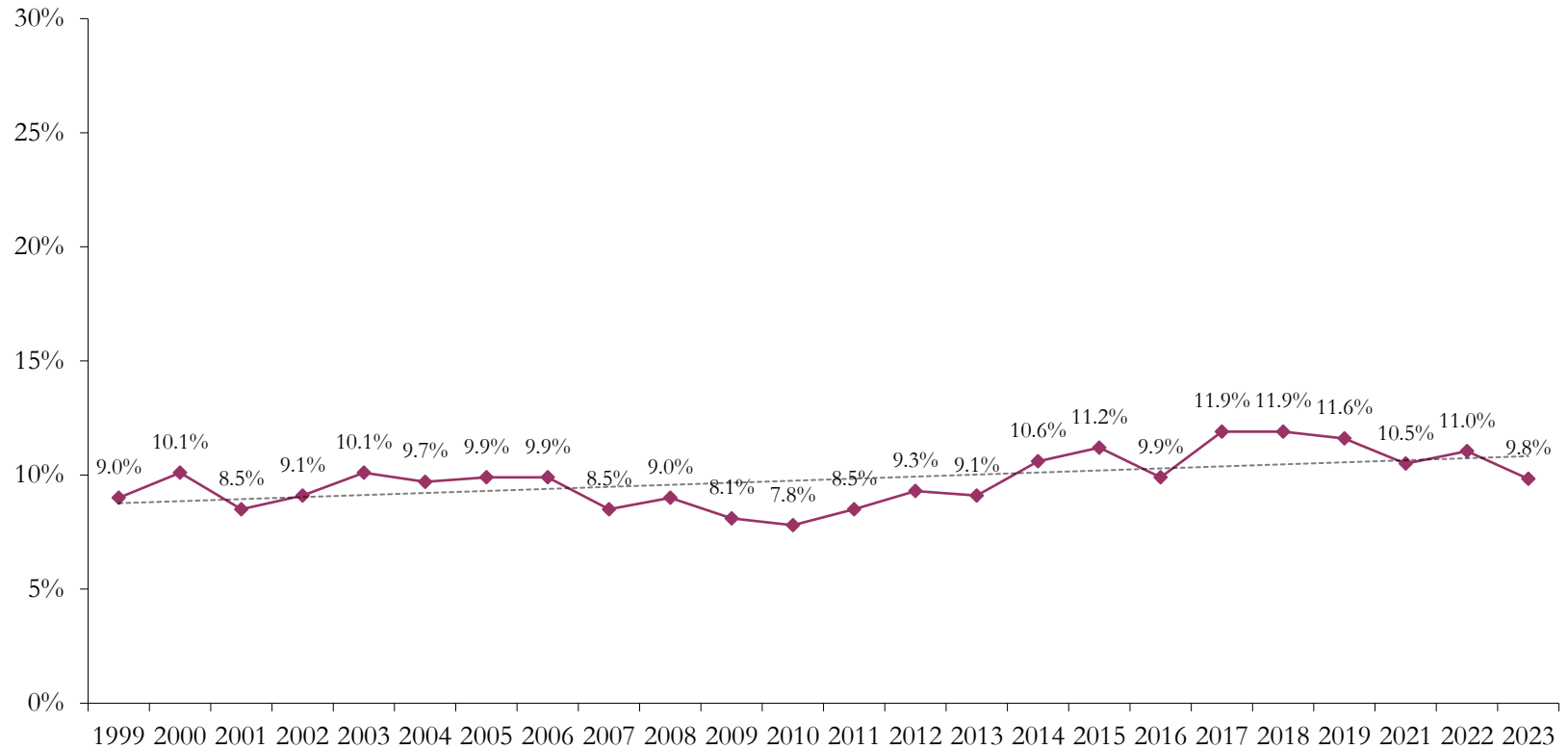


JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*Factors controlled for: Age & Boat Type

## National Life Jacket Wear Rates for ADULTS (18 years or older) 1999 to 2023

Figure C and Table 2.1 show the national wear rate trend for all adults on all boats excluding PWCs. The national average wear rate for all adults in 2023 was 9.8%. The 2023 rate represents a 8.9% relative increase since 1999 (9.0% to 9.8%) and a 25.6% relative increase since 2010 (7.8% to 9.8%). The 2023 rate continues the relative decline in wear rates since 2017, despite the slight increase in 2022.

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

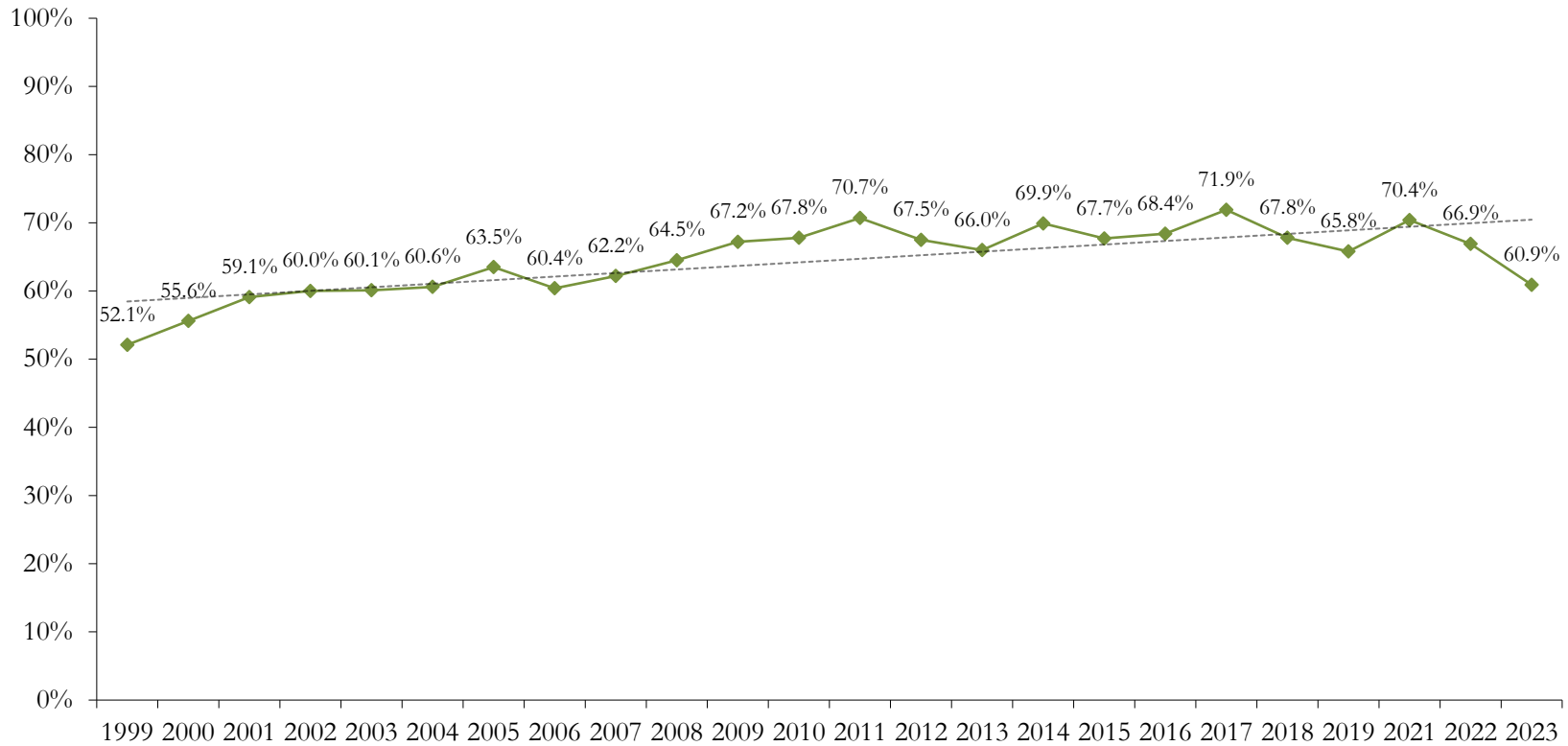


JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type

## National Life Jacket Wear Rates for YOUTH (17 years or younger) 1999 to 2023

Figure D and Table 2.1 show the national wear rate trend for all youth (17 years or younger) on all boats except PWCs. These rates are relatively high across the twenty-four years of data shown, with a general upward trend. The wear rate for 2023 is 60.9%. This is a relative increase of 16.9% since the beginning of the study in 1999 (52.1%). However, this year's data represents a continued decline from 2021 (70.4%) and a general decline since the high point in 2017. The tables in the next section show how each youth age group contributed to that decline.

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



JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type.

## Life Jacket Wear Rates by Age Categories 1999 to 2023

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

The youth (0-17) wear rate for 2023 was 60.9%. Despite a 16.9% relative increase since 1999 (52.1%), the 2023 youth wear rate was the third lowest wear rate ever observed for this group. Wear rates for the under six age group have always been relatively high; the 2023 rate of 88.9% represents a 10.3% relative increase since 1999 (80.6%). Wear rates for youth 6-12 years old was 81.5% and represent a 17.9% relative increase since 1999 (69.1%). Teenager (13-17) wear rates of 30.3% represents a 25.7% relative increase since 1999 (24.1%). All youth age groups declined from 2022 data levels, however, with the teenager wear rates showing the largest decline (38.7% to 30.3%) and also all age groups have declined since the highpoint of the 2017 data.

For adults ages 18 to 64, the 2023 wear rate is 9.7% and represents a 10.2% relative increase since 1999 (8.8%).

For adults 65 years of age and older, the 2023 data show a wear rate of 11.8% and represents an 8.5% decrease from 1999 (12.9%). This also represents a significant decrease from 2022 (16.2%), which represented the highest wear rate for this group since the study's onset.

As indicated in Figure C and in Table 2.1, for the combined adult group (18+ years), there has been a relative increase in wear rates of 8.9% since 1999 (9.0% to 9.8%).



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

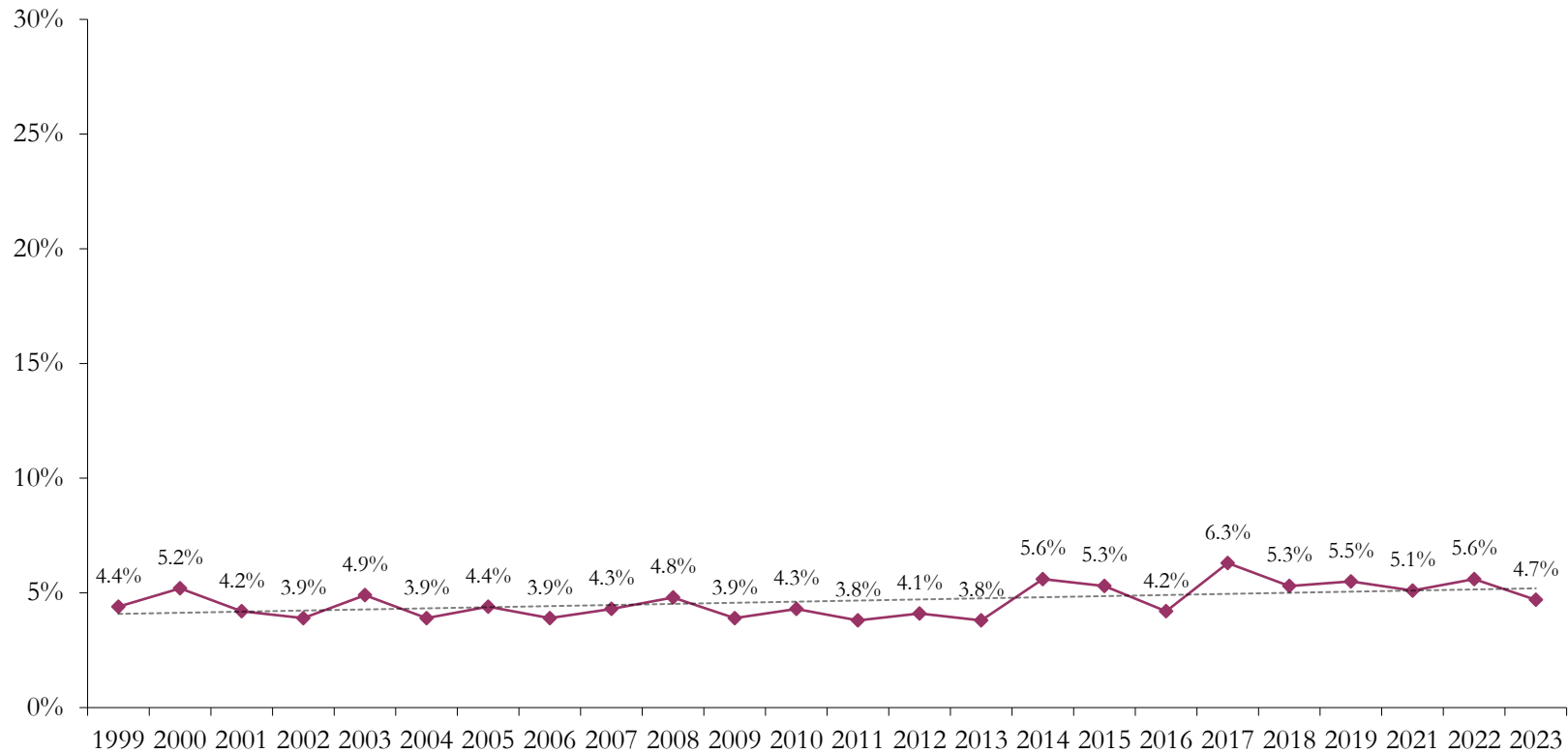
Age (yrs)	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>0-5</b>	80.6% (500)	90.3% (2096)	92.9% (2115)	93.3% (2792)	93.6% (854)	94.8% (811)	96.6% (874)	94.7% (662)	93.5% (789)	94.5% (804)	92.1% (694)	92.9% (573)	94.1% (555)	90.4% (615)	93.2% (790)	91.3% (368)	90.1% (444)	88.9% (586)
<b>6-12</b>	69.1% (2104)	76.0% (8579)	80.7% (7834)	83.5% (7806)	86.5% (2812)	89.1% (2809)	90.7% (2381)	84.9% (2844)	85.4% (2494)	87.3% (2757)	87.2% (2227)	84.1% (2184)	87.3% (2131)	86.2% (2575)	82.2% (2473)	88.6% (1889)	84.8% (1807)	81.5% (2117)
<b>13-17</b>	24.1% (2244)	30.0% (8101)	31.5% (7390)	31.8% (7551)	38.9% (2420)	35.1% (2127)	41.4% (1817)	37.6% (2163)	34.9% (1933)	41.6% (1837)	37.2% (1694)	41.5% (1675)	46.5% (2077)	38.3% (2138)	38.9% (2176)	40.7% (2099)	38.7% (1808)	30.3% (2281)
<b>0-17</b> (all youth)	52.1% (4624)	59.3% (18776)	62.2% (17339)	63.2% (18149)	67.2% (6086)	67.8% (5747)	70.7% (5072)	67.5% (5669)	66.0% (5216)	69.9% (5398)	67.7% (4615)	68.4% (4432)	71.9% (4763)	67.8% (5328)	65.8% (5439)	70.4% (4356)	66.9% (4059)	60.9% (4984)
<b>18-64</b>	8.8% (24321)	8.8% (91135)	9.0% (91246)	8.5% (92407)	8.1% (34632)	7.7% (36420)	8.5% (33267)	9.2% (32298)	9.1% (30843)	10.4% (33058)	11.1% (31012)	9.9% (30906)	11.9% (29760)	11.9% (34246)	11.6% (32918)	10.3% (26365)	10.8% (23978)	9.7% (28177)
<b>65+</b>	12.9% (1147)	7.3% (3236)	8.9% (3255)	8.1% (2874)	7.0% (1129)	10.7% (763)	7.2% (951)	11.8% (1122)	6.9% (1091)	13.3% (1634)	12.3% (1232)	11.0% (1339)	12.2% (1134)	11.7% (975)	12.0% (1078)	14.6% (1522)	16.2% (982)	11.8% (1438)
<b>18+</b> (all adults)	9.0% (25468)	8.7% (94371)	9.0% (94501)	7.8% (95281)	8.1% (35761)	7.8% (37003)	8.5% (34218)	9.3% (33420)	9.1% (31934)	10.6% (34692)	11.2% (32244)	9.9% (32245)	11.9% (30894)	11.9% (35221)	11.6% (33996)	10.5% (27887)	11.0% (24960)	9.8% (29615)

JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*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 2023 rate for all powerboats, excluding PWCs, is 4.7%, a relative increase of 6.8% compared to 1999 rates (4.4%). Wear rates in 2023 for PWCs (97.2% to 97.5%) and powered inflatables/rafts (22.1% to 35.8%) were higher than the observed wear rates in 2022 for those boat types. Skiffs show a wear rate of 6.7%, the second lowest wear rate ever observed and represents a 21.2% decrease from 2022 (8.5%) and a 33.0% decrease since 1999 (10.0%). In fact for all power boat types except powered inflatables the 2023 rates are noticeably lower than the 2017 highpoint levels.

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



JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type.

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

Boat Type	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>All Powerboats</b> (no PWC's)	4.4% (19894)	4.2% (76000)	4.3% (77632)	4.3% (80007)	3.9% (29924)	4.3% (30894)	3.8% (28954)	4.1% (27890)	3.8% (26786)	5.6% (28766)	5.3% (26444)	4.2% (26774)	6.3% (25823)	5.3% (29602)	5.5% (28792)	5.1% (23561)	5.6% (21814)	4.7% (25450)
<b>Skiff</b>	10.0% (1867)	8.2% (7564)	8.4% (13680)	8.4% (16052)	6.9% (7257)	9.7% (6634)	8.2% (6530)	7.8% (6936)	6.4% (7231)	13.1% (6776)	10.2% (6592)	7.4% (7338)	10.8% (7558)	10.8% (8407)	9.0% (8946)	8.2% (7392)	8.5% (7127)	6.7% (7702)
<b>Runabout</b>	4.2% (13195)	4.7% (45514)	4.4% (43325)	3.8% (42827)	3.5% (14635)	3.2% (15093)	3.0% (14381)	3.3% (13441)	3.5% (11686)	3.5% (13040)	4.1% (11853)	3.5% (11736)	4.6% (10192)	3.4% (11277)	4.1% (11083)	3.9% (8766)	3.8% (7877)	3.2% (9248)
<b>Runabout/ Speedboat</b> (excluding towed participants)	3.6% (13096)	4.0% (45205)	3.6% (42920)	2.9% (42433)	2.5% (14481)	2.2% (14947)	2.3% (14279)	2.3% (13294)	2.4% (11554)	2.6% (12923)	3.5% (11766)	2.7% (11638)	3.7% (10101)	3.0% (11218)	3.5% (10998)	3.3% (8706)	3.3% (7832)	2.6% (9184)
<b>Open Motorboat **</b>	.	.	.	4.5%*** (18603)	4.9% (21892)	5.3% (21727)	4.8% (20911)	5.0% (20377)	4.9% (18917)	5.8% (19816)	6.1% (18445)	5.7% (19074)	7.0% (17750)	6.4% (19684)	6.5% (20029)	6.4% (16158)	7.4% (15004)	5.9% (16803)
<b>Cabin Cruiser</b>	1.8% (3396)	1.6% (17727)	1.3% (15408)	1.7% (14061)	1.6% (5342)	1.5% (5900)	1.6% (5085)	1.6% (4611)	1.0% (4719)	2.2% (4669)	2.7% (4782)	1.4% (4418)	3.9% (4301)	1.1% (4920)	2.8% (4183)	2.7% (2839)	4.7% (2617)	3.0% (3681)
<b>Houseboat</b>	0.0% (151)	0.4% (502)	1.7% (763)	0.0% (209)	0.0% (31)	0.0% (140)	1.2% (309)	0.0% (18)	0.0% (51)	0.8% (131)	1.6% (64)	0.0% (93)	0.0% (32)	0.0% (63)	0.0% (85)	0.0% (55)	0.0% (57)	0.0% (74)
<b>Pontoon</b>	4.0% (1231)	3.2% (5195)	3.2% (5219)	2.0% (6477)	2.1% (2436)	1.5% (2922)	1.4% (2734)	2.3% (2624)	1.4% (2917)	2.4% (3966)	2.6% (2961)	1.5% (3080)	3.4% (3438)	3.3% (4695)	2.3% (4237)	2.4% (4291)	3.3% (3994)	2.4% (4445)
<b>PWC</b>	94.2% (1899)	96.6% (5639)	95.2% (5168)	97.0% (5708)	97.4% (2093)	97.5% (1921)	97.7% (1524)	96.9% (1811)	96.3% (1905)	96.9% (1856)	97.6% (1501)	95.6% (1256)	97.9% (1625)	97.4% (1483)	97.0% (1960)	97.0% (1673)	97.2% (1412)	97.5% (1796)
<b>Powered Inflatable/ Raft</b>	15.7% (205)	18.6% (590)	14.3% (814)	21.1% (797)	11.9% (254)	16.7% (345)	14.3% (224)	14.1% (278)	27.2% (233)	22.9% (315)	12.8% (256)	23.8% (223)	13.1% (334)	13.1% (303)	26.8% (343)	15.0% (273)	22.1% (199)	35.8% (374)

JSI Research & Training Institute, Inc.

2023 National Observational Life Jacket Wear Rate Study

\*Factors controlled for: Age & Boat Type.

\*\*The Open Motorboat category was created by grouping skiffs and runabout/speedboats. Age (proportions of 18 to 64 and 65+ adults) and the proportion of skiffs to runabout/speedboats control factors have been set for each year within each state to reflect the proportions observed in 2006 (first Strategic Plan goals measurement year). In addition, each state's contribution to the national average was weighted to reflect the 2006 proportion.

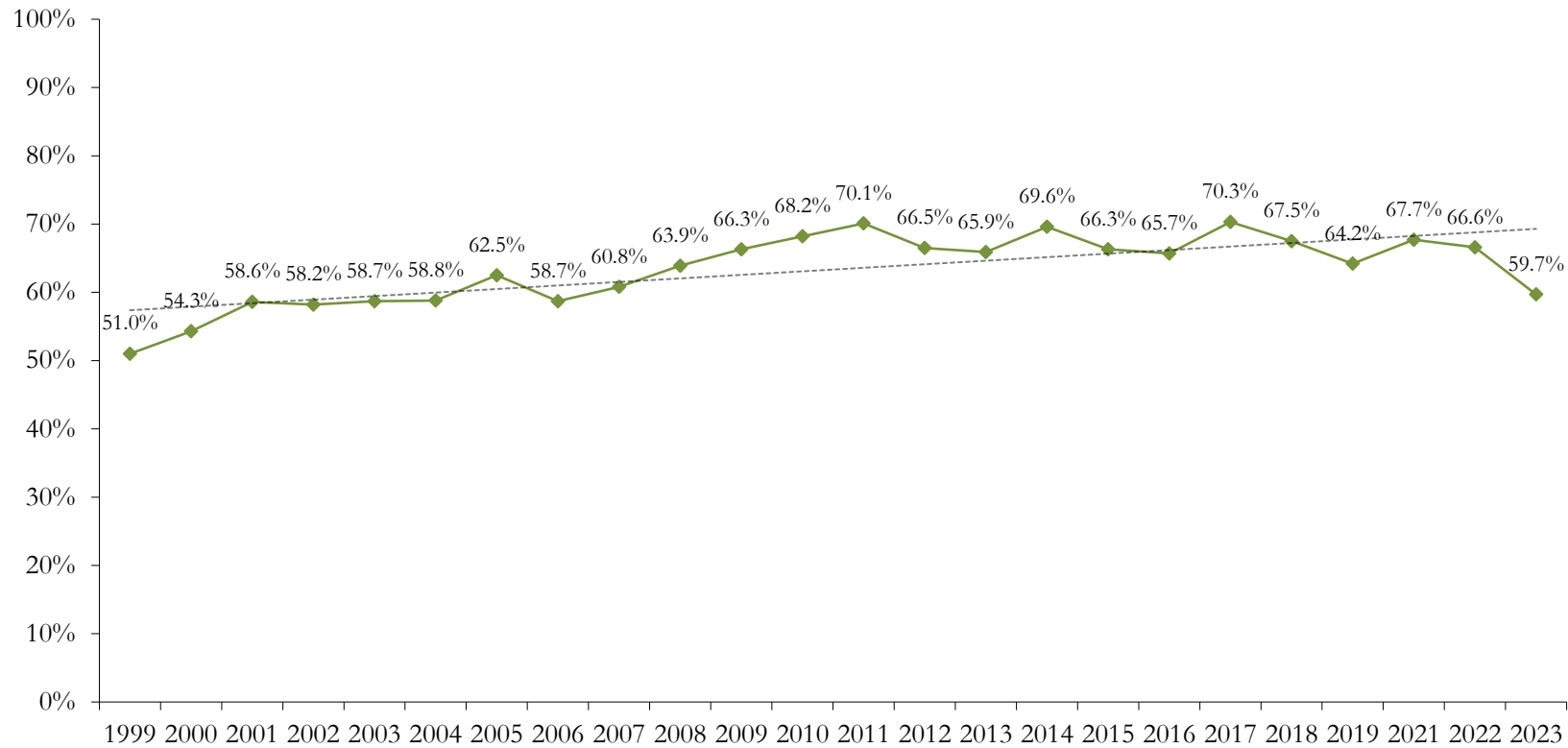
\*\*\*This data point is for 2006 only.



## 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). The 2023 wear rate is 59.7%, although a relative increase of 17.1% since 1999 (51.0%), but wear rates for youth have decreased noticeably since the highest wear rates in 2017 (70.3%). Skiffs, speedboats, cabin cruisers, and pontoons showed a decrease in wear rates from 2022, with pontoons having the largest decrease (63.1% to 47.9%), while powered inflatable/rafts showed a 19.1% increase from 2022 (69.5% to 82.8%). Even though individual years did not always show increases from previous years, on all types of boats, wear rates have improved since 1999 for youth.

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



JSI Research & Training Institute, Inc.  
2023 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 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)	
<b>All Powerboats</b> (no PWCs)	51.0% (3834)	57.8% (15902)	60.8% (14983)	62.1% (15855)	66.3% (5451)	68.2% (5090)	70.1% (4589)	66.5% (4846)	65.9% (4546)	69.6% (4798)	66.3% (4028)	65.7% (3750)	70.3% (4118)	67.5% (4762)	64.2% (4820)	67.7% (3681)	66.6% (3524)	59.7% (4539)	
<b>Skiff</b>	52.7% (338)	61.1% (1369)	63.7% (2187)	64.3% (2596)	70.4% (1097)	68.1% (862)	75.4% (929)	65.1% (1022)	66.3% (936)	70.8% (901)	68.2% (948)	65.6% (871)	73.7% (980)	68.4% (1116)	66.0% (1088)	68.8% (1017)	66.2% (987)	62.4% (1090)	
<b>Runabout</b>	51.6% (2744)	58.9% (11242)	62.4% (9909)	63.4% (10121)	68.2% (3133)	69.7% (2943)	71.0% (2624)	69.9% (2744)	69.2% (2482)	70.5% (2696)	68.1% (2121)	66.3% (1934)	70.6% (2019)	67.0% (22929)	65.1% (2536)	67.4% (1641)	65.6% (1528)	57.9% (1995)	
<b>Open Motorboat**</b>	51.8% (3082)	.	.	.	68.6% (4230)	69.5% (3805)	71.6% (3553)	69.1% (3766)	68.7% (3418)	70.6% (3597)	68.2% (3069)	66.6% (2805)	71.2% (2019)	68.0% (3345)	65.2% (3624)	67.7% (2658)	65.7% (2515)	58.6% (3085)	
<b>Cabin Cruiser</b>	42.6% (418)	49.5% (2051)	49.8% (1715)	50.6% (1721)	51.2% (644)	58.8% (524)	61.6% (507)	50.6% (465)	48.9% (505)	56.6% (364)	58.9% (430)	58.7% (409)	59.7% (473)	49.1% (459)	50.6% (400)	55.2% (279)	63.1% (269)	47.9% (451)	
<b>Houseboat</b>	8.7% (46)	21.7% (138)	19.1% (136)	28.5% (46)	.	19.1% (18)	39.9% (19)	.	.	.	.	.	.	.	.	.	.	17.5% (13)	77.7% (13)
<b>Pontoon</b>	38.3% (272)	56.4% (1240)	57.7% (1172)	61.0% (1311)	66.2% (530)	68.4% (716)	65.7% (494)	67.3% (580)	66.7% (598)	71.9% (787)	63.2% (511)	65.5% (508)	72.2% (606)	75.0% (908)	65.8% (758)	72.8% (721)	71.3% (718)	65.4% (967)	
<b>PWC</b>	96.0% (551)	99.2% (1835)	98.3% (1757)	99.2% (1766)	98.6% (572)	99.4% (427)	99.1% (376)	98.7% (401)	98.0% (371)	99.7% (365)	99.0% (292)	98.7% (154)	98.2% (275)	99.3% (269)	99.3% (402)	99.6% (245)	99.2% (234)	99.7% (295)	
<b>Powered Inflatable/Raft</b>	59.3% (62)	76.1% (106)	76.6% (125)	68.1% (106)	70.3% (47)	78.2% (45)	73.1% (35)	58.5% (35)	65.4% (25)	68.9% (50)	69.5% (18)	84.0% (28)	68.9% (40)	71.4% (50)	80.6% (38)	58.0% (23)	69.5% (22)	82.8% (36)	

JSI Research & Training Institute, Inc.

2023 National Observational Life Jacket Wear Rate Study

\*Factors controlled for: Age & Boat Type.

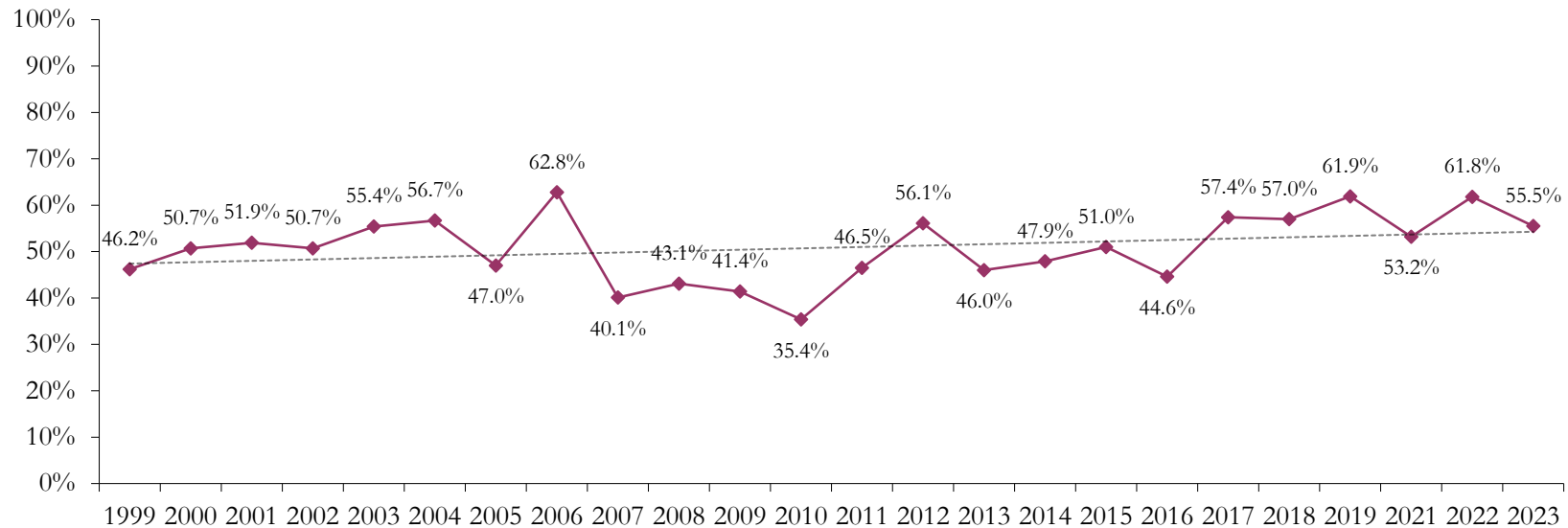
\*\* The Open Motorboat category was created by grouping "Skiffs" and "Speedboat/Runabouts" together. The proportion of Skiffs to Speedboat/Runabouts has been set to reflect the national proportions observed in 2006, the year in which the Strategic Plan goals were first measured. In addition, JSI controls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

## 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 boat type began to be counted in 2010). The 2023 rates for all paddlecraft excluding standup paddleboards were 55.5%, representing a relative increase of 20.1% from 1999 (46.2%) rates but a notable decrease from 2022 (61.8%). These changes in rates should be viewed with caution, since paddlecraft activity is mostly observed at only a few sites—mainly the Provo River in Utah where life jacket use is mandatory and the Illinois River in Oklahoma, where life jacket use is traditionally very low. Uneven changes from year to year are highly influenced by the relative number of boaters observed at these two sites.

In 2015, JSI added two rows of data to Table 2.4. One for standup paddleboards (first observed in 2010) and one for an all paddlecraft wear rates including standup paddleboards. The wear rates for standup paddleboards have hovered around 50% since 2012 (52.9%), and the 2023 rate of 50.9% represents a 83.1% relative increase since 2010 (27.8%). There has been an increase of 56.8% in all paddlecraft including paddleboards since 2010 (35.4% to 55.5%). While kayaking had a decrease in wear rates from 2022 (77.5% to 70.1), canoeing had a small increase in wear rates since the previous year (28.7% to 29.8%).

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



JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*Factors controlled for: Age & Boat Type.

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

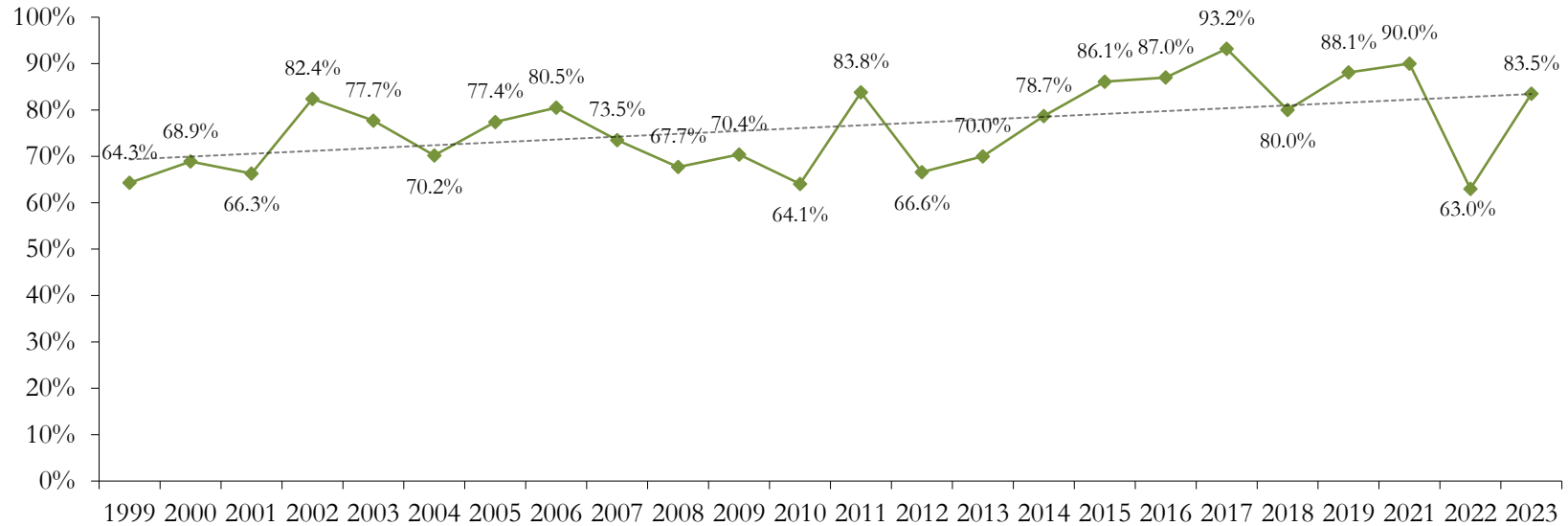
Boat Type	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>All Paddlecraft</b> (excluding SUPs)	46.2% (1676)	17.0% (11492)	19.6% (10393)	24.4% (9575)	41.4% (1939)	35.4% (2551)	46.5% (1608)	56.1% (2015)	46.0% (1919)	47.9% (2555)	51.0% (2531)	44.6% (2391)	57.4% (2251)	57.0% (2353)	61.9% (2086)	53.2% (2117)	61.8% (1356)	55.5% (1563)
<b>Paddled Inflatable/ Raft</b>	.	.	.	30.9% (739)	8.2% (340)	6.9% (813)	10.9% (324)	39.4% (485)	15.8% (271)	18.2% (337)	39.1% (455)	28.2% (371)	45.9% (354)	41.7% (247)	74.0% (209)	38.6% (516)	40.4% (265)	29.5% (253)
<b>Rowboat/ Dinghy</b>	24.4% (82)	27.7% (412)	18.9% (203)	23.7% (247)	35.3% (51)	34.8% (46)	34.3% (87)	60.2% (35)	17.8% (75)	29.0% (79)	22.1% (37)	40.2% (56)	43.0% (73)	32.3% (64)	11.0% (74)	8.4% (62)	33.3% (25)	11.9% (36)
<b>Canoe</b>	17.7% (809)	24.4% (2165)	23.7% (1910)	21.8% (1611)	25.0% (758)	19.1% (994)	37.4% (386)	32.7% (438)	35.7% (569)	24.9% (744)	30.0% (716)	14.6% (605)	30.0% (532)	28.1% (677)	23.6% (498)	32.6% (360)	28.7% (250)	29.8% (291)
<b>Kayak</b>	82.7% (611)	85.3% (2005)	80.8% (2027)	71.9% (2036)	72.6% (790)	75.9% (698)	68.6% (811)	74.9% (1056)	67.9% (1004)	74.9% (1395)	70.7% (1323)	71.5% (1359)	71.3% (1292)	75.6% (1365)	78.1% (1305)	64.1% (1179)	77.5% (816)	70.1% (983)
<b>Canoe/ Kayak Combined</b>	45.9% (1420)	60.0% (4170)	57.7% (3937)	52.1% (3647)	49.1% (1548)	47.3% (1692)	49.4% (1197)	52.8% (1494)	50.9% (1573)	51.9% (2139)	51.6% (2039)	47.3% (1964)	52.3% (1824)	55.4% (2042)	56.1% (1803)	48.1% (1539)	57.7% (1066)	52.6% (1274)
<b>Paddleboard (SUPs)</b>	.	.	.	.	.	27.8% (54)	41.7% (84)	52.9% (157)	58.7% (264)	53.9% (397)	52.0% (348)	54.6% (407)	50.9% (509)	55.3% (492)	50.3% (457)	52.7% (406)	48.5% (497)	50.9% (460)
<b>All Paddlecraft</b> (including SUPs)	.	.	.	.	.	35.5% (2605)	46.0% (1692)	55.0% (2171)	45.4% (2183)	48.7% (2952)	51.1% (2879)	46.0% (2798)	56.2% (2760)	56.7% (2845)	59.8% (2543)	52.9% (2523)	58.2% (1853)	54.5% (2023)

JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*Factors controlled for: Age & Boat Type.

## 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 with caution because of the relatively small number of youth who use these types of craft. For all paddlecraft combined excluding standup paddleboards, the wear rate in 2023 was 83.5%, a 29.9% relative increase since 1999 (64.3%) and a 32.5% relative increase from 2022. The steep decrease in 2022 wear rates recovered in 2023 largely due to a return to usual numbers of observations at a specific observation site (Provo River) which has mandatory regulations for all boaters.

**Figure H – Youth Wear Rates for ALL Paddlecraft (excluding Paddleboards)\***



JSI Research & Training Institute, Inc.

2023 National Observational Life Jacket Wear Rate Study

\*Factors controlled for: Age & Boat Type.

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

Boat Type	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>All Paddlecraft</b> (excluding SUPs)	64.3% (317)	73.6% (811)	76.1% (706)	75.8% (1076)	70.4% (319)	64.1% (419)	83.8% (231)	66.6% (476)	70.0% (371)	78.7% (337)	86.1% (340)	87.0% (389)	93.2% (414)	80.0% (327)	88.1% (303)	90.0% (530)	63.0% (309)	83.5% (203)
<b>Paddled Inflatable/Raft</b>	.	.	.	60.3% (393)	59.0% (76)	41.9% (139)	68.5% (49)	50.2% (192)	55.1% (98)	68.7% (100)	83.5% (112)	84.4% (119)	85.0% (127)	69.7% (88)	89.7% (73)	94.0% (293)	45.3% (101)	72.5% (49)
<b>Rowboat/Dinghy</b>	11.1% (9)	63.9% (76)	74.3% (42)	71.1% (72)	.	.	94.0% (15)	.	.	74.2% (23)	.	99.3% (15)	.	.	.	.	47.5% (8)	66.0% (13)
<b>Canoe</b>	57.7% (142)	72.6% (501)	70.5% (377)	79.9% (330)	70.6% (132)	68.0% (169)	95.2% (82)	66.5% (89)	78.0% (139)	78.4% (87)	82.1% (61)	70.0% (57)	92.6% (102)	71.5% (105)	77.2% (43)	80.0% (66)	52.0% (86)	94.4% (33)
<b>Kayak</b>	83.3% (84)	91.9% (234)	91.7% (287)	88.8% (281)	85.3% (102)	85.4% (97)	89.3% (85)	84.8% (185)	77.0% (124)	90.7% (127)	91.9% (163)	85.4% (198)	94.5% (182)	90.6% (128)	89.9% (182)	86.8% (165)	87.1% (114)	87.6% (108)
<b>Canoe/Kayak Combined</b>	67.3% (226)	81.2% (735)	81.0% (664)	85.1% (611)	76.0% (234)	75.1% (266)	88.8% (167)	74.6% (274)	77.2% (263)	83.3% (214)	85.6% (224)	78.3% (255)	92.0% (284)	81.0% (233)	82.7% (225)	82.2% (231)	71.0% (200)	85.6% (141)
<b>Paddleboard (SUPs)</b>	.	.	.	.	.	.	.	.	51.9% (52)	75.0% (44)	77.5% (40)	73.4% (84)	75.0% (80)	77.1% (61)	64.3% (98)	78.7% (75)	80.5% (87)	78.3% (69)
<b>All Paddlecraft **</b> (including SUPs)	.	.	.	.	70.5% (320)	63.5% (428)	84.1% (236)	67.3% (489)	63.8% (423)	78.3% (381)	85.2% (380)	84.6% (473)	90.3% (494)	79.6% (388)	82.3% (401)	94.6% (605)	66.9% (396)	82.2% (272)

JSI Research & Training Institute, Inc.

2023 National Observational Life Jacket Wear Rate Study

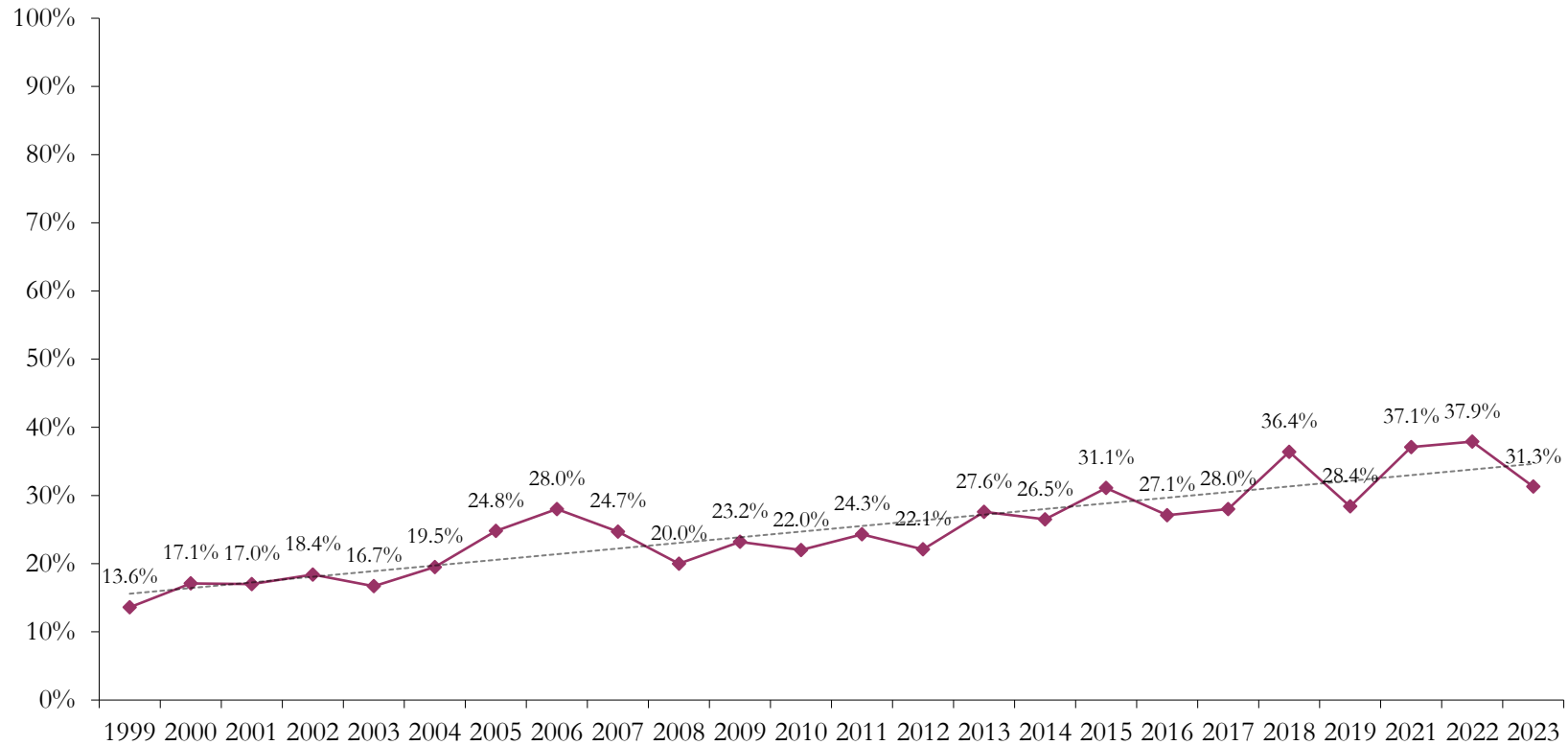
\*Factors controlled for: Age & Boat Type

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

## Sailboats for Adults (18 years or older)

Figure I and Table 2.6 document observations of adults in sailboats. For all sailboats combined, the wear rate of 31.3% represents a 230.1% relative increase since 1999 (13.6%). Sailboat wear rates for both day sailors and cabin sailboats have increased over the twenty-four years of observations. Day sailors have shown a relative increase of 256.7% from 1999 to 2023 (30.7% to 78.8%). Cabin sailboats have shown a relative increase of 212.1% from 1999 to 2023 (9.1% to 19.3%).

**Figure I – Adult Wear Rates for ALL Sailboats\***



JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type.

**Table 2.6 – Life Jacket Wear Rates by Sailboats for Adults\***

Boat Type	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>All Sailboats</b>	13.6 (3420)	17.0% (11492)	19.6% (10393)	24.4% (9575)	23.2% (3733)	22.0% (3336)	24.3% (3231)	22.1% (3297)	27.6% (2840)	26.5% (2786)	31.1% (2800)	27.1% (2557)	28.0% (2269)	36.4% (2766)	28.4% (2568)	37.1% (1742)	37.9% (1154)	31.3% (2057)
<b>Sailboard</b>	16.4% (46)	86.1% (100)	89.7% (77)	89.6% (47)	.	83.2% (29)	.	.	.	.	94.5% (17)	.	.	92.0% (36)	82.0% (28)	92.8% (13)	76.3% (26)	90.5% (10)
<b>Day Sailor</b>	30.7% (739)	41.1% (2519)	48.1% (2543)	52.8% (1651)	61.7% (652)	57.5% (731)	61.3% (736)	54.0% (682)	67.1% (469)	55.1% (630)	69.6% (565)	62.4% (532)	61.9% (365)	70.4% (560)	72.6% (602)	80.1% (249)	79.7% (251)	78.8% (348)
<b>Cabin Sailboat</b>	9.1% (2635)	10.3% (8873)	11.7% (7773)	16.2% (7877)	13.0% (3074)	11.7% (2576)	13.4% (2486)	12.9% (2601)	17.3% (2361)	18.3% (2153)	20.5% (2218)	17.2% (2015)	18.8% (1894)	27.1% (2170)	15.7% (1938)	26.6% (1480)	26.9% (877)	19.3% (1699)

JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*Factors controlled for: Age & Boat Type.

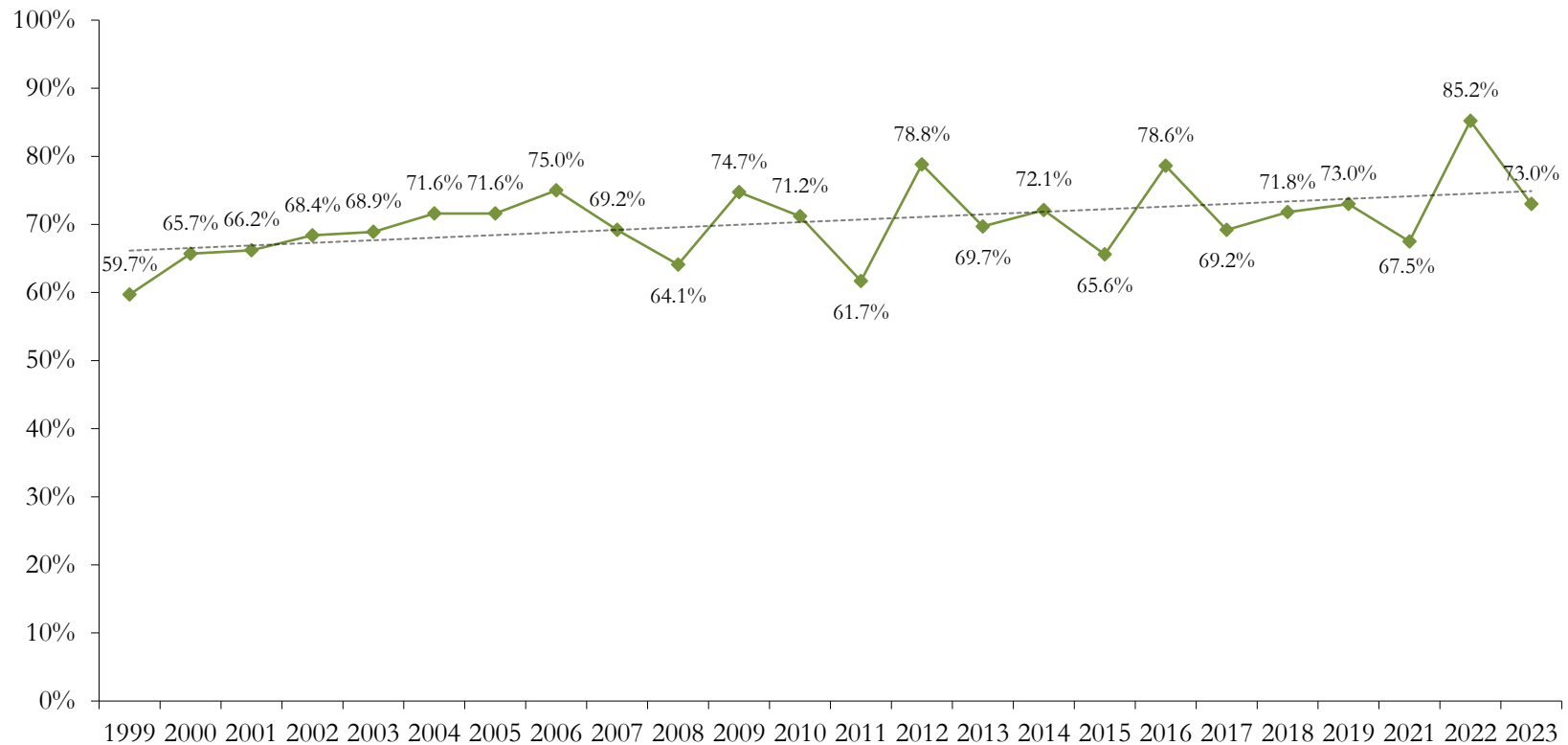




## Sailboats for Youth (17 years or younger)

Figure J and Table 2.7 show that the national average wear rate on all sailboats for all youth in 2023 was 73.0% and represents a relative increase of 22.3% since 1999 (59.7%). View wear rates with caution since relatively few youth, particularly younger youth, are observed on these types of boats.

**Figure J – Youth Wear Rates for ALL Sailboats\***



JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type.

**Table 2.7 – Life Jacket Wear Rates by Sailboats for Youth\***

Boat Type	Observation Year																	
	1999 % (N's)	2000-2002 % (N's)	2003-2005 % (N's)	2006-2008 % (N's)	2009 % (N's)	2010 % (N's)	2011 % (N's)	2012 % (N's)	2013 % (N's)	2014 % (N's)	2015 % (N's)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)
<b>All Sailboats</b>	59.7% (347)	66.2% (1134)	70.5% (974)	69.3% (915)	74.7% (305)	71.2% (202)	61.7% (219)	78.8% (313)	69.7% (220)	72.1% (206)	65.6% (170)	78.6% (200)	69.2% (147)	71.8% (174)	73.0% (211)	67.5% (64)	85.2% (101)	73.0% (153)
<b>Sailboard</b>	0.0% (3)	77.2% (17)	. (6)	82.3% (15)	. (0)	. (1)	. (0)	. (1)	. (0)	. (1)	. (0)	. (1)	. (0)	. (1)	. (3)	. (1)	. (0)	. (0)
<b>Day Sailor</b>	71.1% (114)	82.9% (279)	82.2% (300)	89.3% (251)	92.5% (80)	85.2% (86)	80.2% (57)	98.2% (166)	91.5% (36)	97.2% (54)	87.7% (27)	96.4% (103)	90.7% (25)	95.2% (39)	96.7% (70)	85.7% (11)	100.0% (55)	88.3% (37)
<b>Cabin Sailboat</b>	58.3% (230)	59.8% (838)	65.3% (668)	61.4% (649)	66.4% (225)	65.9% (115)	54.9% (162)	60.3% (146)	61.7% (184)	61.0% (152)	58.6% (143)	66.7% (97)	66.2% (122)	61.5% (134)	60.3% (138)	61.6% (52)	67.5% (46)	66.4% (116)

JSI Research & Training Institute, Inc.  
 2023 National Observational Life Jacket Wear Rate Study  
 \*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 2023, 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 that was used in prior years.)

Wear rates and boat size show an inverse relationship: wear rates decrease as the size of the boat increases. This is true for all three general types of boats. In 2023, for powerboats under 16 feet in length wear rates were 10.1% but dropped steadily to 2.1% for boats over 26 feet in length. In 2023, for sailboats under 16 feet in length wear rates were 63.0% but dropped to 15.6% for those over 26 feet in length. In 2023, for paddlecraft under 16 feet in length wear rates were 57.1% whereas for paddlecraft 16 to 21 feet wear rates were 37.4%.

When comparing wear rates for each size category to rates seen in 2004 almost every length within the general boat types shows marked increases over those 19 years of the study. However, because there is also a trend during that period to a greater proportion of boaters using bigger boats (with their lower wear rates), the relative increases of wear rates for all sizes combined are less than observed for the individual size categories within the general boat types.



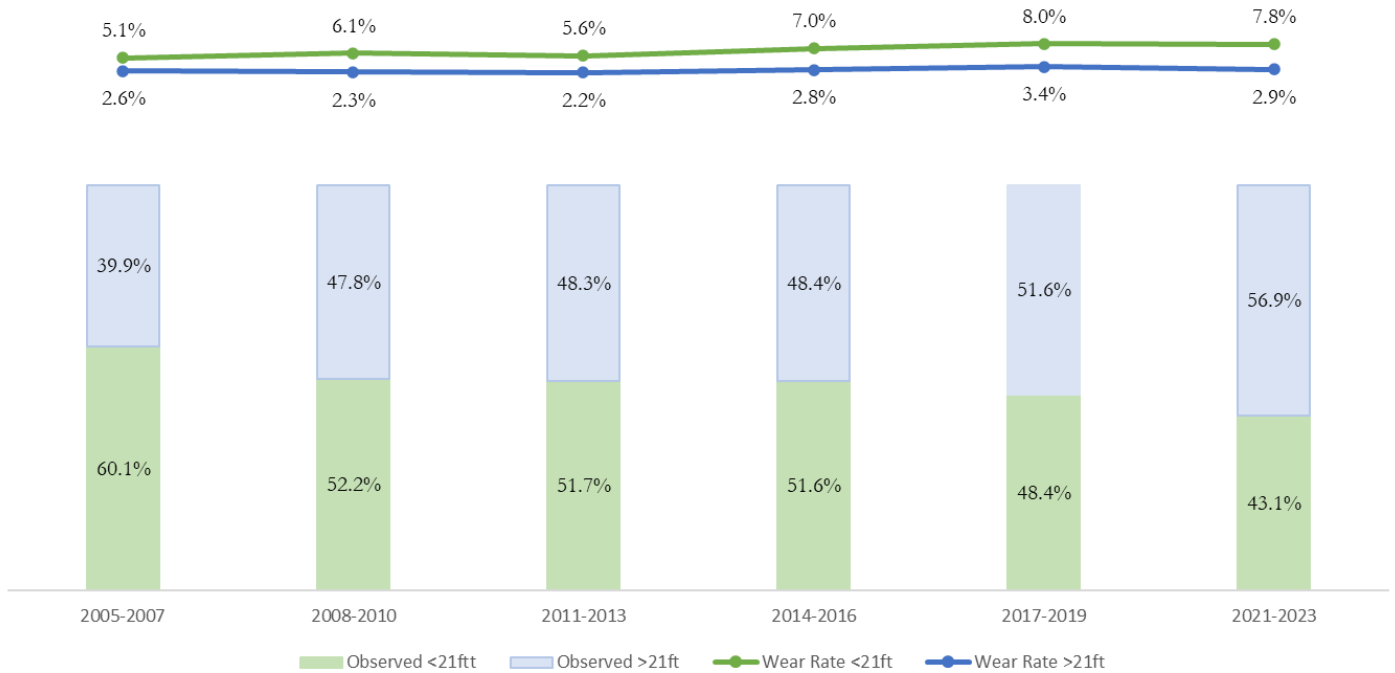
**Table 2.8 – Life Jacket Wear Rates by Boat Type and Size for Adults\***  
(2004 to 2023)

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)	2016 % (N's)	2017 % (N's)	2018 % (N's)	2019 % (N's)	2021 % (N's)	2022 % (N's)	2023 % (N's)	Total % (N's)
<b>Powerboats (no PWCs)</b>																				
<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)	6.5% (2008)	9.4% (1483)	13.0% (1691)	13.7% (2086)	16.5% (1623)	13.6% (958)	18.8% (1203)	10.1% (38538)
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)	6.3% (11340)	8.3% (11416)	7.8% (11696)	5.9% (12441)	6.0% (8322)	7.2% (9332)	6.0% (9155)	5.7% (230606)
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)	2.2% (9048)	4.2% (8467)	3.0% (11050)	4.7% (10115)	3.2% (9957)	2.9% (8532)	2.4% (10940)	3.0% (170266)
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)	1.8% (4393)	3.5% (4442)	1.7% (5153)	1.8% (4144)	2.1% (3659)	5.2% (2982)	2.6% (4121)	2.0% (77390)
<b>Sailboats</b>																				
<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)	89.0% (197)	81.5% (136)	70.5% (198)	77.0% (328)	70.3% (75)	72.8% (79)	83.4% (88)	63.0% (3964)
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)	47.8% (339)	51.3% (239)	70.4% (398)	65.2% (317)	74.9% (357)	80.9% (186)	75.2% (270)	46.7% (6041)
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)	29.4% (559)	39.1% (541)	37.9% (685)	30.1% (728)	43.8% (462)	52.0% (253)	35.7% (538)	27.6% (14755)
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)	13.3% (1453)	11.6% (1353)	23.1% (1485)	8.4% (1192)	14.7% (848)	17.6% (636)	12.5% (1159)	15.6% (29150)
<b>Paddlecraft (excluding SUPs)</b>																				
<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)	49.8% (2079)	61.9% (1694)	64.1% (1671)	67.0% (1722)	66.4% (1284)	62.4% (1188)	55.6% (1253)	56.3% (30720)
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)	38.2% (312)	41.3% (541)	36.6% (674)	33.0% (343)	30.1% (783)	49.1% (166)	52.2% (304)	38.2% (8321)

JSI Research & Training Institute, Inc.  
2023 National Observational Life Jacket Wear Rate Study  
\*Factors controlled for: Age & Boat Type.

Figure K below shows more clearly these opposing trends. The bar graphs show the changing proportions of larger powerboats going from 39.9% in the early years to 56.9% in recent years. There is a mirrored decline in proportion of smaller power boats. The line graph below shows that wear rates for larger power boats has essentially stayed the same over the 24-year period of the study whereas wear rates for smaller powerboats have increased over this period with a 53% relative increase (5.1% to 7.8%) over that time period. When all sizes of powerboats are aggregated together the relative increase over that period of time is only 6.8%.

**Figure K. Life Jacket Wear Rates and Proportions of Boaters on Larger and Smaller Powerboats for Adults\***



### III. Engine Cut-off Switch

Engine cut-off switches (ECOS) are US Coast Guard-required equipment on recreational powerboats less than 26 feet since December 2019. Even before this regulation took effect, manufacturers started to fit recreational powerboats of this size with ECOS links to help prevent runaway vessels when the operator goes overboard. In addition to boats of this size category being fitted with this equipment, a new federal law effective April 1, 2022, required those operating powerboats under 26 feet to use an ECOS while under way. This law only applies when the helm is not in a cabin and when the boat is operating on plane or above displacement speed. Use of the ECOS link is not required while the boat is docking, launching, loading on a trailer, trolling and operating in no-wake zones.

In 2021 JSI expanded data collection to include observations of the use of ECOS on powerboats. ECOS status was collected for all powerboats regardless of size and boating activity. Table 2.9 shows results of three years of ECOS observations for boats under 26 feet. It includes the proportion of observations for each boat type where the observer was able or not able to determine if the operator was using ECOS equipment as well as when use or non-use was visible and could be recorded by the observers.

Table 2.9 demonstrates the continued difficulty in capturing ECOS use during observations as an ECOS is usually attached to the operator's wrist, belt, or life jacket which are often obstructed by the vessel itself. Distance from the vessel can also prevent an observer from making a clear ECOS observation. In addition, the advent of wireless ECOS systems will make it even harder to determine whether an ECOS system is in use. Overall, in 2023, visibility was only possible in 42.3% of skiffs, 22.0% of runabouts, 19.0% of cabin cruisers, 25.0% of houseboats, and 42.9% of powered inflatables/rafts. ECOS visibility in 2023 was highest for PWCs at 73.1% of observations, although this represents a 16% decrease from 2021.

As also shown in Table 2.9, when ECOS use was clearly observed (observable), the overwhelming majority of operators were not using an ECOS with the exception of PWC operators which had an ECOS use rate of 91.3%. Other powerboat types showed ECOS use between 0% and 10.5%. The largest fluctuation since 2021 was a relative increase of 518.1% in cabin cruisers (1.1% to 6.8%) and a 51.9% relative decrease in runabouts (10.4% to 5.0%). Data should be viewed with caution due to the difficulty in clearly observing this data point.

**Table 2.9 – 2021 to 2023 ECOS Use Visibility (Yes) and Actual Use by Boat Type**  
(Data are for boats not boaters; n's are denominators)

Boat Type	Observation Year					
	2021 % (N's)		2022 % (N's)		2023 % (N's)	
	Observable	Using	Observable	Using	Observable	Using
Skiff	46.6% (2960)	5.0% (1380)	43.2% (2864)	5.4% (1237)	42.3% (3040)	6.4% (1285)
Runabout	22.8% (2868)	10.4% (653)	22.5% (2619)	1.5% (589)	22.0% (2999)	5.0% (660)
Cabin Cruiser	22.6% (403)	1.1% (91)	20.9% (277)	0.0% (58)	19.0% (464)	6.8% (88)
Houseboat	33.3% (3)	0.0% (1)	33.3% (3)	0.0% (1)	25.0% (4)	0.0% (1)
Pontoon	36.9% (1019)	8.0% (376)	29.3% (1052)	2.9% (308)	23.9% (1047)	6.4% (250)
Powered Inflatable/Raft	53.8% (145)	7.7% (78)	48.1% (129)	6.5% (62)	42.9% (76)	10.5% (76)
PWC	87.1% (1334)	90.5% (1162)	85.6% (1177)	94.5% (1007)	73.1% (1438)	91.3% (1051)
<b>Total*</b>	34.9% (7398)	6.7% (2579)	32.5% (6944)	3.9% (2255)	30.4% (7630)	6.2% (2360)

\*Totals do not include PWC data.

## IV. Fall Observations

Beginning in 2022, JSI began fall life jacket wear rate observations at 19 sites within 5 established summer observation states to explore changes in life jacket wear rates and boater activity. These observations were expanded in 2023 to include 10 established summer observation states covering 40 observation sites.

Table 2.11 shows the difference in wear rates for major boat types in summer and fall observations. In 2023 there is a relative increase of 28.0% on powerboats (4.7% to 6.0%). There is also an increase in wear rates for sailboats from 19.0% to 34.4%. This increase, however, is offset by a decrease among paddlecraft boaters from 48.2% to 27.3%. When all of these boat types are grouped together, we find an increase in fall wear rates from 13.6% to 16.6%, which is a relative increase of 22%.

The two years of comparisons between summer versus fall observations give evidence of some changes in wear rates across the seasons but the differences are not consistent across years and in particular vary by boat type. Additional years of comparison observations will need to be made in order to clarify the direction of these changes.

**Table 2.11– Summer and Fall Observed Adult Wear Rates by Boat Type**

Boat Type	Observation Period			
	Summer 2022 % (N's)	Fall 2022 % (N's)	Summer 2023 % (N's)	Fall 2023 % (N's)
<b>Powerboats*</b>	5.7% (4396)	11.1% (1523)	4.7% (7166)	6.0% (3807)
<b>Paddlecraft</b>	61.2% (91)	64.5% (109)	48.2% (174)	27.3% (383)
<b>Sail Boats</b>	30.7% (89)	24.7% (44)	19.0% (858)	34.4% (816)
<b>All Boat Types*</b>	8.1% (4666)	16.4% (2121)	13.6% (9477)	16.6% (5305)

\*Does not include PWC data

## V. Summary of Life Jacket Wear Rates

In spite of noticeable decreases in life jacket wear on all types of powerboats and for all age groups since 2017, for the twenty-three years of the Life Jacket Wear Rate Observation Study there have been increases in wear rates on many types of boats and for all age groups. The average wear rate in 2023 for all boaters on all types of boats except PWCs was 17.6%, which is a relative increase of 14.3% over the 1999 wear rate of 15.4%.

Some boat types show greater increases than other boat types. The same is true for age groups. Below JSI summarizes the relative increases in wear rates for age groups and for boat types.

1. For many different age groups of boaters on all types of boats taken together, even with noticeable decreases in wear rates since 2017, wear rates in 2023 mark substantial relative increases in wear rates since the 1999 baseline year.
  - a. All adults (18+) on all types of boats excluding PWCs: 8.9% relative increase (9.0% to 9.8%)
  - b. All youth (0-17) on all types of boats excluding PWCs: 16.9% relative increase (52.1% to 60.9%)
  - c. Children (0-5) on all types of boats excluding PWCs: 10.3% relative increase (80.6% to 88.9%)
  - d. Children (6-12) on all types of boats excluding PWCs: 17.9% relative increase (69.1% to 81.5%)
  - e. Teenagers (13-17) on all types of boats excluding PWCs: 25.7% relative increase (24.1% to 30.3%)
2. For adults, in spite of noticeable declines since 2017, there have been relative increases in wear rates by specific types of boats comparing 2023 levels to the baseline year of 1999. Note that the baseline year for open motorboat observations is 2006.
  - a. All powerboats except PWCs: 6.8% relative increase (4.4% to 4.7%)
  - b. Open motorboats: 31.1% relative increase from 2006 (4.5% to 5.9%)
  - c. All paddlecraft except paddleboards: 20.1% relative increase (46.2% to 55.5%)
  - d. All sailboats: 230.1% relative increase (13.6% to 31.3%)
  - e. Day sailors: 256.7% increase (30.7% to 78.8%)
  - f. Cabin sailboats: 212.1% increase (9.1% to 19.3%)
3. Over the twenty-three-year span of this study, the proportion of boating on longer powerboats has trended upwards. In 2004, about a third of the occupants (34.8%) were on powerboats more than 21 feet in length. In 2023, that percentage increased to 59.4%. Since wear rates tend to be lower on larger boats, this trend of increasing boat sizes masks the actual relative proportion of increases of wear rates observed if one only looked at improvements within a boat type and size category.
4. Fall observations compared to summer observations at a limited number of states showed some changes in wear rates but not consistently across boat types. Additional years of data collection may help clarify the magnitude and direction of these changes for various boat types.



## VI. Environmental Impact on Wear Rates

In calendar year 2022, the United States Coast Guard (USCG) counted 4,040 accidents that involved 636 deaths. Where cause of death was known, 75% of fatal boating accident victims drowned. Of those drowning victims with reported life jacket usage, 85% **were not** wearing a life jacket.<sup>1</sup>

There are several environmental factors that may place boaters at a heightened risk for drowning. In the event that a boater falls overboard, cold water and air temperatures can place severe strain on the body, leading to possible hyperventilation, swim fatigue, loss of function, or hypothermia. Environmental conditions such as restricted visibility and poor weather increase the difficulty of navigating and operating boats, which may lead to capsizing, falling overboard, and difficulty searching for and rescuing boaters who have entered the water. Strong winds that create large waves and harsh or quick-changing weather patterns can also increase the possibility of entering the water unexpectedly. Even a moderate current can exert a force of several tons against a boat and cause its operator to lose control and capsize. The USCG reports that hazardous weather, water, and waves were among the top ten known contributing factors of boating accidents in 2022.<sup>2</sup>

This chapter of the report uses almost twenty-five years of observational data – from 1999 to 2023 – to look at influences of environmental conditions on adult life jacket wear rates. The analyses look at each environmental condition individually, as well as evaluating the relative effect of these conditions and the impact of multiple risks at one time. This chapter will explore differences in wear rates by three boat groups: powerboats (N=642,989), paddlecraft (N=44,222), and sailboats (N=72,016). The following boat types are included within each of these boat groups:

- Powerboats: skiffs/utility vessels, speedboats/runabouts, cabin cruisers, pontoons, and powered inflatables/rafts
- Paddlecraft: canoes, kayaks, rowboats, paddleboards (SUPs), and paddled inflatables/rafts
- Sailboats: cabin sailboats, day sailors, and sailboards.

This chapter will focus on the following seven environmental conditions and re-classifies each condition into either “risky” or “non-risky”. While the terms “risky” and “non-risky” are used throughout this chapter, it is recognized that any time a person is boating there is some level of risk of entering the water unexpectedly which could lead to potential drownings.

Environmental Condition	Risky	Non-Risky
Visibility	Poor visibility	Good/Fair visibility
Wave Height	Rough	Calm/Choppy
Weather	Raining/Storming	Sunny/Cloudy
Wind Speed	≥ 6 knots	< 6 knots
Water Temperature	< 60 degrees	≥ 60 degrees
Air Temperature	< 70 degrees	≥ 70 degrees
Current	Strong	Weak/Moderate

Findings from these analyses are presented by the following three overarching research questions:

- RQ1: Is there a difference in life jacket wear rates based on environmental conditions?
- RQ2: What is the relative effect of each environmental condition on the decision to wear a life jacket?
- RQ3: Do wear rates increase as the number of environmental risks increase?

<sup>1</sup> “2022 Recreational Boating Statistics” (2023). Accessed online (February 17<sup>th</sup>, 2024): <https://www.uscgboating.org/library/accident-statistics/Recreational-Boating-Statistics-2022.pdf>

<sup>2</sup> “2022 Recreational Boating Statistics” (2023). Accessed online (February 17<sup>th</sup>, 2024): <https://www.uscgboating.org/library/accident-statistics/Recreational-Boating-Statistics-2022.pdf>

In order to answer the first research question, we explore bivariate relationships between environmental condition and wear rate within each boat group. We test for statistically significant differences in wear rates using chi-square tests of statistical significance at an alpha level of  $p < 0.05$ . We then run a logistic regression model to answer our second research question. The results of this model present the odds of wearing a life jacket based on the presence of each environmental condition while controlling for boat group, year, and boat size. Finally, we explore the differences in wear rates by number of environmental risks to answer our third research question assessing the impact of multiple risks at one time for each boat type.

### Section 4.1: Differences in Life Jacket Wear Rate by Environmental Condition

Table 4.1 shows the percentage of each boat type that was observed in each “risky” environmental condition. While not surprising, boaters are much more likely to be out on the water when environmental conditions are more favorable. Relative to other environmental conditions, wind speed seems to be less of a deterrent, especially among sailboats. A little over a third (37.8%) of sailboats were observed when windspeeds were  $\geq 6$  knots. It is important to note that the level of risk presented by higher wind speeds may be experienced differently for those in sailboats given that sailboats are best used in conditions with moderate wind speeds.

Table 4.1. Percentage within Boat Group Observed in "Risky" Environmental Condition (1999-2023)

**Table 4.1. Percentage within Boat Group Observed in "Risky" Environmental Conditions (1999-2023)**

Risky Environmental Condition	Powerboats	Paddlecraft	Sailboats
Poor Visibility	0.6%	0.5%	0.6%
Rough Water	0.7%	1.4%	1.4%
Raining/Storming	2.3%	2.2%	2.3%
Wind Speed $\geq 6$ knots	21.5%	16.2%	37.8%
Water Temperature $< 60$ degrees	4.3%	6.6%	2.6%
Air Temperature $< 70$ degrees	8.2%	10.9%	9.9%
Strong Current	4.1%	10.6%	4.1%

When boaters are out in riskier environmental conditions, they tend to wear life jackets at significantly higher rates (Table 4.2). For example, among powerboats 4.4% of boaters wear a life jacket when the water temperature is  $\geq 60$  degrees compared to 15.6% when the water temperature is  $< 60$  degrees. Among paddlecraft, wave height seems to make the most difference with 52.3% of boaters wearing a life jacket in calm or choppy water compared to 85.0% in rough water. For sailboats, water temperature also seems to be a significant factor: 22.8% of those on sailboats wear a life jacket when the water temperature is  $\geq 60$  degrees compared to 40.3% when the water temperature is  $< 60$  degrees.

Wave height among sailboats is the only environmental condition that does not have an effect on wear rate. Additionally, among sailboats there are a couple of environmental conditions in which wear rates are in the “opposite” direction of what one would expect. In particular, those in sailboats are less likely to wear a life jacket when visibility is poor (versus good/fair) and when the current is strong (versus weak/moderate). This may be explained by the fact that the majority of sailboats that are out in these riskier conditions are cabin sailboats (95% and 87%, respectively), which have a much lower wear rate than day sailors and sailboards. Furthermore, there are very few sailboats out in poor visibility and findings regarding current should be interpreted with caution given that this is a more difficult condition to accurately observe. We also see this unexpected direction of wear rates for wind speed among powerboats. However, this difference is very small (less than half a percent).

**Table 4.2. Wear Rates for Each Environmental Condition by Boat Group (1999-2023)**

Environmental Condition	Boat Group		
	Powerboats % (N's)	Paddlecraft % (N's)	Sailboats % (N's)
<b>Visibility</b>			
Poor	6.6% (3497)*	78.6% (210)*	18.4% (414)*
Good/Fair	4.9% (636195)	52.9% (43589)	23.7% (71163)
<b>Wave Height</b>			
Rough	15.1% (4626)*	85.0% (626)*	25.5% (989)
Calm/Choppy	4.8% (636228)	52.3% (43058)	23.7% (70737)
<b>Weather</b>			
Raining/Storming	7.5% (14902)*	62.7% (957)*	26.9% (1678)*
Sunny/Cloudy	4.8% (625421)	52.8% (42951)	23.7% (70063)
<b>Wind Speed</b>			
≥ 6 knots	4.6% (136965)*	58.3% (7114)*	26.2% (26977)*
< 6 knots	5.0% (500936)	52.0% (36895)	22.1% (44331)
<b>Water Temperature</b>			
< 60 degrees	15.6% (27233)*	81.7% (2884)*	40.3% (1817)*
≥ 60 degrees	4.4% (604873)	50.9% (40825)	22.8% (67247)
<b>Air Temperature</b>			
< 70 degrees	9.9% (52262)*	59.2% (4797)*	33.9% (7100)*
≥ 70 degrees	4.5% (588586)	52.2% (39234)	22.4% (64360)
<b>Current</b>			
Strong	11.5% (26057)*	71.6% (4643)*	18.9% (2960)*
Weak/Moderate	4.6% (613429)	50.8% (39264)	23.9% (68739)

\*Statistically significant

## Section 4.2: Relative Effect of Each Environmental Condition

While the above section shows the bivariate relationships between each environmental condition and wear rates, it is helpful to understand which environmental conditions have the strongest association with adult life jacket wear rates. Through sensitivity analyses we found that wear rates by environmental condition differ based on boat size, and have changed over time from 1999-2023. Therefore, we ran a logistic regression model and present the odds of wearing a life jacket based on the presence of each environmental condition while controlling for boat group, year, and boat size. Since methods of recording boat size changed in 2004, data for the logistic regression in which we control for boat size exclude 1999-2003.

Table 4.3 shows that almost all of the environmental conditions remain significantly associated with wearing a life jacket. Rough or cold water are the risky conditions with the strongest effect: those boating in cold water have 3 times the odds of wearing a life jacket compared to those boating in warmer water and those in rough water have 2 times the odds of wearing a life jacket compared to those in calm/choppy water. Poor visibility was the only environmental condition that was not significantly associated with the odds of wearing a life jacket.

**Table 4.3. Adjusted\*\* Logistic Regression Predicting Odds of Wearing a Life Jacket (2004-2023; N=590,224)**

Variable	Reference Category	Odds Ratio	Confidence Limits	
Poor Visibility	Good/Fair Visibility	1.10	0.96	1.26
<b>Rough Water*</b>	<b>Calm/Choppy Water</b>	<b>2.30</b>	<b>2.08</b>	<b>2.54</b>
Rainy/Stormy Weather*	Sunny/Cloudy Weather	1.14	1.07	1.22
≥ 6 knots Wind Speed*	< 6 knots Wind Speed	1.11	1.08	1.13
<b>&lt; 60 degrees Water Temp.*</b>	<b>≥ 60 degrees Water Temp.</b>	<b>3.08</b>	<b>2.95</b>	<b>3.21</b>
< 70 degrees Air Temp.*	≥ 70 degrees Air Temp.	1.30	1.25	1.34
Strong Current*	Weak/Moderate Current	1.21	1.16	1.26

\*Statistically significant

\*\*Adjusted for boat group, year, and boat size.

## Section 4.3: Impact of Multiple Risks at One Time

In an effort to understand boater decision-making about wearing a life jacket, we also explored the cumulative effect of the boater facing several risks at one time. In other words, we were interested to understand if a boater is more likely to wear a life jacket as the number of risks they experience increases, and if this differs by boat type. The number of possible risks ranged from 0-7, while the actual range was 0-5. In other words, there were no boats out in conditions with more than five risky environmental factors. Most boats were out in conditions with either zero or one risk (Table 4.4). A higher percentage of sailboats were out in two or more risky environmental conditions (11.3%) compared to powerboats and paddlecraft (7.2% and 9.6%, respectively).

**Table 4.4. Percent of Observations within each Boat Group by Number of Risks (1999-2023)**

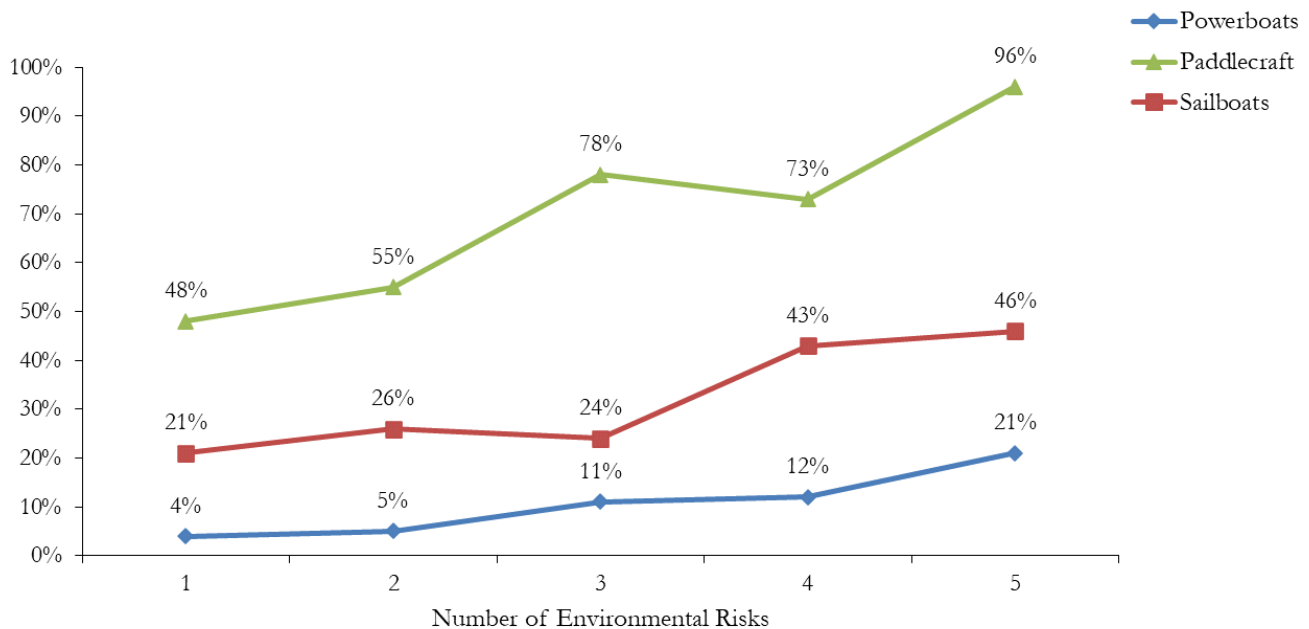
# of Risks	Powerboats	Paddlecraft	Sailboats
0	68.4%	64.3%	55.2%
1	24.4%	26.1%	33.5%
2	5.3%	7.7%	9.3%
3	1.6%	1.5%	1.8%
4 or 5	0.3%	0.4%	0.2%

Table 4.5 and Figure 4.1 show that for all boat types there is a cumulative effect on wear rates of several risks at one time. This effect is strongest for powerboats: those in a powerboat are five times as likely to wear a life jacket when there are four or more environmental risks present compared to no risks. Those in paddlecraft and sailboats are two times more likely to wear a life jacket when there are four or more risks present compared to no risks. Still, almost 100% of those in paddlecraft and half of those in sailboats wear a life jacket when there are four or more risks present. For powerboats and paddlecraft, the greatest increase in wear rates happens between one to two risks and three to four or more risks. This pattern differs for sailboats, where the greatest increase in wear rates happens between two to three risks.

**Table 4.5. Wear Rates by Cumulative Risk for each Boat Group (1999-2023)**

# of Risks	Powerboats % (n's)	Paddlecraft % (n's)	Sailboats % (n's)
0	4.1% (424836)	48.1% (151462)	21.1% (37341)
1	5.1% (151462)	54.6% (11190)	25.9% (22692)
2	11.0% (32773)	77.6% (3303)	24.1% (6316)
3	11.6% (9920)	73.0% (651)	42.7% (1205)
4 or 5	21.0% (1963)	95.6% (160)	46.4% (140)

**Figure 4.1. Wear Rates by Cumulative Risk for each Boat Group (1999-2023)**



## Section 4.4: Conclusions

The results of this analysis show that there are associations between environmental conditions and boaters' decision to wear a life jacket. This suggests that boaters are aware of the connection between wearing a life jacket and the risks of entering the water in adverse conditions. Furthermore, there are some differences by boat size and boat group: powerboat, paddlecraft, and sailboat. The key takeaways from our analyses in this chapter are as follows:

- For almost all environmental conditions, boaters tend to wear life jackets at a significantly higher rate when they are out in “riskier” conditions.
- When assessing the relative effect of each environmental condition, water temperature and wave height have the strongest effect on the odds of wearing a life jacket when controlling for boat type, size, and year.
- Visibility is the only environmental condition that does not have a statistically significant effect on the odds of wearing a life jacket when controlling for all other environmental conditions, boat type, size and year.
- For all boat types, the adult life jacket wear rates increase with the cumulative number of risky conditions present. Boaters in powerboats and paddlecraft are most influenced when going from one to two or three to four or more risks. Boaters in sailboats are most influenced when going from two to three risks.
- While it is encouraging that adult boaters in every boat type category seem to be considering environmental conditions and that this consideration influences the decisions to wear life jackets, there are two important caveats: 1) a lack of perception of a risk factor does not mean the risk is not present; and 2) even in conditions that are in fact more benign, falls overboard or capsizing can still happen and therefore potential drownings can occur. Thus, life jackets should be worn at all times.
- The challenge of these results for the boating safety community is how to do two things at once: 1) teach boaters how to become more situationally aware and to respond by wearing a life jacket; and 2) no matter what the perceived risks are to always wear a life jacket while boating.

## VII. Information on Boats & People Observed

From 1999 to 2023, JSI has observed a total of 338,994 boats and 952,141 boaters during summer observations. This year, 2023, 13,096 boats carrying 36,700 boaters were observed. Multiple sites had low boat counts or cancelled observations due to poor weather including rain, storms, and high heat. The proportions of the different types of boats, length of boat, operation and activity of boats, as well as the age and gender of the boaters observed has remained fairly consistent (see Figures L through V). 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 twenty- year span.

Figures W through AC 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 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).

## VIII. Appendix A: 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 summer data collection.

**Time period** - Observations were conducted during the summer months of each year, beginning the weekend of July 4<sup>th</sup> 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 by JSI or USCGAUX staff for four-hour periods 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, image-stabilizing binoculars and called out the information, 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 JSI and USCGAUX observers via web instruction and an on-line quiz. The training curriculum covered procedures, definitions, and pictures of various types of boats and passengers to facilitate consistent classification by observers. The e-learning web course also explained how to complete the data collection forms, including new data points, and use project equipment to take weather observations.

**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, three changes made in 2016, and one change made in 2023. 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, sailboard, day sailor, cabin sailboat, rowboat, inflatable, canoe, kayak, and other); **ECOS status** (Y, N, ? (unsure)); **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** and **life jacket type** (buoyant/traditional, inflatable suspender or belt pack, or not wearing). 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. Also, when boaters were swimming off of the boat, those boaters in the water were identified as well as their life jacket use.

**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 23 years of observations five 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. In 2007, JSI 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. In 2016 JSI removed the type of propulsion category from the form because it was not adding value to our analysis. Instead JSI added separate boat type categories for “powered” inflatables and “paddled” inflatable the only ambiguous category. Finally, JSI updated the life jacket wear and type categories for the first time. Until 2016, options read “Old,” meaning inherently buoyant, “New,” meaning inflatable and “No,” for not wearing. In order to prevent confusion about these categories, they were renamed more explicitly to “Buoyant (Trad),” “Inflatable” “Susp” (suspender) and “Belt,” and “Not Wear.”

### JSI Data Collection Form: 2023 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



POWER BOAT:		SAIL:	PADDLE:	GENDER			AGE(years)					PFD			WS SW
<input type="radio"/> Skiff/Utility <input type="radio"/> Pontoon <input type="radio"/> Runabout <input type="radio"/> Inflatable/Raft <input type="radio"/> Cabin cruiser <input type="radio"/> Houseboat <input type="radio"/> PWC   ECOS <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> ?		<input type="radio"/> Day sailor <input type="radio"/> Cabin sailboat <input type="radio"/> Sailboard	<input type="radio"/> Kayak <input type="radio"/> Paddle board <input type="radio"/> Canoe <input type="radio"/> Inflatable <input type="radio"/> Rowboat	M	F	?	0-5	6-12	13-17	18-64	65+	Buoyant (Trad)	Inflatable Susp Belt	Not Wear	Yes
<b>SIZE:</b>		<b>OPERATION:</b>		<b>ACTIVITY:</b>											
<input type="radio"/> Under 16 <input type="radio"/> 16 - 20.9 <input type="radio"/> 21 - 25.9 <input type="radio"/> 26 - 45.9 <input type="radio"/> 46 +		<input type="radio"/> Cruising/Motoring <input type="radio"/> Sailing <input type="radio"/> Rowing/Paddling <input type="radio"/> Drifting <input type="radio"/> Anchored		<input type="radio"/> Pleasure <input type="radio"/> Fishing <input type="radio"/> Water skiing <input type="radio"/> Intent to Fish <input type="radio"/> White water <input type="radio"/> Swimming <input type="radio"/> High Speed <input type="radio"/> Other		OP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

POWER BOAT:		SAIL:	PADDLE:	GENDER			AGE(years)					PFD			WS SW
<input type="radio"/> Skiff/Utility <input type="radio"/> Pontoon <input type="radio"/> Runabout <input type="radio"/> Inflatable/Raft <input type="radio"/> Cabin cruiser <input type="radio"/> Houseboat <input type="radio"/> PWC   ECOS <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> ?		<input type="radio"/> Day sailor <input type="radio"/> Cabin sailboat <input type="radio"/> Sailboard	<input type="radio"/> Kayak <input type="radio"/> Paddle board <input type="radio"/> Canoe <input type="radio"/> Inflatable <input type="radio"/> Rowboat	M	F	?	0-5	6-12	13-17	18-64	65+	Buoyant (Trad)	Inflatable Susp Belt	Not Wear	Yes
<b>SIZE:</b>		<b>OPERATION:</b>		<b>ACTIVITY:</b>											
<input type="radio"/> Under 16 <input type="radio"/> 16 - 20.9 <input type="radio"/> 21 - 25.9 <input type="radio"/> 26 - 45.9 <input type="radio"/> 46 +		<input type="radio"/> Cruising/Motoring <input type="radio"/> Sailing <input type="radio"/> Rowing/Paddling <input type="radio"/> Drifting <input type="radio"/> Anchored		<input type="radio"/> Pleasure <input type="radio"/> Fishing <input type="radio"/> Water skiing <input type="radio"/> Intent to Fish <input type="radio"/> White water <input type="radio"/> Swimming <input type="radio"/> High Speed <input type="radio"/> Other		OP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

POWER BOAT:		SAIL:	PADDLE:	GENDER			AGE(years)					PFD			WS SW
<input type="radio"/> Skiff/Utility <input type="radio"/> Pontoon <input type="radio"/> Runabout <input type="radio"/> Inflatable/Raft <input type="radio"/> Cabin cruiser <input type="radio"/> Houseboat <input type="radio"/> PWC   ECOS <input type="radio"/> Y <input type="radio"/> N <input type="radio"/> ?		<input type="radio"/> Day sailor <input type="radio"/> Cabin sailboat <input type="radio"/> Sailboard	<input type="radio"/> Kayak <input type="radio"/> Paddle board <input type="radio"/> Canoe <input type="radio"/> Inflatable <input type="radio"/> Rowboat	M	F	?	0-5	6-12	13-17	18-64	65+	Buoyant (Trad)	Inflatable Susp Belt	Not Wear	Yes
<b>SIZE:</b>		<b>OPERATION:</b>		<b>ACTIVITY:</b>											
<input type="radio"/> Under 16 <input type="radio"/> 16 - 20.9 <input type="radio"/> 21 - 25.9 <input type="radio"/> 26 - 45.9 <input type="radio"/> 46 +		<input type="radio"/> Cruising/Motoring <input type="radio"/> Sailing <input type="radio"/> Rowing/Paddling <input type="radio"/> Drifting <input type="radio"/> Anchored		<input type="radio"/> Pleasure <input type="radio"/> Fishing <input type="radio"/> Water skiing <input type="radio"/> Intent to Fish <input type="radio"/> White water <input type="radio"/> Swimming <input type="radio"/> High Speed <input type="radio"/> Other		OP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
						P8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**PFD Study 2023**

**CODE**

State	Site	Block	Group	Phase	Page Number

# JSI Data Collection Form: 2023 Site Form

**PFD Study 2023**

			<b>ID</b>						
# 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

★★ **Loaner Board:**  Yes (COMPLETE 'Loaner Board' section on back of page.)  No

## 2. Type of Body of Water

- |   |  |                                    |
|---|--|------------------------------------|
| <input type="radio"/> Bay, inlet or sound   | <input type="radio"/> River, stream, creek or canal              | <input type="radio"/> Other: _____ |
| <input type="radio"/> Harbor                | <input type="radio"/> Lake, pond, or reservoir (not Great Lakes) |                                    |
| <input type="radio"/> Intracoastal waterway | <input type="radio"/> 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 style="width: 30px;" type="text"/> F	Water Conditions <input type="radio"/> Calm (less than 6") <input type="radio"/> Choppy (6" to 2') <input type="radio"/> Rough (over 2')	Current <input type="radio"/> Strong <input type="radio"/> Moderate <input type="radio"/> Weak/None	Visibility <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor	Weather Conditions <input type="radio"/> Sunny <input type="radio"/> Raining <input type="radio"/> Partly Cloudy <input type="radio"/> Stormy <input type="radio"/> Cloudy
Wind Speed <input style="width: 30px;" type="text"/> knots				

### B. Second Weather Observation (to be completed during 2nd 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 style="width: 30px;" type="text"/> F	Water Conditions <input type="radio"/> Calm (less than 6") <input type="radio"/> Choppy (6" to 2') <input type="radio"/> Rough (over 2')	Current <input type="radio"/> Strong <input type="radio"/> Moderate <input type="radio"/> Weak/None	Visibility <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor	Weather Conditions <input type="radio"/> Sunny <input type="radio"/> Raining <input type="radio"/> Partly Cloudy <input type="radio"/> Stormy <input type="radio"/> Cloudy
Wind Speed <input style="width: 30px;" type="text"/> knots				

### C. Third Weather Observation (to be completed during 3rd time block of boat observations)

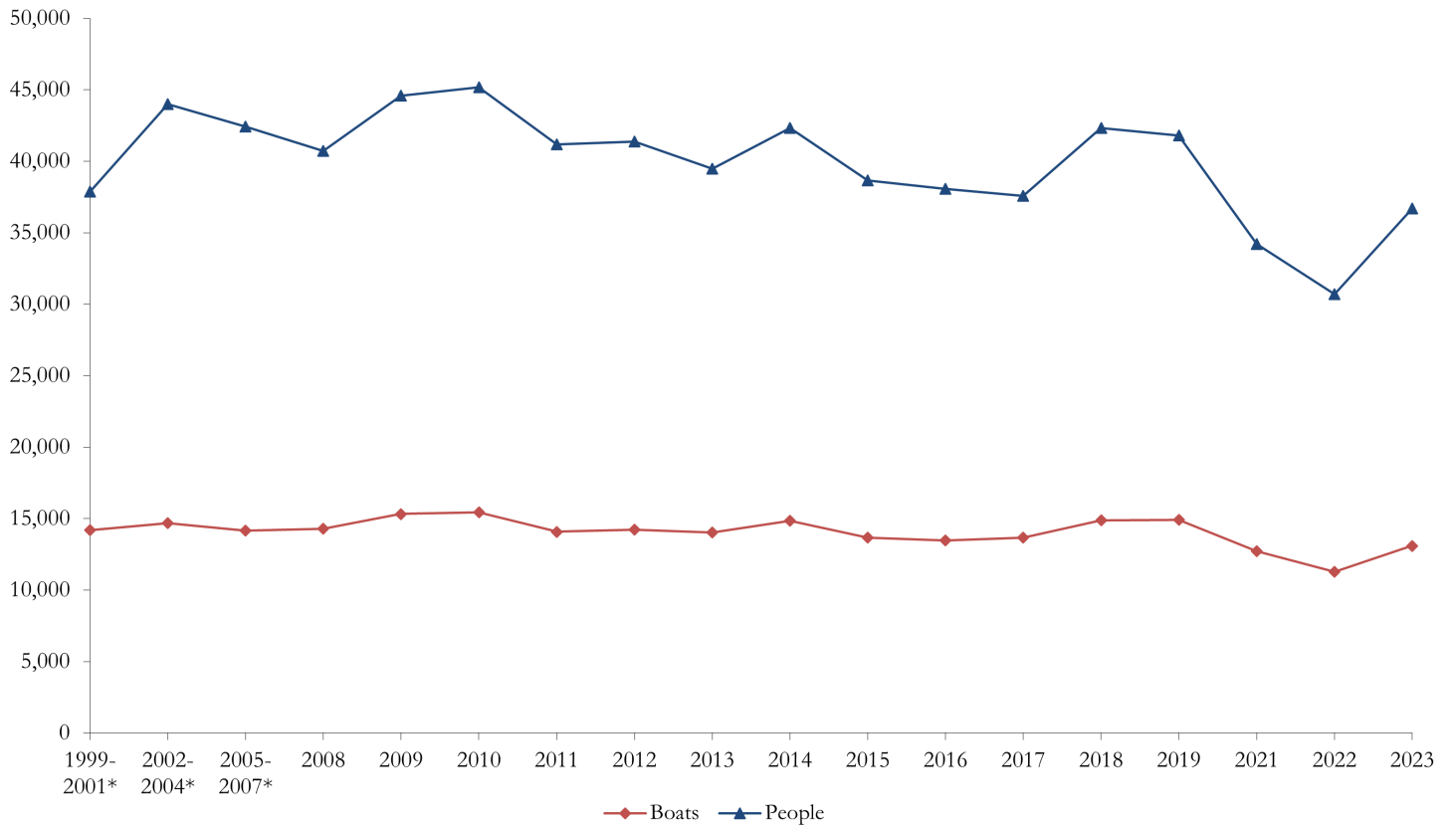
Time:  7:59 or before  8-9:59 AM  10-11:59 AM  12-1:59 PM  2-3:59 PM  4-5:59 PM  6 PM or later

Air Temp. <input style="width: 30px;" type="text"/> F	Water Conditions <input type="radio"/> Calm (less than 6") <input type="radio"/> Choppy (6" to 2') <input type="radio"/> Rough (over 2')	Current <input type="radio"/> Strong <input type="radio"/> Moderate <input type="radio"/> Weak/None	Visibility <input type="radio"/> Good <input type="radio"/> Fair <input type="radio"/> Poor	Weather Conditions <input type="radio"/> Sunny <input type="radio"/> Raining <input type="radio"/> Partly Cloudy <input type="radio"/> Stormy <input type="radio"/> Cloudy
Wind Speed <input style="width: 30px;" type="text"/> knots				

TURN TO BACK PAGE FOR ADDITIONAL QUESTIONS →

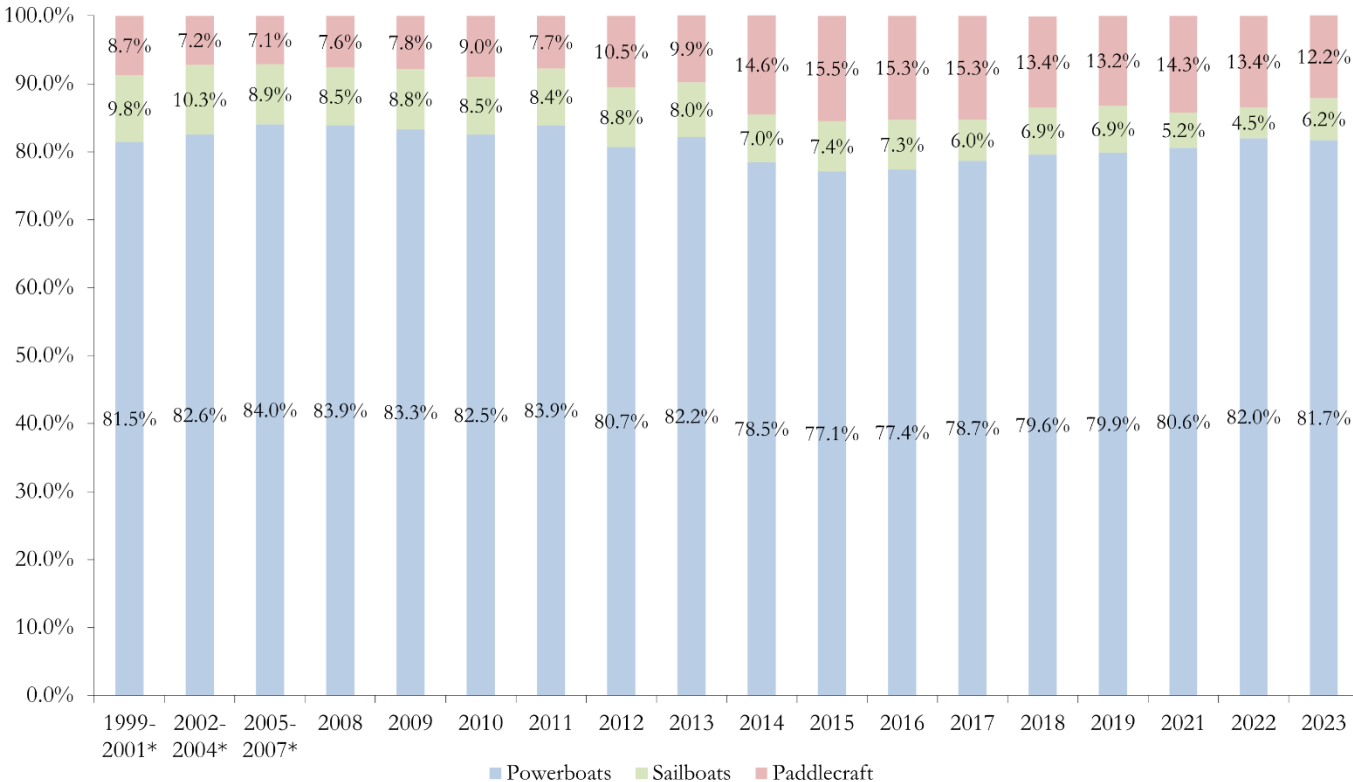


Figure L. Number of Boats and People



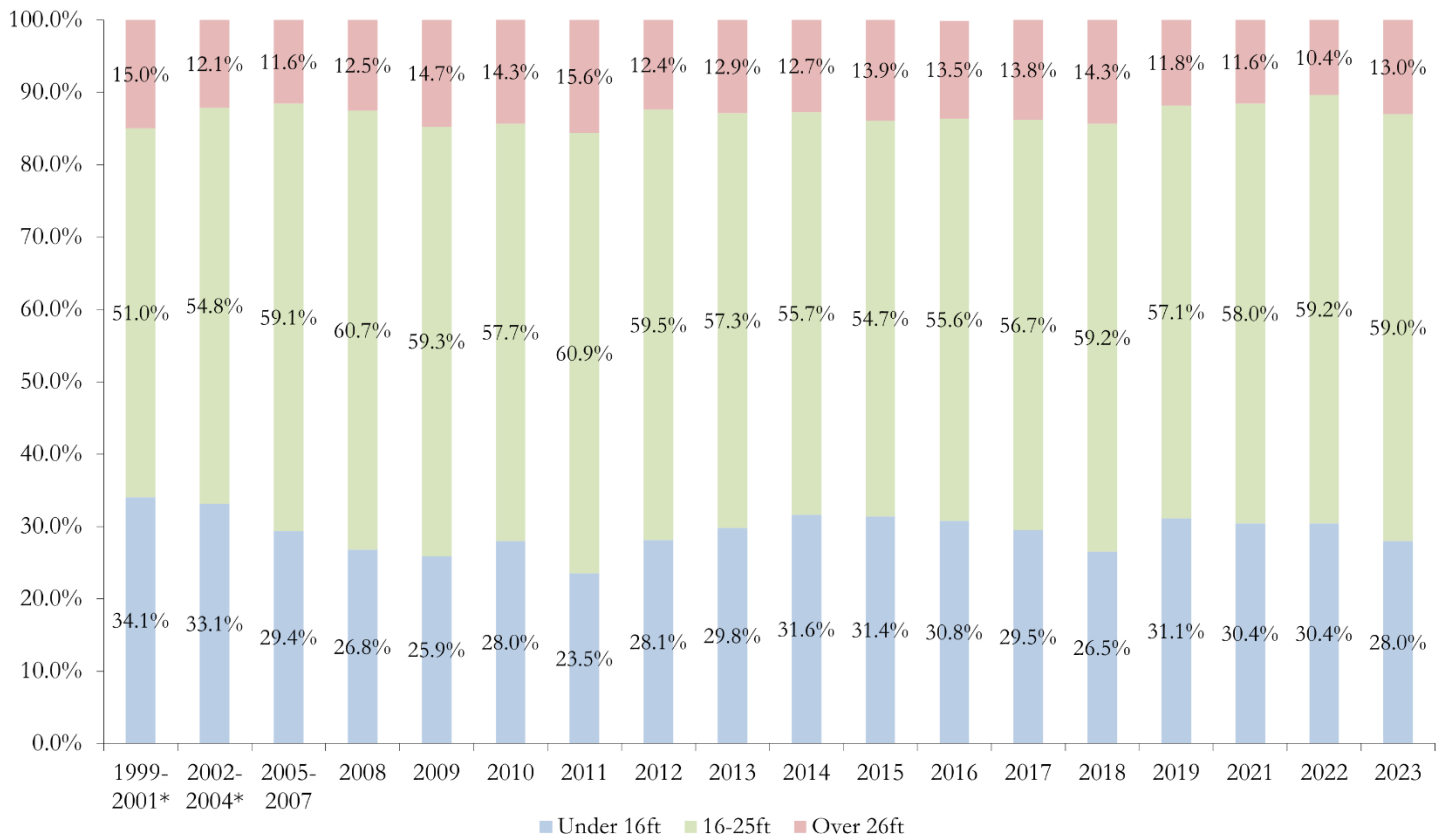
\*Three-year average

**Figure M. Types of Boats**



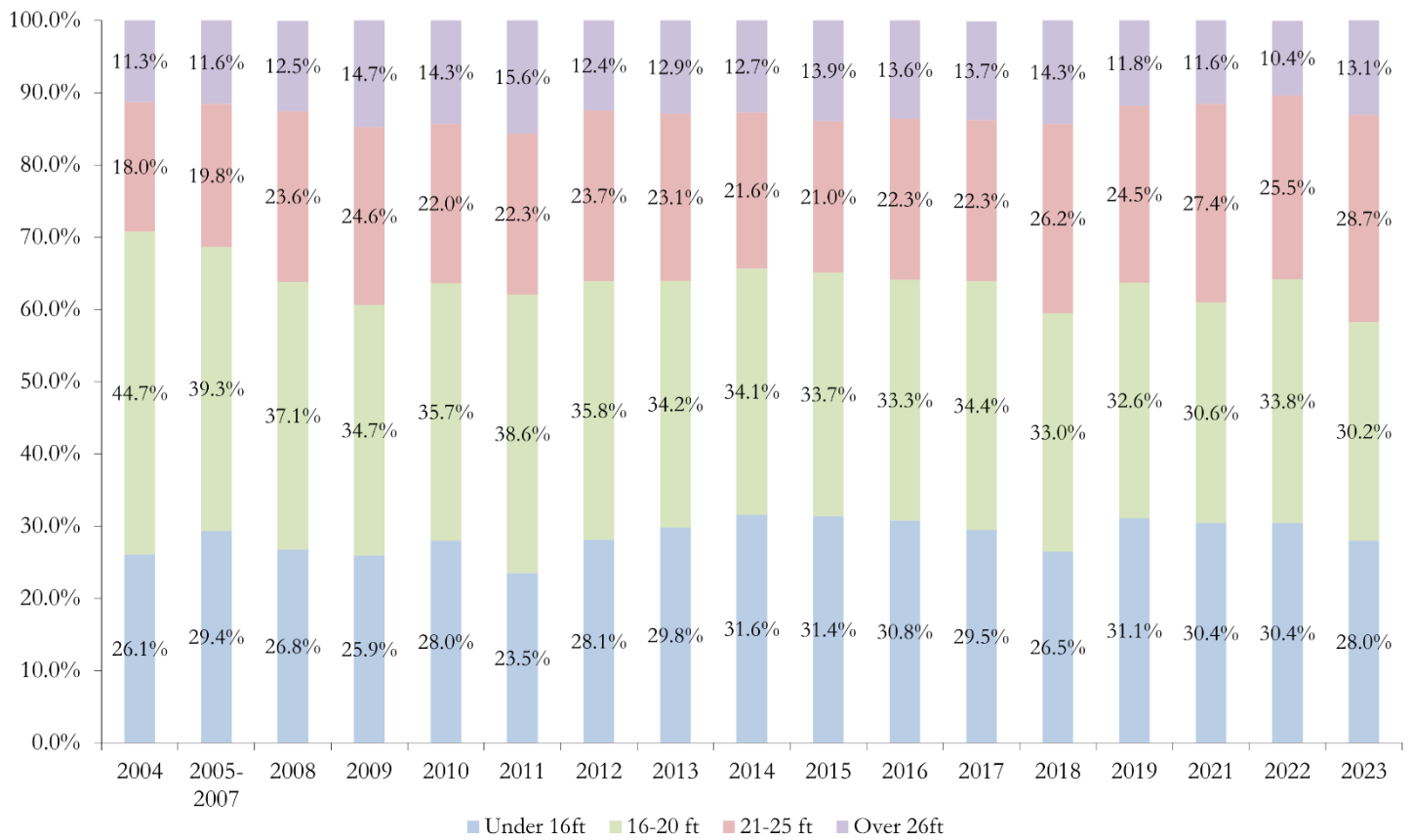
\*Three-year average

**Figure N. Length of Boats**

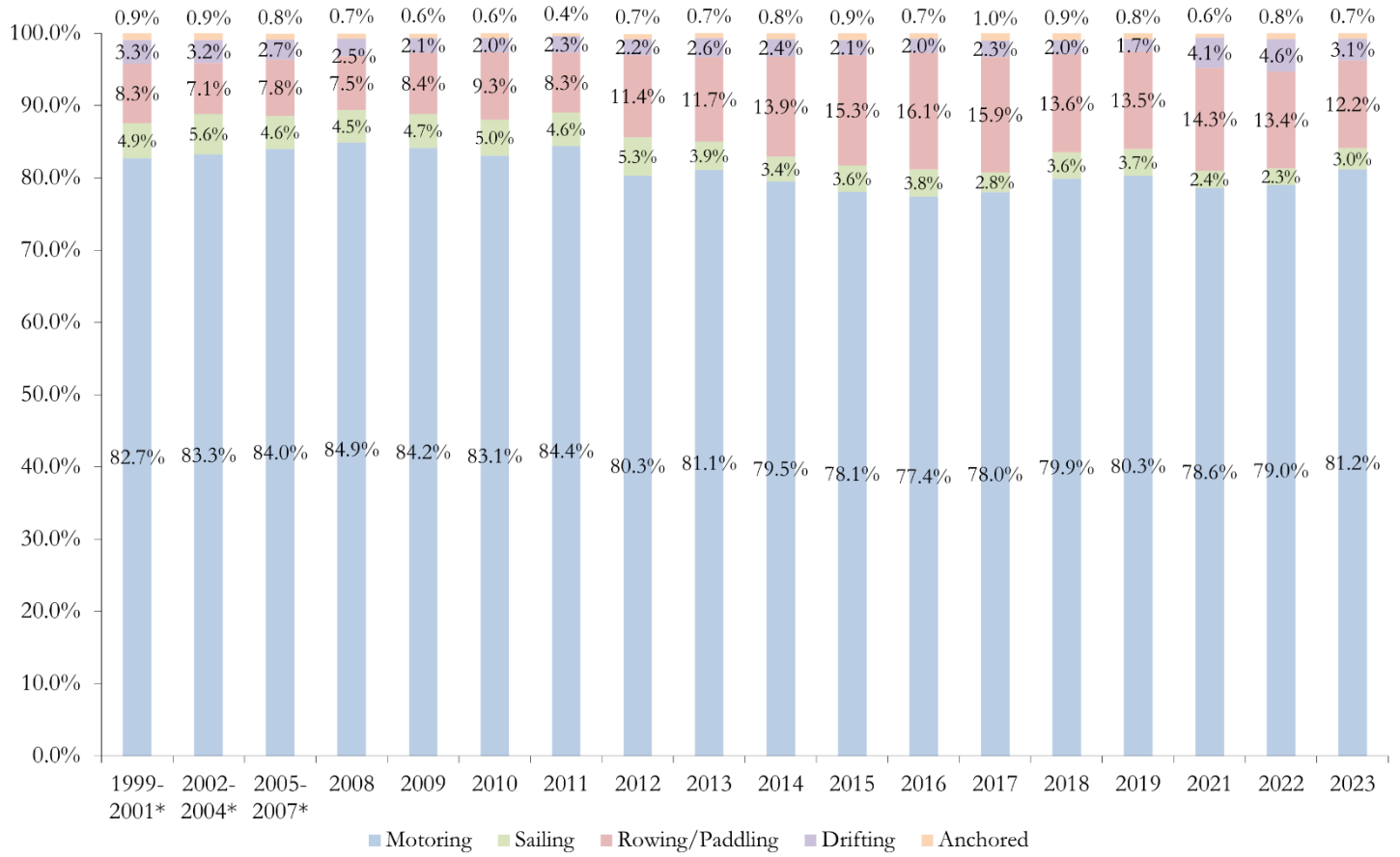


\*Three-year average

**Figure O. Length of Boats 2004-2023 Data Only**



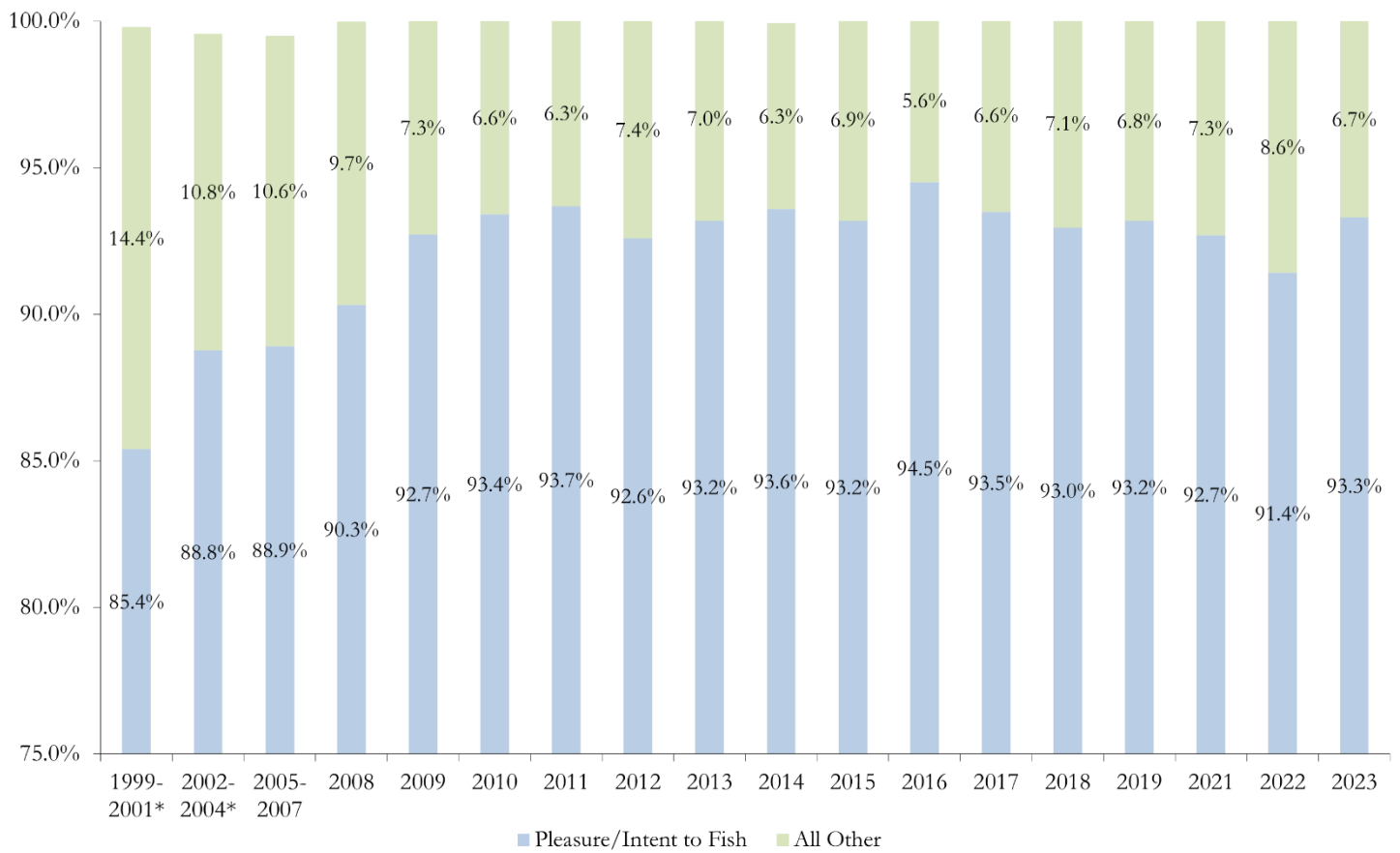
**Figure P. Operation of Boats**



\*Three-year average

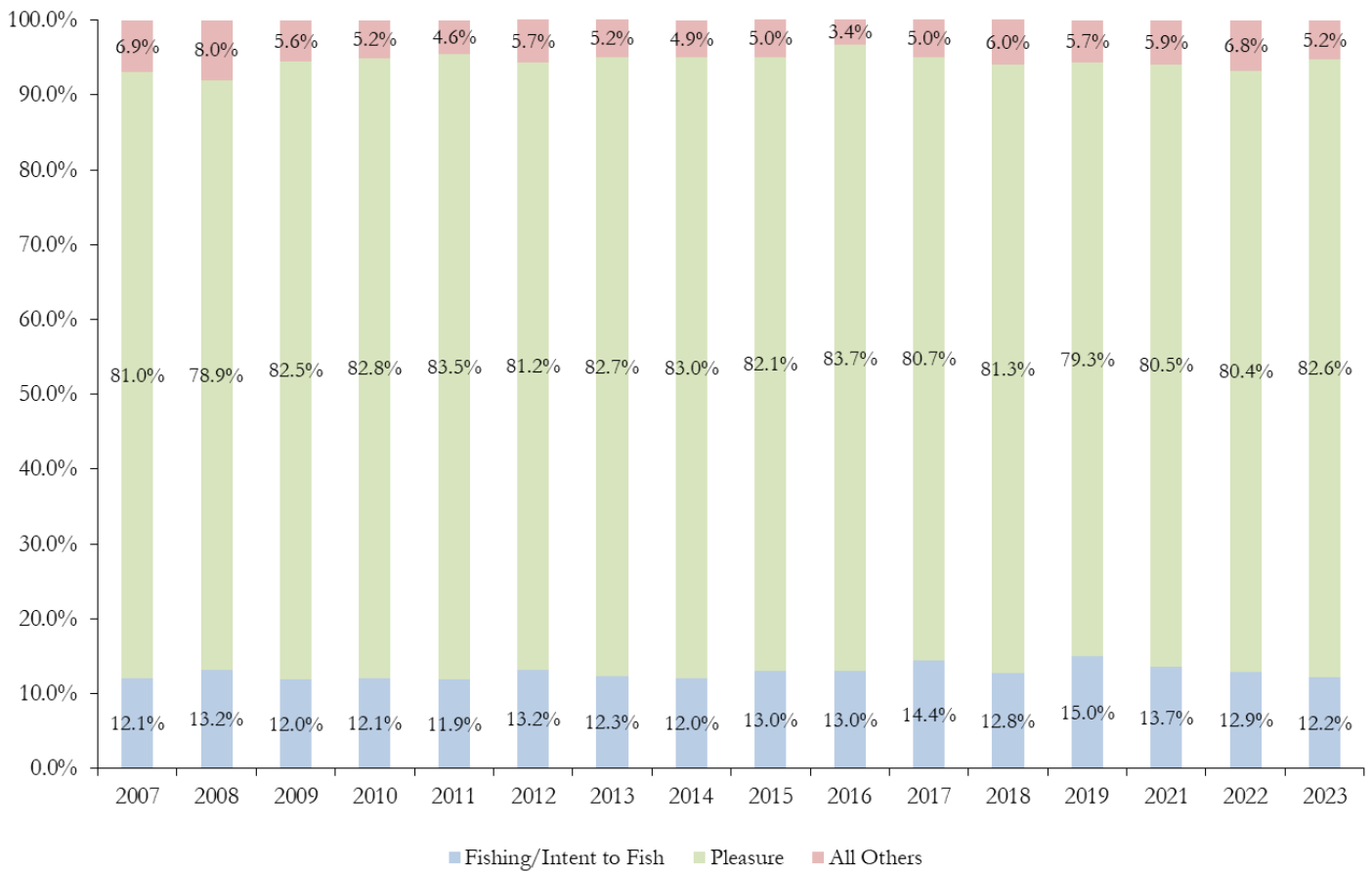


**Figure Q. Activity of Boaters—ALL YEARS\***

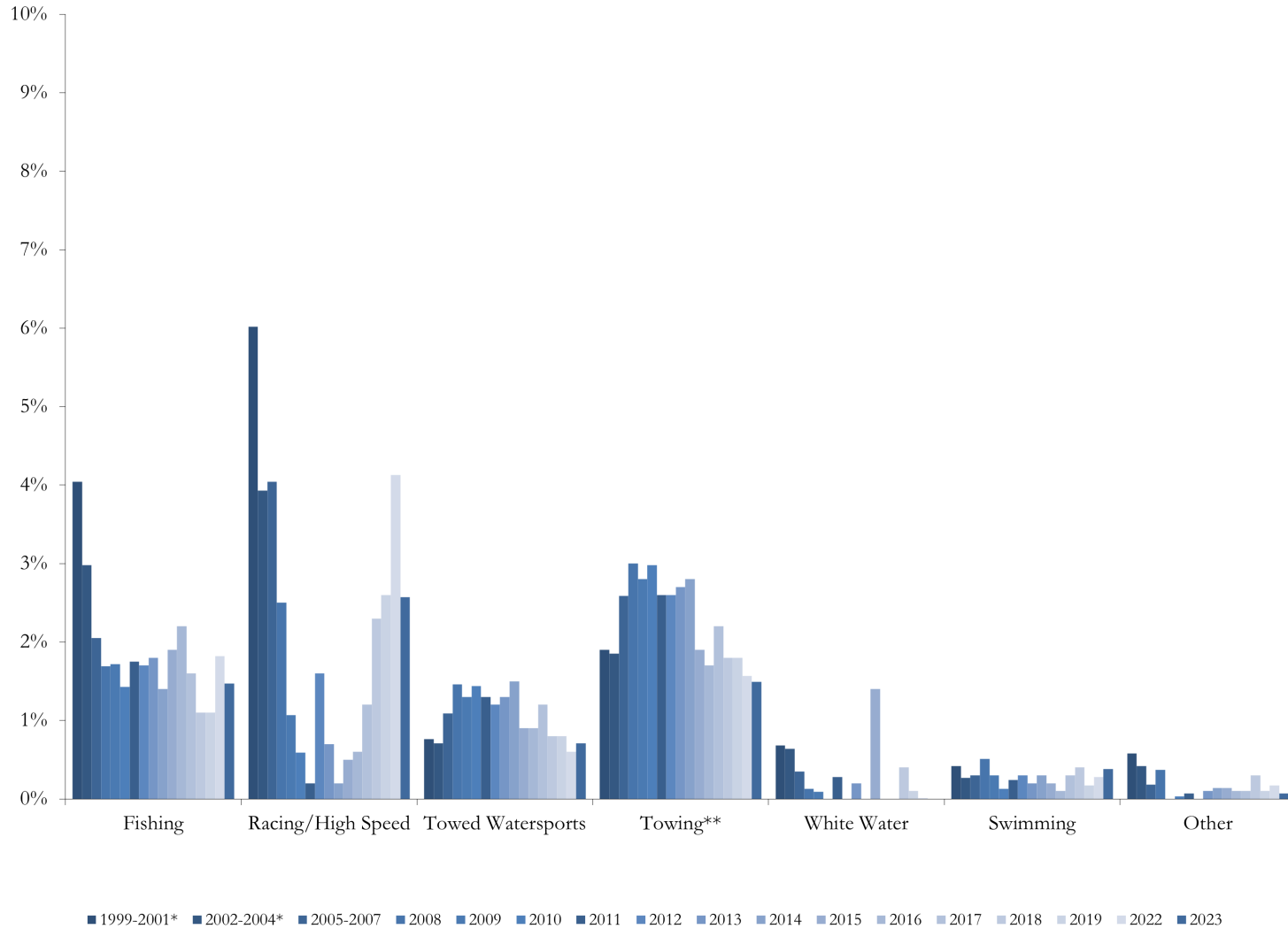


\*Three-year average

Figure R. Activity of Boaters 2007-2023 Data



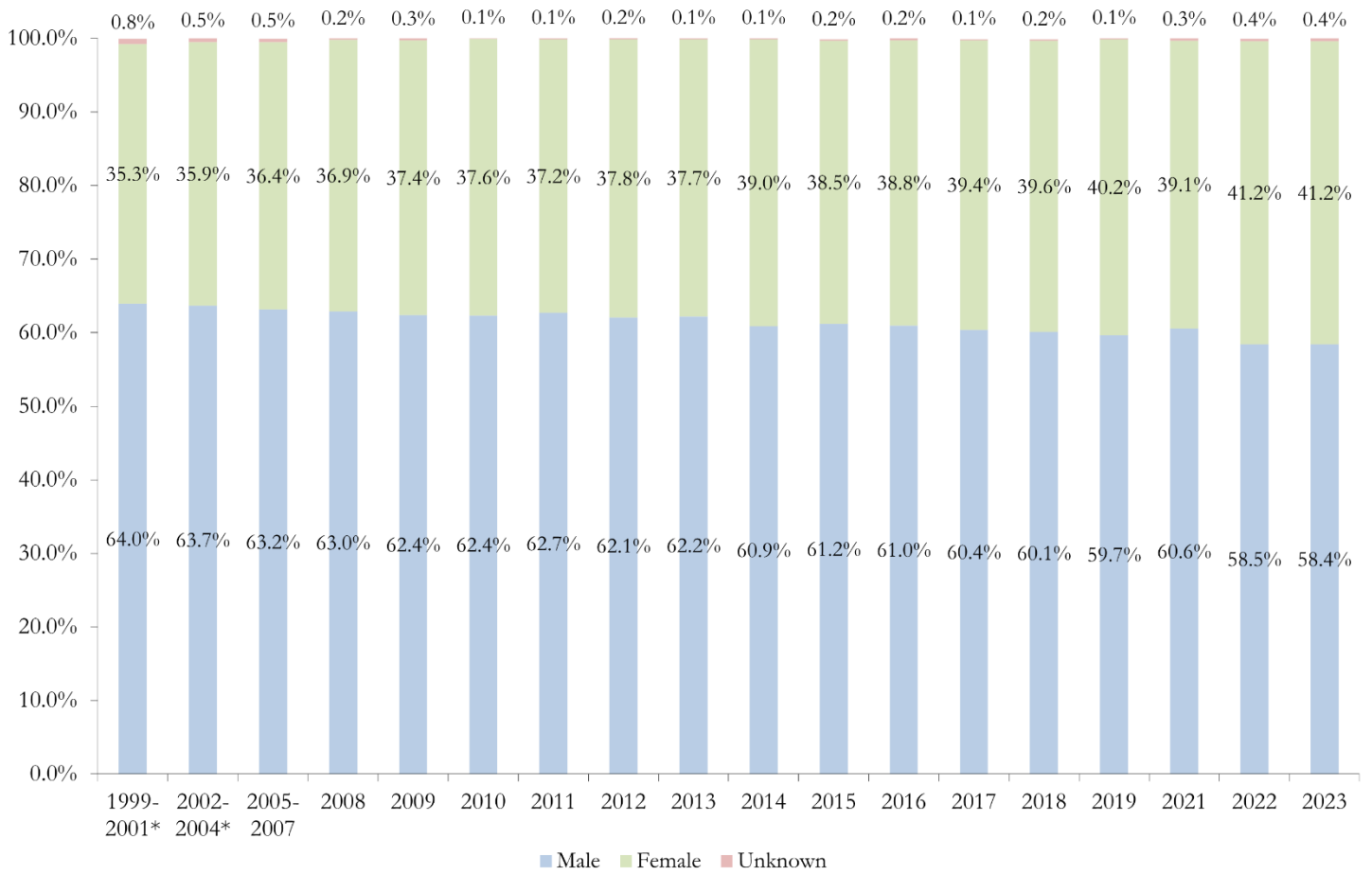
**Figure S. Activity of Boaters 2002-2023**  
 Detailed Breakdown of ALL OTHER Category from Figure T2



\*Three-year average

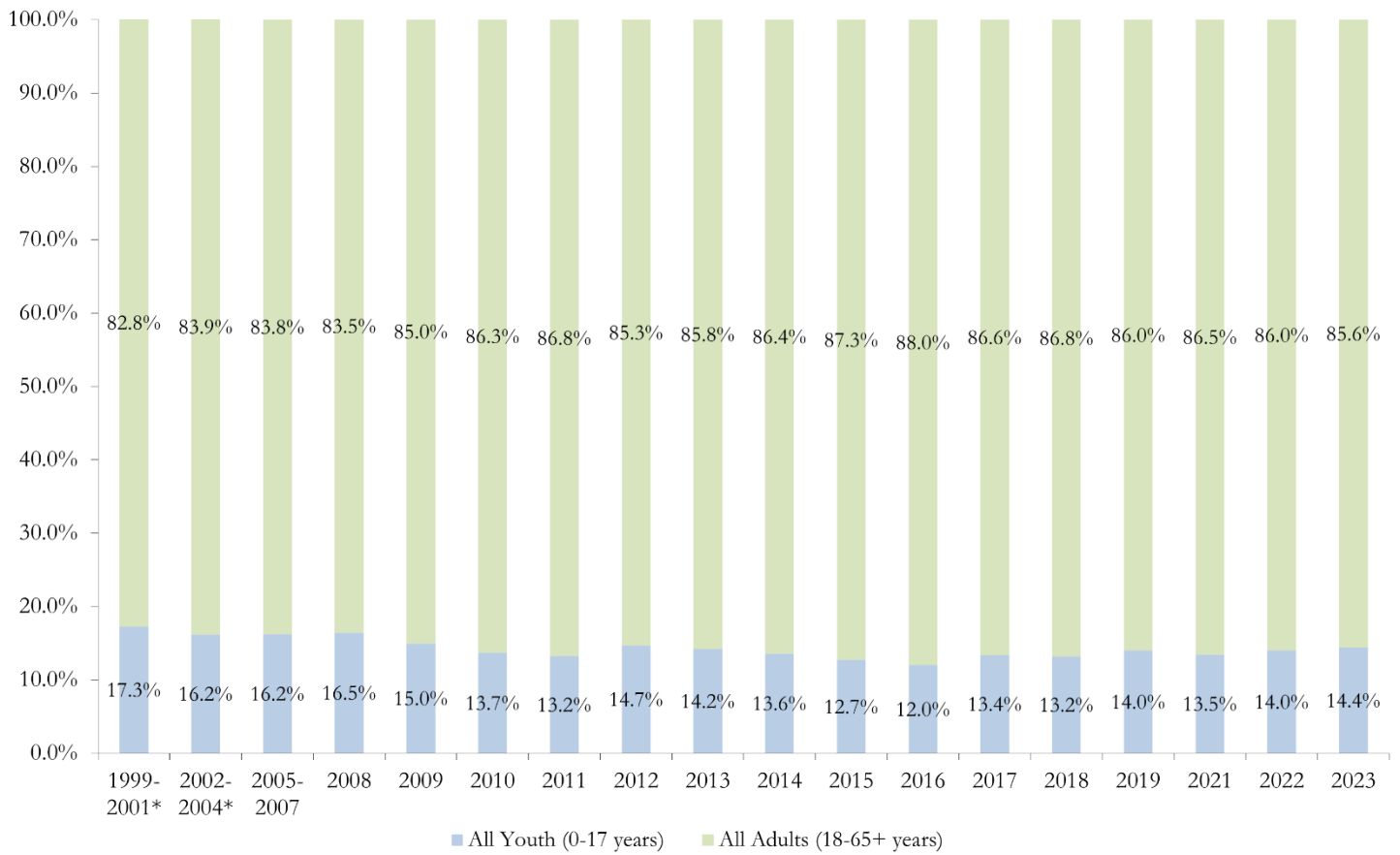
\*\*The activity “Towing” indicates that these boaters were passengers in a boat towing water-skiers or other towing activities. Likewise, “Towed Watersports” includes all towing sports and is reserved for the boaters in the water being towed. The label was changed in April 2010.

**Figure T. Gender of Boaters**



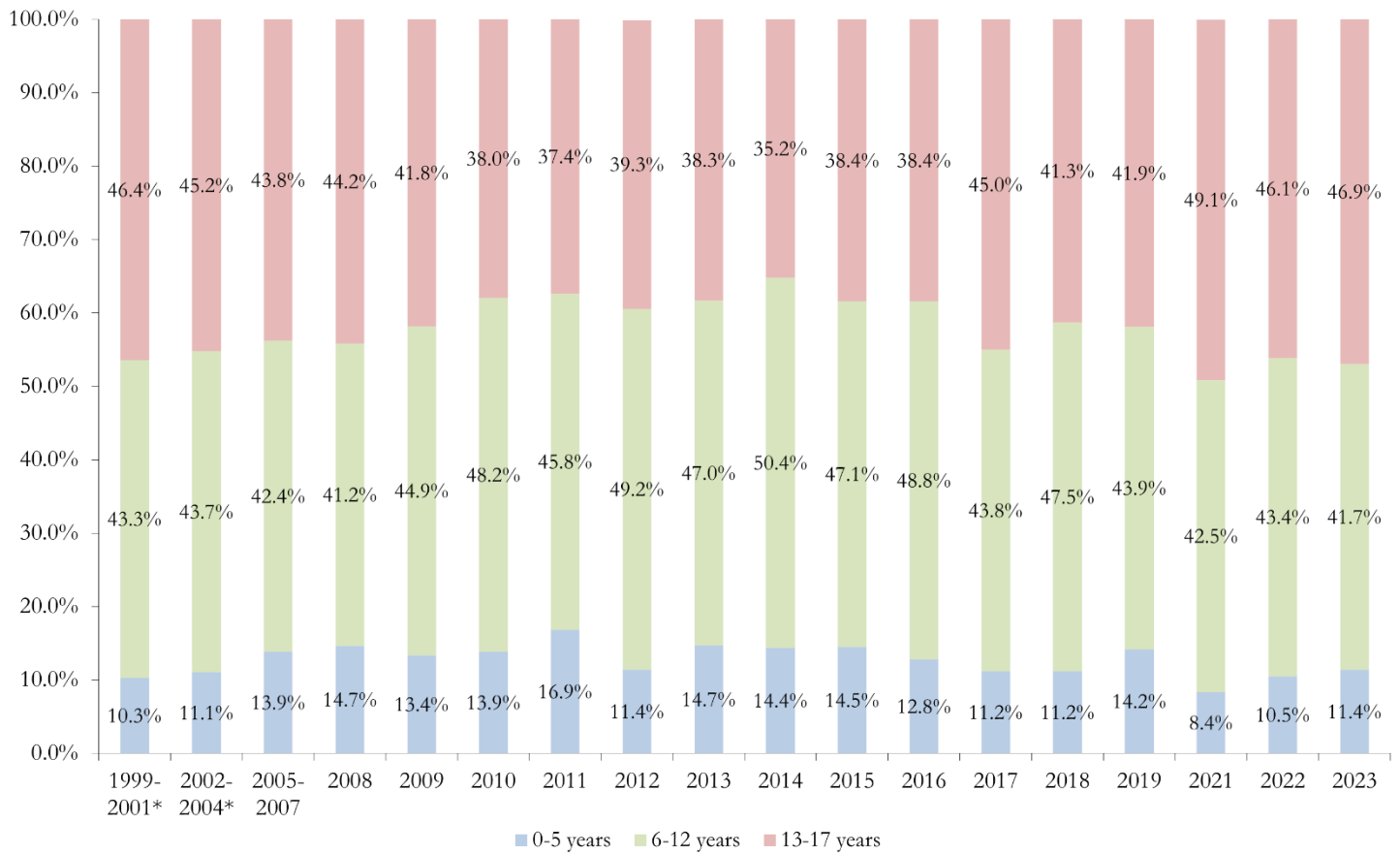
\*Three-year average

**Figure U. Age of Boaters**



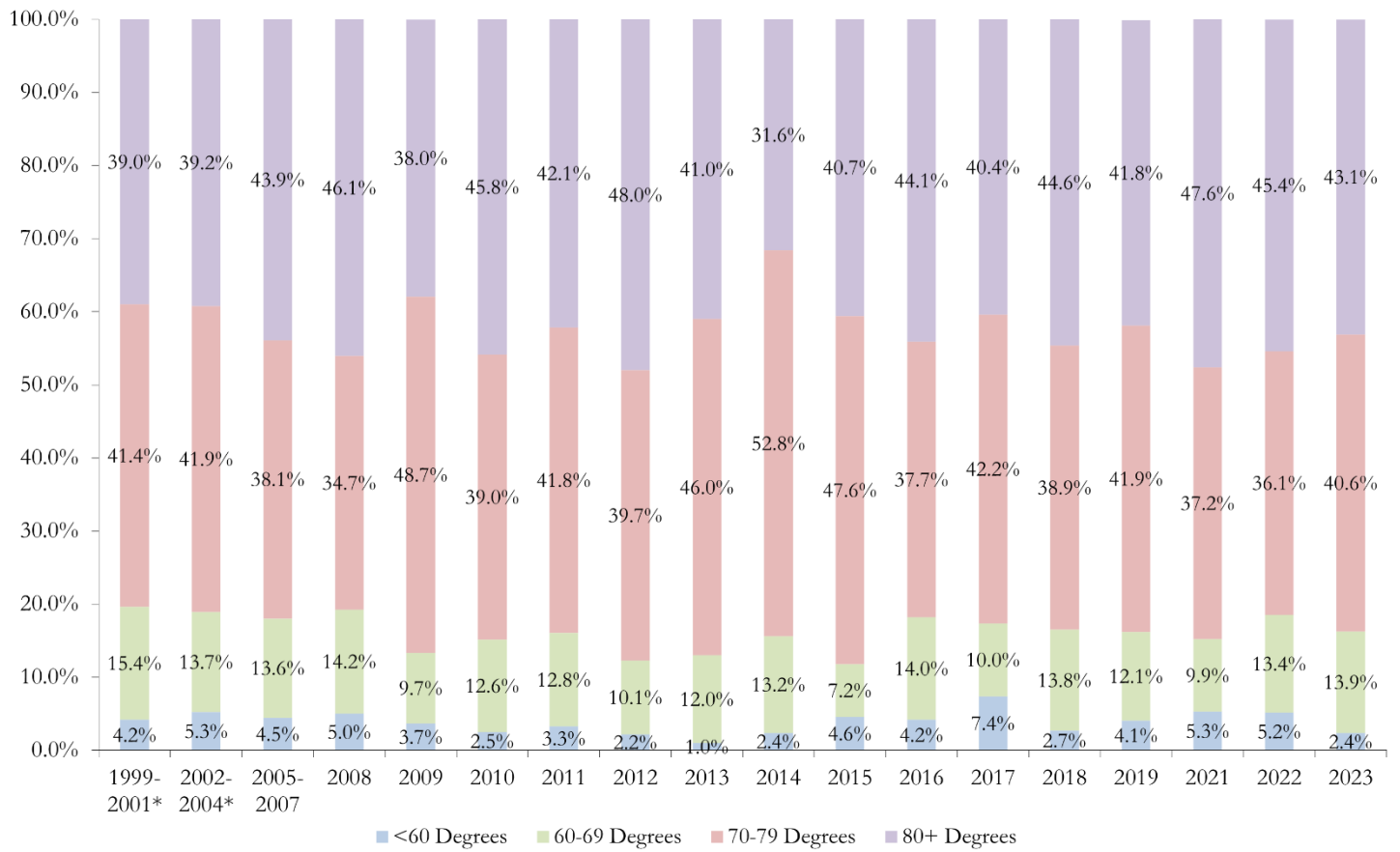
\*Three-year average

**Figure V. Age of Youth Boaters**



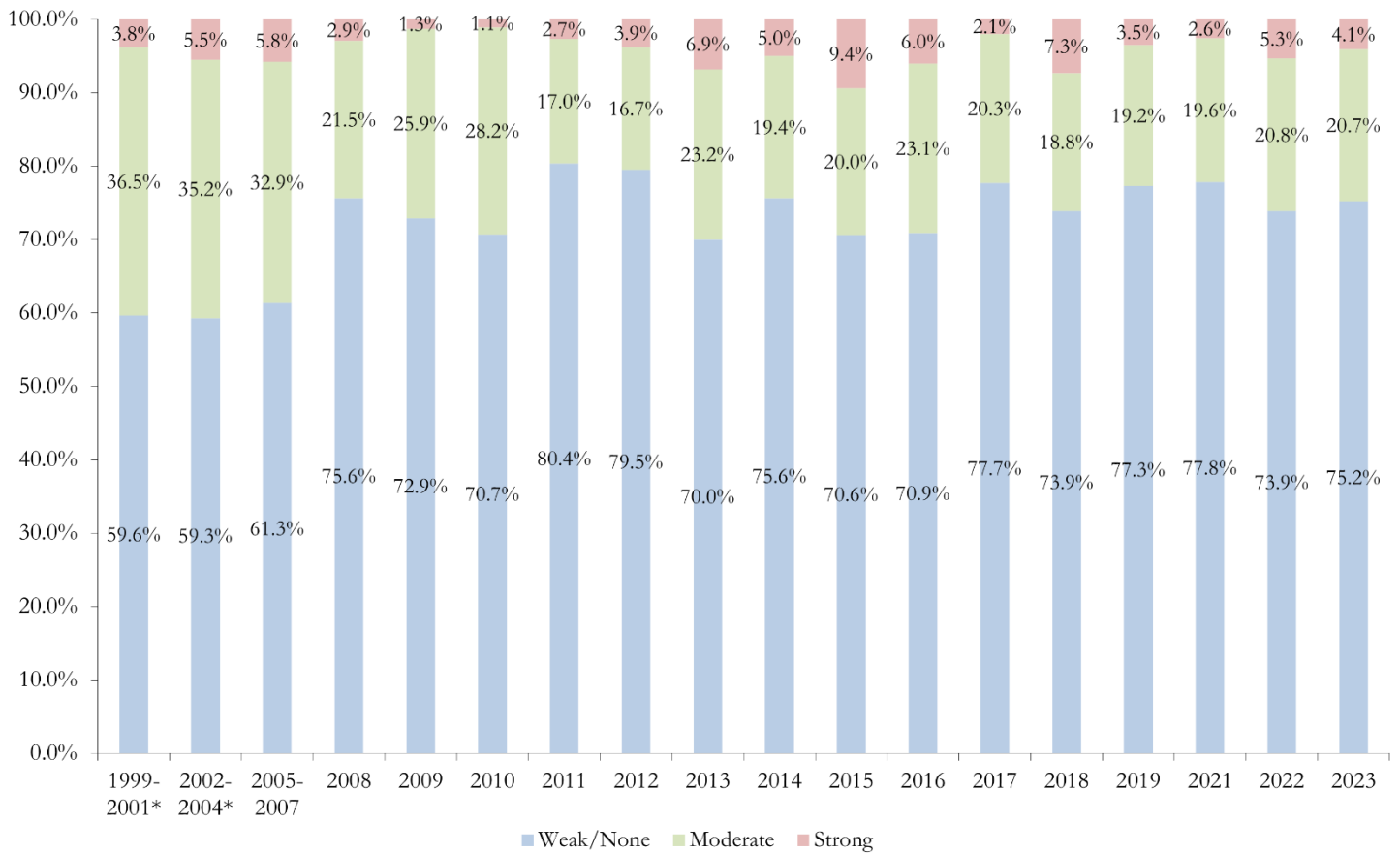
\*Three-year average

**Figure W. Water Temperature in which ALL Boaters were Observed**



\*Three-year average

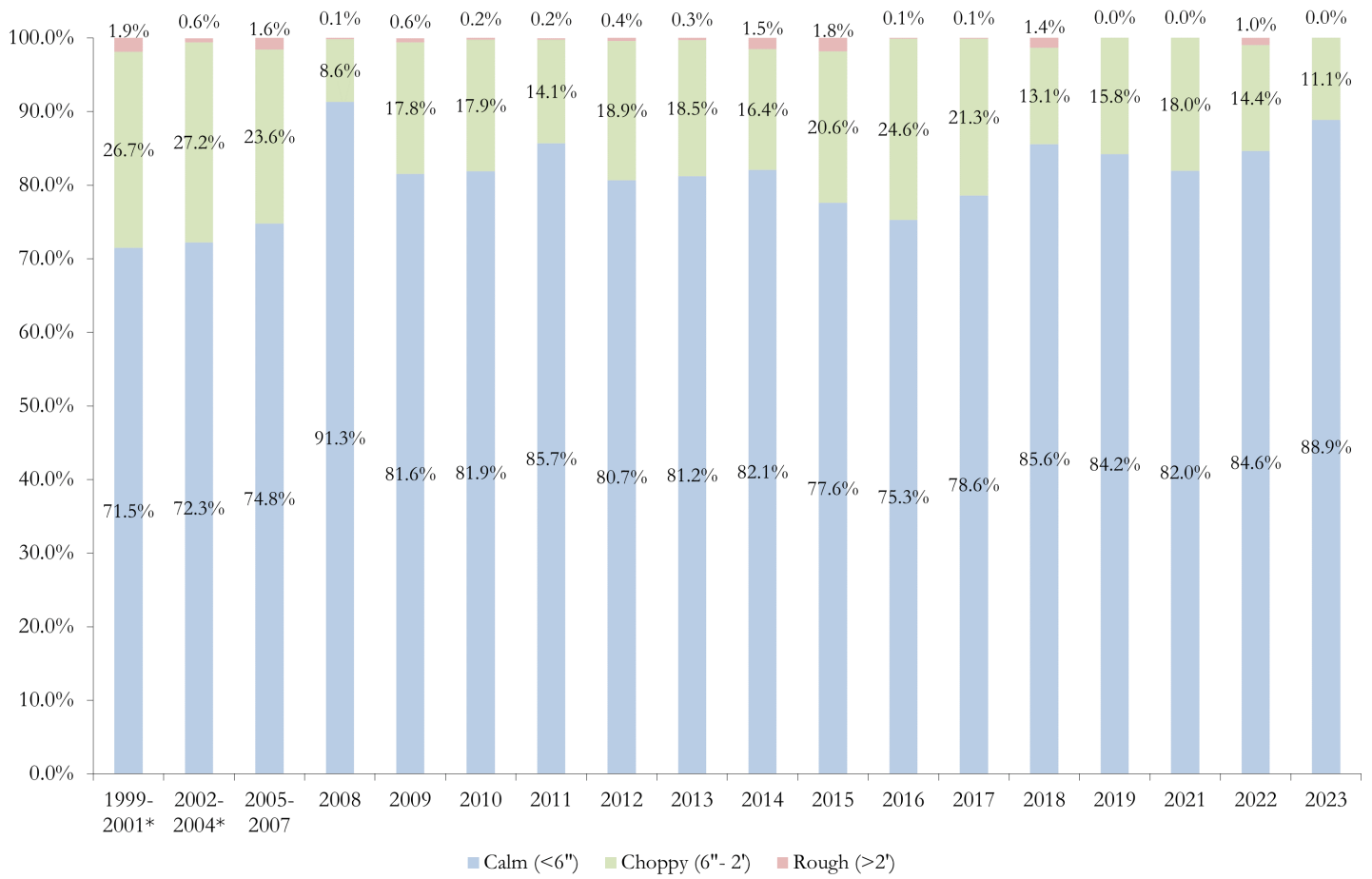
**Figure X. Water Current in which ALL Boaters were Observed**



\*Three-year average

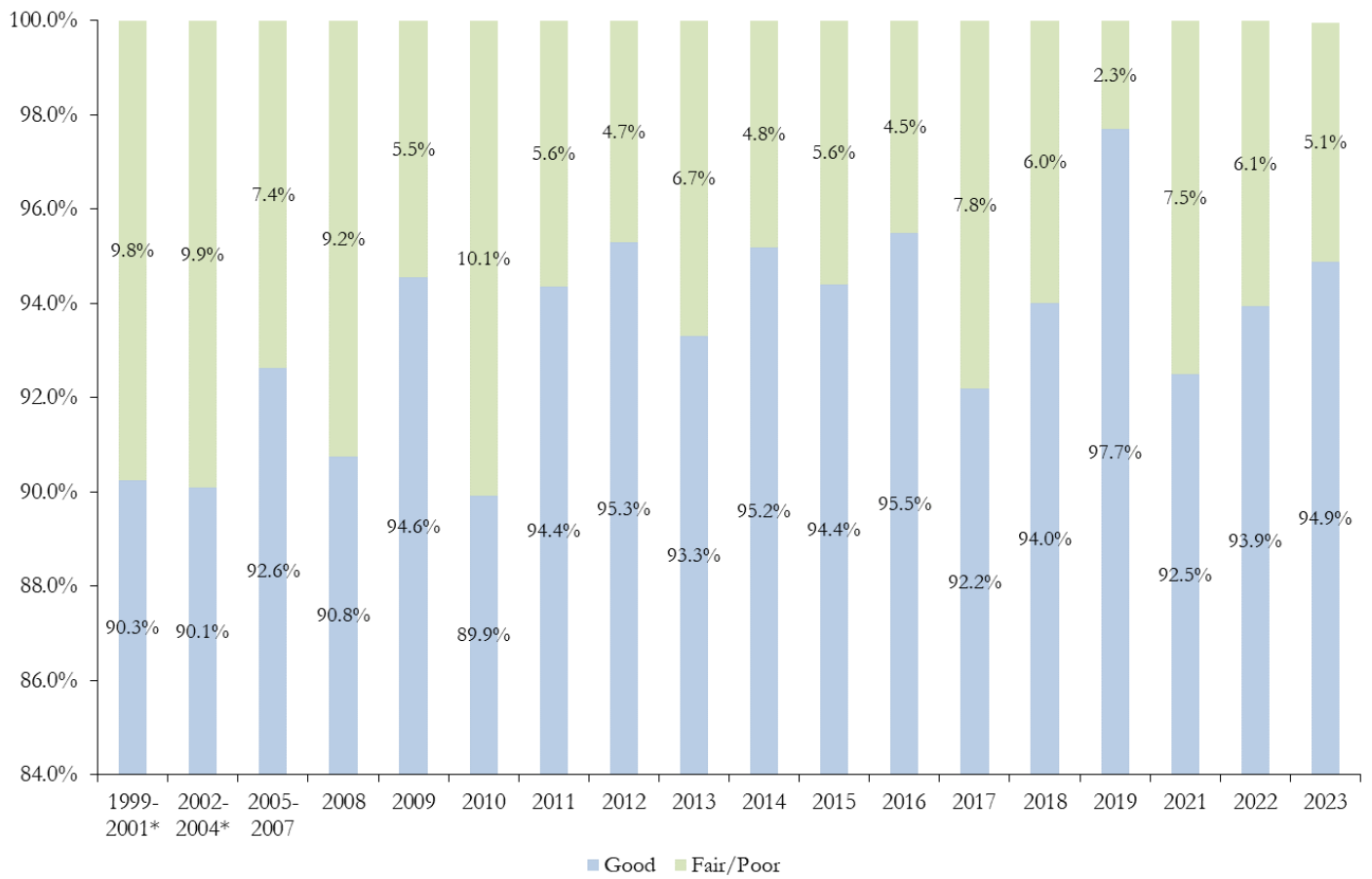


**Figure Y. Wave Height in which ALL Boaters were Observed**



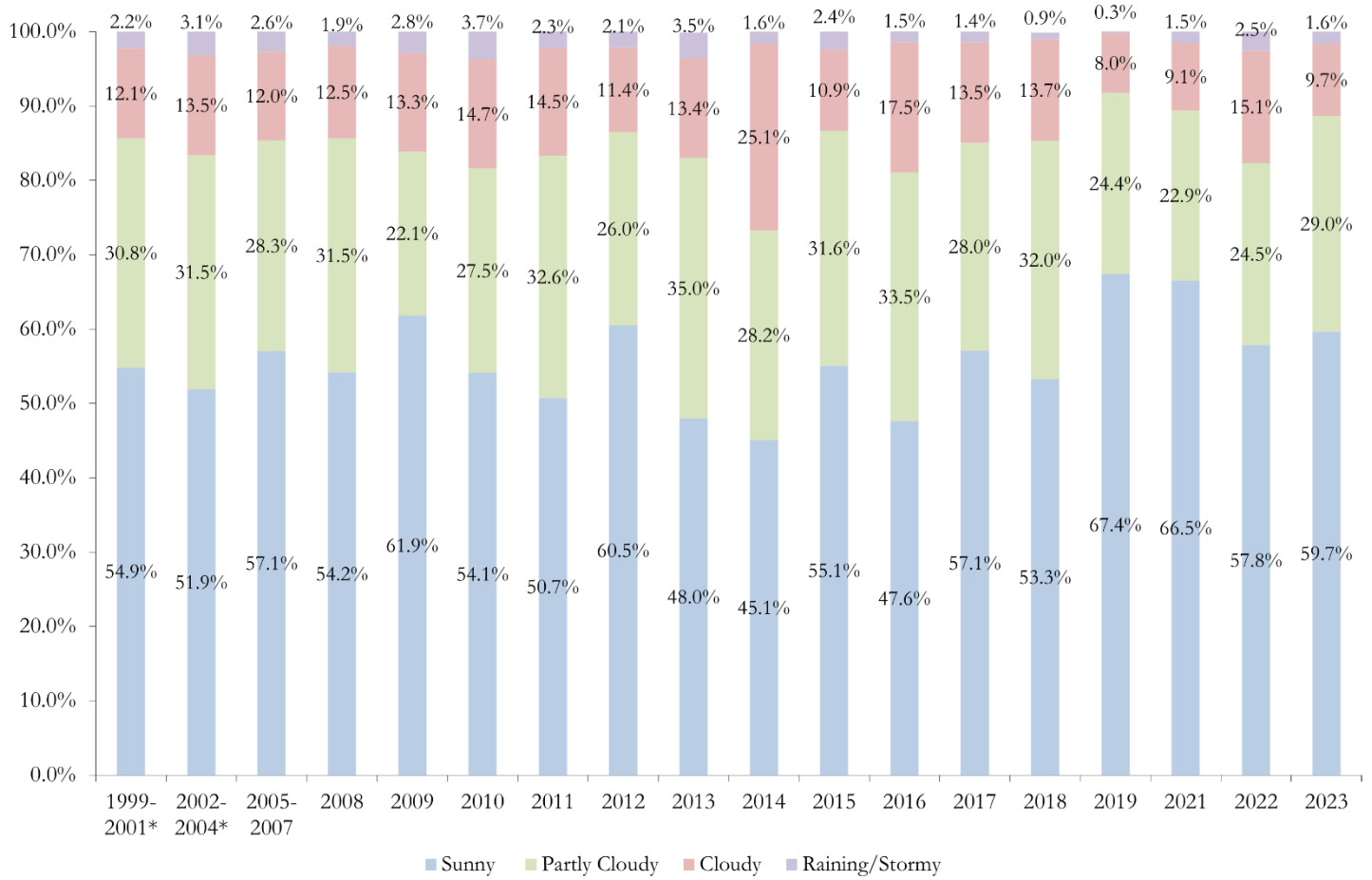
\*Three-year average

**Figure Z. Visibility in which ALL Boaters were Observed**



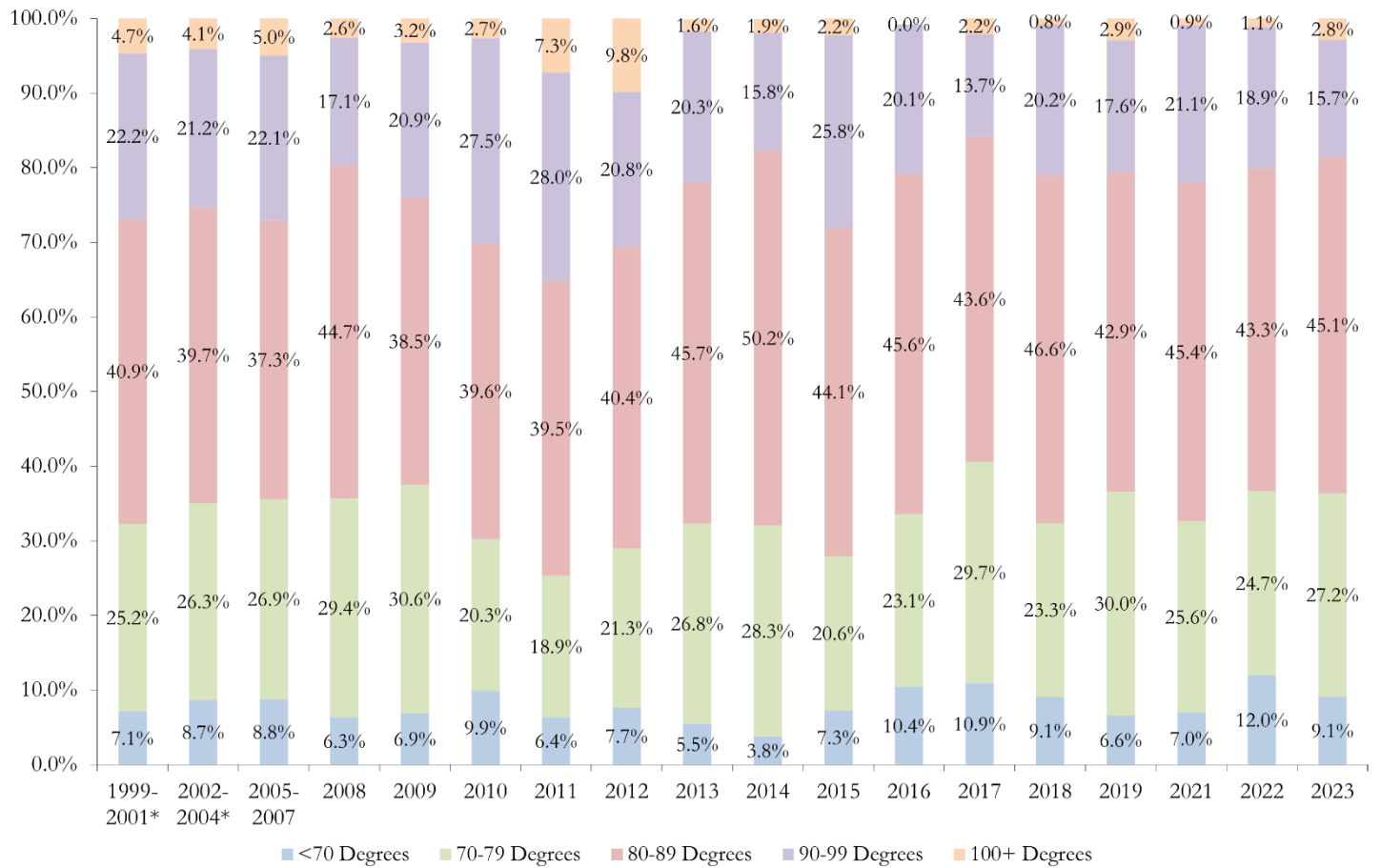
\*Three-year average

**Figure AA. Weather in which ALL Boaters were Observed**



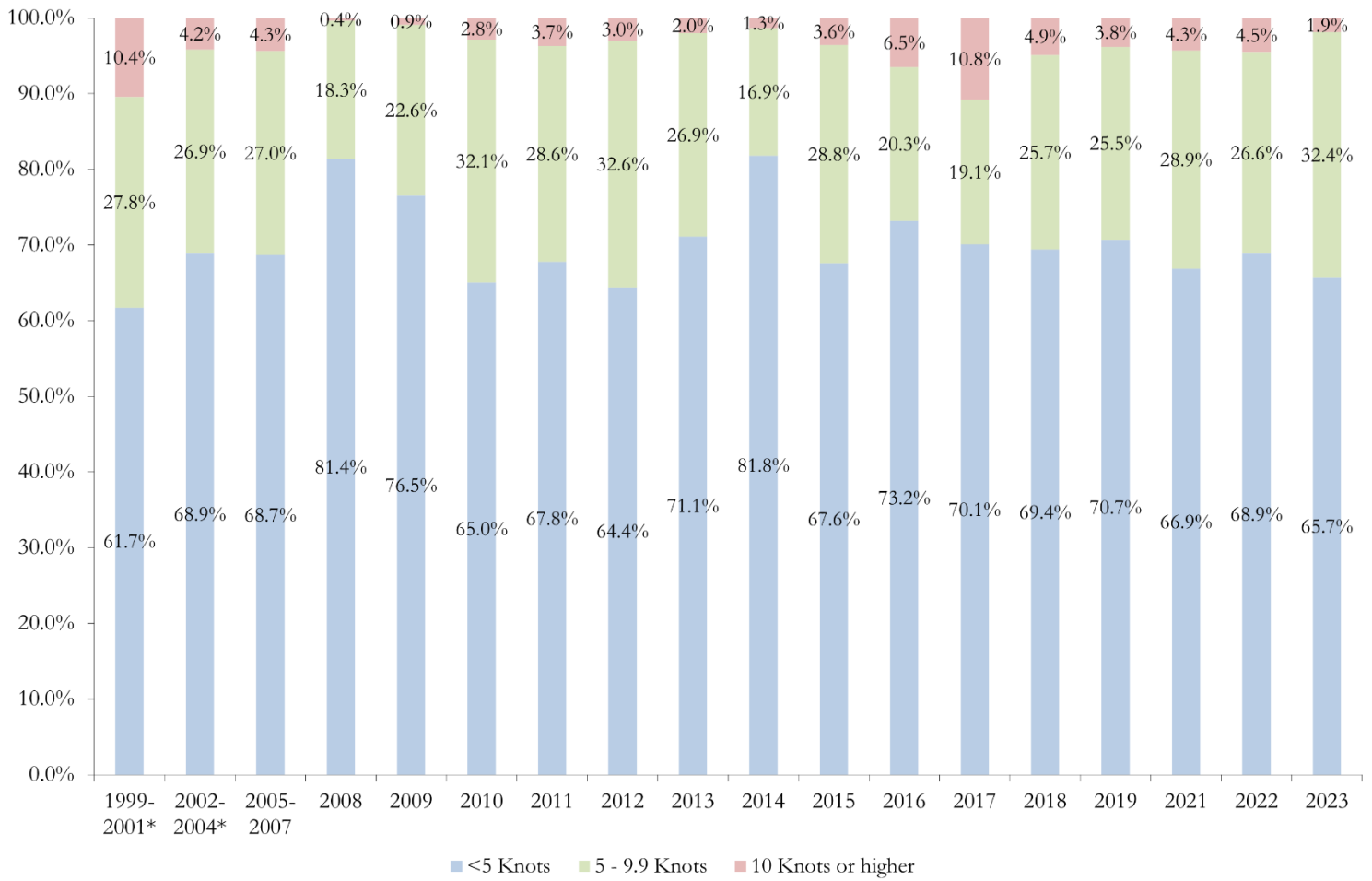
\*Three-year average

**Figure AB. Air Temperature in which ALL Boaters were Observed**



\*Three-year average

**Figure AC – Wind Speed in which ALL Boaters were Observed**



\*Three-year average