

Washington State Boating Personal Flotation Device (PFD) Use Report

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Seattle Children's Hospital
Harborview Injury Prevention and Research Center

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Project Team:

Linda Quan, MD, University of Washington School of Medicine and Seattle Children's Hospital

Mary Kernic, MD, Harborview Injury Prevention and Research Center

Elizabeth Bennett, MPH, MCHES, Seattle Children's Hospital

Susan Kavanaugh, Washington State Parks and Recreation Commission Boating Program

Jim French, Washington State Parks and Recreation Commission Boating Program

Anna Zimmerman, MSW, Seattle Children's Hospital

Celeste Chung, MSW, MPH, Seattle Children's Hospital

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Table of Contents

List of Figures	iv
List of Tables.....	iv
Background	1
Study Methods.....	1
Analysis	3
Results	4
PFD Use by Occupant Characteristics (Adjusted for Age and Boat Length)	4
PFD Use by Boat Characteristics.....	4
PFD Use by Water and Weather Conditions.....	6
PFD Use by Special Groups	7
Changes in PFD Use over Time.....	8
Summary of PFD Use in Washington State.....	9
Recommendations for Increasing PFD Use in Washington State.....	10
Appendix A. WA PFD Observation Study Variables Compared to JSI Variables.....	12
Appendix B. Organizations Providing Observers.....	15
Appendix C: Recommendations for Future Observational Studies.....	16
Appendix D: Number of Occupants by Observation Sites.....	17
Appendix E. Occupant Characteristic Data Tables.....	18
Appendix F. Boat Characteristic Data Tables.....	19
Appendix G: Water and Weather Conditions Data Tables	21
Appendix H: Special Groups Data Tables.....	23
Appendix I: County PFD Use by Age, Gender, and Boat Type	25
Appendix J: PFD Use by EMS Region.....	34

List of Figures

Figure 1. PFD Use by Age.....	4
Figure 2. PFD Use by Vessel.....	4
Figure 3. PFD Use by Boat Length.....	5
Figure 4. PFD Use by Boat Movement.....	5
Figure 5. PFD Use by Activity.....	5
Figure 6. PFD Use among Fisherpersons Compared to All Occupants.....	7
Figure 7. PFD Use Ages 0-17 by Adult PFD Use.....	7

List of Tables

Table 1. PFD Use by Water and Weather Conditions.....	6
Table 2. PFD Use Over Time by Region.....	8
Table 3. WA State PFD Observation Study Variables Compared to JSI Variables.....	12
Table 4. Observer Affiliated Organizations.....	15
Table 5. Number of Occupants by Observation Site (excluding inner tubes).....	17
Table 6. PFD Use by Age.....	18
Table 7. PFD Use by Age Groups <65 Compared to Age>65.....	18
Table 8. PFD Use by Gender.....	18
Table 9. PFD Use Among Females Compared to Males.....	18
Table 10. PFD Use by Gender and Age.....	18
Table 11. PFD Use by Boat Characteristic.....	19
Table 12. PFD Use in Non-Motor Boats Compared to Motor Boats.....	19
Table 13. PFD Use in Boats <25 feet Compared to Boats >25 feet.....	19
Table 14. PFD Use in Moving Boats Compared to Anchored Boats.....	20
Table 15. PFD Use by Activity.....	20
Table 16. PFD Use in Non-Fishing Activities Compared to Fishing.....	20
Table 17. PFD Use in Other Currents Compared to Strong Currents.....	21

Table 18. PFD Use in Other Water Conditions Compared to No Waves.....	21
Table 19. PFD Use in Water Temp >60°F Compared to Water Temp <60°F.....	21
Table 20. PFD Use when Raining Compared to Other Weather.....	21
Table 21. PFD Use when Fair Visibility Compared to Good Visibility.....	21
Table 22. PFD Use in Air Temp >60°F Compared to Air Temp <60°F.....	21
Table 23. PFD Use by Day of Week.....	22
Table 24. PFD Use on Fridays Compared to Other Days of the Week.....	22
Table 25. PFD Use among Fisherpersons by Gender.....	23
Table 26. PFD Use among Fisherpersons by Age.....	23
Table 27. Child PFD Use When At Least One Adult Wore PFD.....	23
Table 28. Child PFD Use by Age and No Adult PFD Use.....	23
Table 29. PFD Use among Children 12 and Under in Boats <20 feet.....	23
Table 30. PFD Use among Water Skiers and PWC Users.....	24
Table 31. PFD Use among Water Skiers Compared to Non-Water Skiers.....	24
Table 32. Characteristics of Inflatable PFD Users.....	24
Table 33. PFD Use by Inner Tubes (not mandated).....	24
Table 34. PFD Use by Water Skiers.....	24
Table 35. Asotin County PFD Use.....	25
Table 36. Benton County PFD Use.....	25
Table 37. Chelan County PFD Use.....	26
Table 38. Clallum County PFD Use.....	26
Table 39. Clark County PFD Use.....	27
Table 40. Cowlitz County PFD Use.....	27
Table 41. Grant County PFD Use.....	28
Table 42. Island County PFD Use.....	28
Table 43. King County PFD Use.....	29

Table 44. Kitsap County PFD Use.....	29
Table 45. Lewis County PFD Use.....	30
Table 46. Pierce County PFD Use.....	30
Table 47. Snohomish County PFD Use.....	31
Table 48. Stevents County PFD Use.....	31
Table 49. Thurston County PFD Use.....	32
Table 50. Walla Walla County PFD Use.....	32
Table 51. Whatcom County PFD Use.....	33
Table 52. Yakima County PFD Use.....	33
Table 53. Central Region (King County).....	34
Table 54. North Central Region (Chelan, Grant Counties).....	34
Table 55. South Central - Yakima Region (Yakima County).....	35
Table 56. South Central - Tri-Cities Region (Benton, Walla Walla Counties).....	35
Table 57. East Region (Asotin, Spokane, Steven Counties).....	36
Table 58. West Region (Pierce, Thurston, Lewis Counties).....	36
Table 59. Northwest Region (Kitsap County).....	37
Table 60. Southwest Region (Clark, Cowlitz Counties).....	37
Table 61. North Region (Whatcom, Island, Snohomish Counties).....	38

Background

Washington State Parks and Recreation Commission Boating Program promotes enjoyable, safe, environmentally responsible recreation on Washington's waters in partnership with government, business, educators, citizen action groups and the boating public. On a statewide basis, the program conducts a targeted boating safety information program intended to increase the safety awareness of specific groups of boaters. One area of continued concern is the number of boating related drowning deaths.

Drowning is a major cause of injury death in the US and in Washington State. On average, two boaters are killed every day on America's waterways – more than 700 per year. In 2009, there were 111 boating accidents in Washington State, which resulted in the deaths of 22 boaters, plus 66 who were injured. In 2009, this number of fatalities placed Washington State 7th among the 50 states; only Florida, California, Texas, Michigan, Louisiana, and Virginia had more drowning deaths¹.

PFDs, also known as personal flotation devices or life jackets, have the potential to prevent drowning². As of 1999, Washington State law requires children under 13 years old to wear a PFD in a boat under 19 feet while underway. The United States Coast Guard (USCG) and the Washington State Parks and Recreation Commission Boating Program promote PFD use among boaters.

This study was conducted to determine the extent of PFD use by recreational boaters in Washington State in 2010, to describe the characteristics associated with their use and non use, and to develop recommendations to increase use.

Study Methods

Washington State Parks and Recreation Commission Boating Program worked with Seattle Children's Hospital and Harborview Injury Prevention and Research Center to develop the scope and methodology for the project. Seattle Children's and Washington State Department of Health conducted PFD observations statewide from 1995-2000³. JSI Research and Training Institute has been working with the U.S. Coast Guard for the last ten years, conducting PFD observations in multiple states. Both were referenced in development of criteria, sites and observational methodology.

In order to be as consistent as possible with national life jacket observations, JSI was consulted to gain information about their protocol and research methodology. JSI provided their PFD observation training material, data forms and protocols. JSI's training materials, forms and protocols were adapted for this study based on Seattle Children's previous observations (1996-2000), and the current observation study needs. See Appendix A for a comparison of JSI study variables and the Washington State PFD 2010 study variables. This observation study was approved by the Seattle Children's Institutional Review Board.

¹ US Coast Guard, 2009 Annual boating statistics at http://www.uscgboating.org/statistics/accident_statistics.aspx, accessed Jan 23, 2011.

² Cummings P, Mueller BA, Quan L. Association between wearing a personal flotation device and death by drowning among recreational boaters: a matched cohort analysis of United States Coast Guard data. *Injury Prevention*. 2010; ePub October 1.

³ Quan L, Bennett E, Cummings P et al. Are life vests worn? A multiregional observational study of personal flotation devices in small boats. *Injury Prevention*. 1998; 4: 203-205.

A list of 46 potential observation sites was created based on sites from previous Washington State observations (1995-2000), boating fatality location data (2000-2009) and recommendations from Washington State Parks Boating Program, county sheriff's offices, marine patrols, and the Boating Safety Advisory Council. Based on boating use, fatality data, prior observations and geographic distribution an initial list of fourteen sites were chosen to be surveyed. Another nineteen sites were chosen from the remaining list of 32 potential sites, using a random selection process designed to ensure a mix of lake, river and salt water sites. A total of 33 sites in 18 counties in Washington were selected for observations. Bodies of water were classified as lakes, rivers or saltwater (bay or sound).

A total of 44 volunteer observers were recruited from local marine law enforcement patrols, US Power Squadrons, USCG Auxiliary, Boating Safety Advisory Council, Safe Kids Coalitions and other organizations. Observers attended an hour-long training, using an adapted version of the protocol from JSI. Observers participated via conference call where they followed along as a trainer went through a presentation. Observers also received a PFD observation-training guide. Observers were taught how to use the data collection forms and how to classify weather, water conditions, boat type, boat size and PFD type. The presentation and the training guide were accessed via an internet Web site. Observers could choose from two training sessions; one held in the morning and one held in the afternoon. Because of scheduling conflicts a third training session was added. Volunteer observers were provided with a \$75 stipend or the equivalent in PFDs for each 90-minute observation they completed.

A minimum of two 90-minute observations or, in several cases, one three hour observation was conducted at each observation site. In almost all observations, two observers worked together to complete observations. Observations were conducted over Friday-Sunday of the last weekend in August 2010 and Friday-Monday (Labor Day) of the following weekend in September 2010. Most observations were conducted between 12:00 pm- 6:00 pm.

Observers were mailed data forms and an air/water thermometer. For each observation period, the observers completed a cover sheet that described the weather and water conditions. A second cover sheet was completed if the weather or water conditions changed significantly during the observation period. A separate data sheet was completed for each vessel observed. Observers returned the forms by mail in pre-stamped envelopes.

Observation variables included the type of boat, boat/vessel size, movement and activity of boat, weather, water conditions, and air and water temperature. PFD use on inner tubes was also assessed. The estimated age (categories of 0-5, 6-12, 13-17, 18-64, 65+), gender, and PFD status of each occupant were collected. If gender, age, or PFD wearing could not be reasonably determined, then the "unknown" designation was used. PFDs were divided into inflatable or non inflatable types.

Completed data collection forms were scanned using ABBYY FormReader 6.0 optical data scanning software. Data was then exported in Microsoft Excel worksheets and converted to Stata 10.0 databases using Stat/Transfer database conversion program. StataCorp. 2007. *Stata Statistical Software: Release 10*. College Station, TX: StataCorp LP. (Microsoft Corp. 2007. Excel software (Version 2007). Redmond, WA., Circle Systems, Inc. Stat/Transfer software (version 7.0.02). Seattle, WA.)

Analysis

All variables were analyzed by PFD use versus non use.

Bivariate analyses were conducted to examine PFD use (yes/no) by site characteristics, vessel characteristics, activity, and occupant demographics. Chi square analyses were conducted for bivariate analyses with $p < 0.05$ indicating a statistically significant result. Multiple robust Poisson regression analyses were used to examine prevalence ratios and corresponding 95% confidence intervals of PFD use by site, vessel and occupant characteristics adjusted for occupant age and boat type. In this report, prevalence ratios are a measure of how the prevalence of PFD use differs among occupants with different values of a given characteristic. For example, in Table 2, occupants of different ages were compared to the referent group (age 65+ years). Children age 0-5 years were 4.6 times more likely to wear a PFD, those 6-12 years were 4.1 times more likely, and those 13-17 years were twice as likely to wear a PFD than those 65+ years. Confidence intervals provide a measure of the statistical confidence in the accuracy of the prevalence ratio. Confidence intervals that do not include 1.0 are considered statistically significantly different rates of PFD use relative to the referent group. In the tables statistically significant findings are **bolded**. Note: Confidence intervals were rounded. As a result, some confidence intervals of 1.0 are bolded.

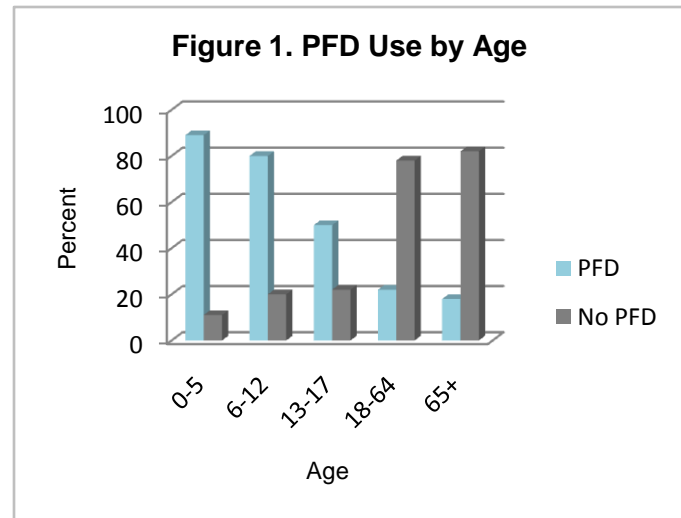
Results

A total of 5,306 boat occupants and 35 inner tube occupants were observed. Results do not include inner tubes occupants. The number of occupants by county and site are available in Appendix D.

PFD Use by Occupant Characteristics (Adjusted for Age and Boat Length)

Age (Figure 1, Appendix E): PFD use was highest among children 12 and under. 89% of children age 0-5 and 80% of children age 6-12 were observed wearing PFDs. The rate of PFD use decreased to 50% for youth age 13-17. PFD use was even lower among people 18 and over. Only 22% of people age 18-64 wore PFDs and 18% of people 65 and over wore PFDs.

Compared to adults, children age 12 and under were 4 times more likely to wear a PFD and youth age 13-17 were 2 times more likely to wear a PFD than adults.

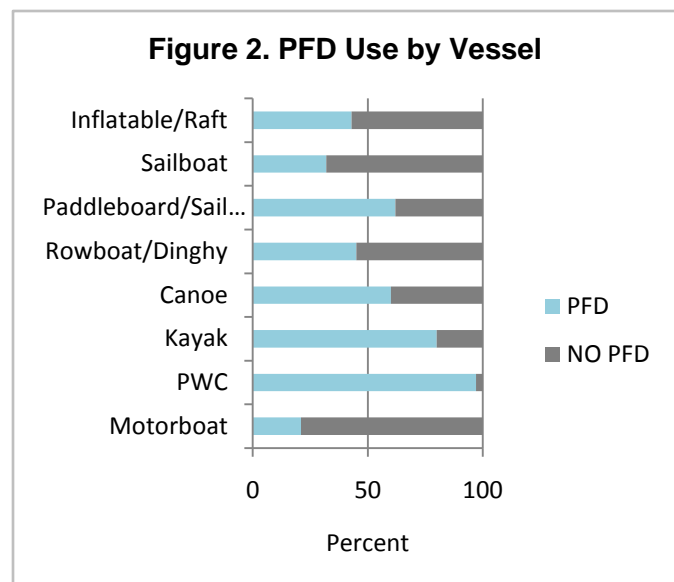


Gender (Appendix E): PFD use did not differ by male and female occupants. 28% of males and 34% of females wore PFDs. The percent of males and females wearing PFDs were similar to the overall PFD use (30%). PFD use did not differ greatly between males and females by age group.

PFD Use by Boat Characteristics

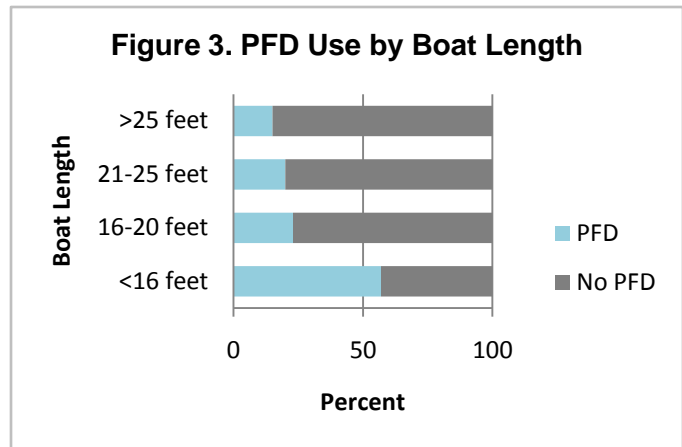
Boat Type (Figure 2, Appendix F): PFD use was highest among PWC and kayak occupants. 97% of PWC and 80% of kayak occupants wore PFDs. About 60% of canoe and paddle board/sailboard occupants wore PFDs. PFD use was lower among sailboat, rowboat/dinghy, and inflatable/rafts (32% sailboat, 45% rowboat/dinghy, and 43% inflatable/raft). PFD use was lowest among motor boat occupants.

Compared to motor boat occupants, PWC and kayak occupants were 5 times more likely to wear PFDs. Sailboat, paddleboard/sailboard, rowboats/dinghy, and canoe occupants were 2-3 times more likely to wear PFDs than motorboat occupants.

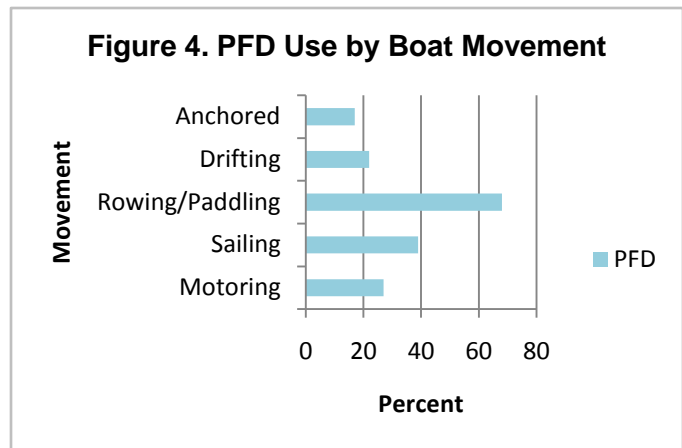


PFD Use by Boat Length (Figure 3, Appendix F): Boats <16 feet had the highest rate of PFD use (57%). Occupants in boats >16 feet were least likely to wear PFDs: 23% 16-20 feet, 20% 21-25 feet, and 15% >25 feet.

Occupants in boats <16 feet were 2 times more likely to wear a PFD and occupants in boats 16-20 feet were almost 2 times more likely to wear PFDs than those in vessels >25 feet. Those in boats 21-25 feet were 1.5 times more likely to wear PFDs than those in boats >25 feet.

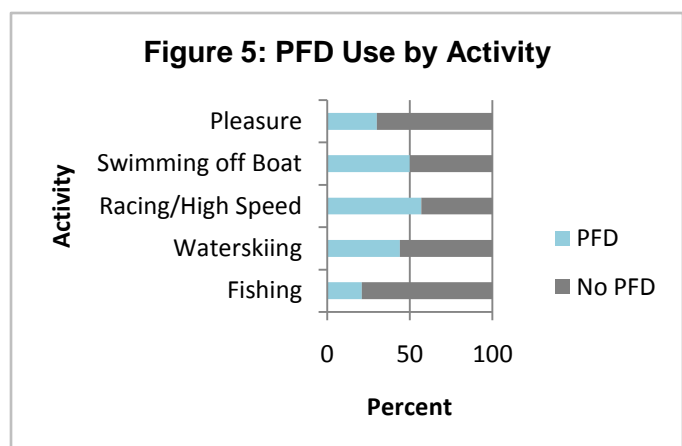


PFD Use by Boat Movement (Figure 4, Appendix F): Occupants who were rowing or paddling were most likely to wear PFDs. 68% of occupants who rowed or paddled wore PFDs. Less than half of sailing occupants wore PFDs (39%). PFD use further decreased with other boating movement. 27% of occupants who were motoring wore PFDs and 22% of occupants who were drifting wore PFDs. Occupants who were anchored were least likely to wear a PFD (17%).



PFD Use by Activity (Figure 5, Appendix F): PFD use was highest among occupants who were racing or boating at a high speed. 57% of occupants who were racing or boating at high speeds wore PFDs. PFD use was lower with other activities. 50% of occupants who were swimming off the boat, 44% who were waterskiing, and 30% who were boating for pleasure wore PFDs. Occupants who were fishing or whose intent was to fish were least likely to wear PFD (21%).

Occupants who were racing were almost 3 times more likely to wear a PFD than occupants who were fishing.



PFD Use by Water and Weather Conditions

Water Current, Water Conditions, and Water Temperature (Table 1, Appendix G): PFD use was similar for weak/none, moderate, and strong currents. PFD use was highest when the water was choppy (38%). PFD use was highest when water temperature was 80-89°F (45%).

Weather (Table 1, Appendix G): PFD use was lowest when it was raining. 8% of people wore PFDs when it was raining compared to 33% when sunny, 29% when partly cloudy, and 33% when cloudy. PFD use by weather may be confounded by activity; people may have participated in activities such as water skiing when there was no rain.

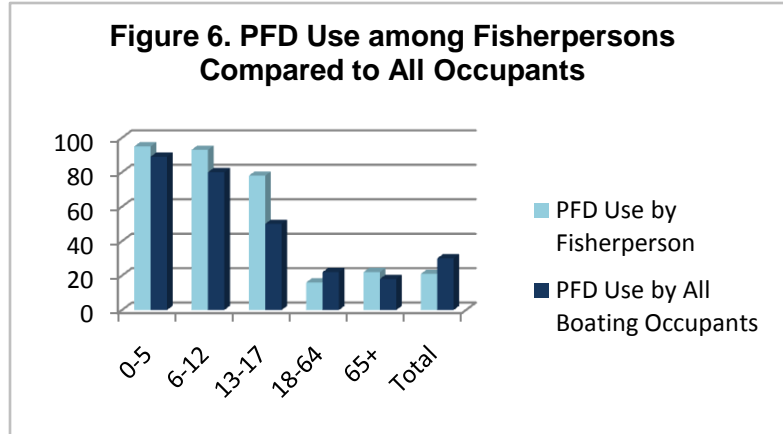
Visibility and Air Temperature (Table 1, Appendix G): Occupants were no more likely to wear PFDs when visibility was fair compared to when visibility was good after adjustment for age and boat type. PFD use did not differ for occupants boating at air temperatures $\geq 60^{\circ}$ F compared to those boating in < 60 degrees after adjustment for age and boat type.

Table 1. PFD Use by Water and Weather Conditions						
		PFD		No PFD		Total
		%	n	%	n	
Water Current	Strong	33	114	67	233	347
	Moderate	27	618	73	1,658	2,276
	Weak/None	33	829	67	1,648	2,477
	Total	31	1,561	69	3,539	5,100
Water Conditions	No waves	29	657	71	1,619	2,276
	Calm	31	748	69	1,664	2,412
	Choppy	38	180	61	289	469
	Total	31	1,585	69	3,572	5,157
Water Temperature (°F)	50-59	27	245	73	678	923
	60-69	31	859	69	1,932	2,791
	70-79	31	390	69	851	1,241
	80-89	45	91	55	111	202
	Total	31	1,585	69	3,572	5,157
Weather	Sunny	33	765	67	1,575	2,340
	Partly Cloudy	29	591	71	1,428	2,019
	Cloudy	33	219	67	451	670
	Raining	8	10	92	118	128
	Total	31	1,585	69	3,572	5,157
Visibility	Good	30	1,544	70	3,524	5,068
	Fair	46	41	54	48	89
	Poor	0	0	0	0	0
	Total	31	1585	69	3572	5157
Air Temperature (°F)	50-59	14	25	86	160	185
	60-69	30	453	70	1,051	1,504
	70-79	32	730	68	1,566	2,296
	80-89	32	375	68	793	1,168
	Total	31	1,583	69	3,570	5,153

PFD Use by Special Groups

Fisherpersons (Figure 5,

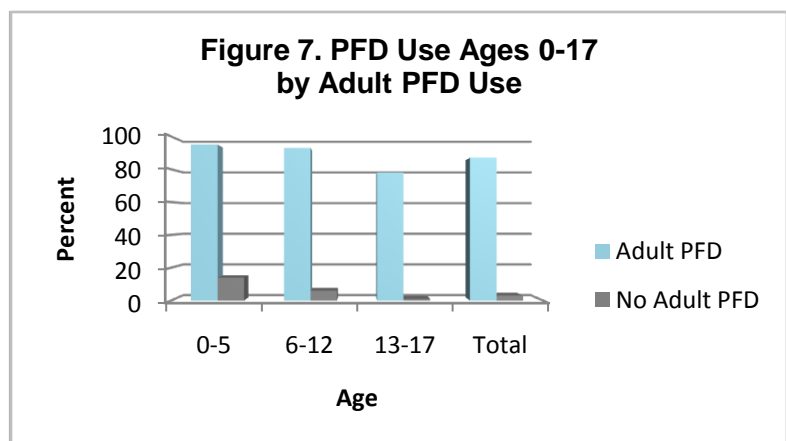
Appendix H): Fisherpersons were defined as people whose boating activity was fishing or intending to fish. Occupants who were characterized as fisherpersons were least likely to wear a PFD compared to occupants engaged in other boating activities. Of the 896 fisherpersons only 21% used a PFD. PFD use among fisherpersons was lower than PFD use of all occupants.



Children and youth age 0-17 who were fishing were more likely to wear PFDs than all children. 95% of children age 0-5 wore a PFD compared to 89% of all children of the same age. 93% of children age 6-12 who were fishing wore a PFD compared to 80% of all children of the same age. 78% of youth age 13-17 who were fishing wore a PFD compared to 50% of all youth of the same age. Adults age 18-64, however, were less likely to wear PFDs while fishing than all other adults. 22% of adult fisherpersons age 18-64 wore PFDs compared to 30% of all adults age 18-64.

Children and Youth (Figure 6,

Appendix H): Children and youth had the highest PFD use: 89% age 0-5, 80% age 6-12, and 50% age 13-17. PFD use, however, differed depending on whether an adult in the boat wore a PFD. Of the children and youth who wore PFDs, 87% wore a PFD when an adult wore a PFD. When an adult did not wear a PFD, only 3% of children and youth wore a PFD. For 0-5 year olds, 95% wore a PFD when an adult wore a PFD compared to 14% when an adult was not wearing a PFD. For 6-12 year olds, 93% wore a PFD when an adult wore a PFD compared to 6% when an adult was not wearing a PFD. For 13-17 year olds, 78% of youth wore a PFD when an adult wore a PFD compared to 1% when an adult did not wear a PFD.



In addition, PFD use among children 12 and under was high in boats <20 feet. 86% of children 12 and under wore a PFD in boats <20 feet.

Water Skiers and PWC Occupants (Appendix I): PFD use was high among water skiers and PWC users. 94% of water skiers and 97% of PWC users wore PFDs. Water skiers were almost 3 times more likely to wear a PFD than non-water skiers.

Inflatable PFD Users (Appendix I): 6% of all PFD users wore an inflatable PFD. Inflatable PFD use did not vary greatly by age, gender, and boat type. Sailboat occupants and motor boat occupants used inflatable PFDs more than occupants of other boat types. 13% of sailboat occupants and 9% of motor boat occupants wore inflatable PFDs. Water skiers did not use inflatable PFDs.

PFD Use by Inner Tube Occupants (not mandatory) (Appendix I): PFD use among inner tube occupants was low. 9% of inner tube occupants wore PFDs.

Changes in PFD Use over Time

Changes in PFD Use over Time (Appendix J): In 2010 several changes were made in how age groups and boat length were categorized. Furthermore, in 2010 boats of all lengths were observed while prior observations only observed vessels <19 feet. These changes were made so that present and future observations could be compared with national USCG observations. However, these changes make it difficult to compare 2010 PFD use with prior observations in Washington State.

Overall PFD use in boats under 21 feet in 2010 was significantly higher than that of boats under 19 feet in 2000 (p<.0001), increasing from 29% to 35%.

Table 2. PFD Use Over Time by EMS Region								
EMS Region	1995*		1997*		2000*		2010**	
	%	n	%	n	%	n	%	n
Central	28%	(359 of 1299)	55%	(501 of 905)	45%	(885 of 1959)	31%	(237 of 763)
North Central	17%	(109 of 640)	30%	(47 of 157)	18%	(304 of 1673)	33%	(249 of 760)
East	22%	(51 of 230)	23%	(191 of 837)	20%	(143 of 715)	40%	(36 of 90)
West	29%	(164 of 558)	40%	(125 of 316)	28%	(255 of 925)	32%	(329 of 1033)
South Central (TriCities, Yakima)	18%	(40 of 215)						
Tri Cities			34%	(276 of 815)	25%	(234 of 933)	28%	(324 of 1173)
Yakima			16%	(48 of 307)	33%	(146 of 440)	33%	(28 of 86)
Southwest			26%	(188 of 718)	22%	(170 of 773)	28%	(49 of 176)
Northwest	36%	(119 of 334)	38%	(93 of 243)	28%	(98 of 344)	31%	(91 of 294)
North							28%	(187 of 676)
All Regions Observed						(2235 of 7762)		
Boats <19 feet	26%	(842 of 3276)	34%	(1469 of 4298)	29%			
Boats <21 feet							35%	(1318 of 3770)
All boat lengths							30%	(1530 of 5051)

*Yes PFD, <19 feet

**Yes PFD, all lengths

Summary of PFD Use in Washington State

The following is a summary of observations of the Washington State 2010 PFD Observations:

Children 12 and under had the highest rate of PFD use while adults had the lowest rate of PFD use. 89% of children age 0-5 and 80% of children age 6-12 were observed wearing PFDs. PFD use decreased to 50% among age 13-17. PFD use decreased again for people age 18 and over. 22% of people age 18-64 wore PFDs and 18% of people age 65 and over wore PFDs. Compared to adults, children age 12 and under were 4 times more likely to wear PFDs than adults and youth age 13-17 were 2 times more likely to wear PFDs than adults.

PWC and kayak occupants had the highest rate of PFD use while motor boat occupants had the lowest rate of PFD use. 97% of PWC and 80% of kayak occupants wore PFDs while 21% of motor boat occupants wore PFDs. PWC occupants were 5 times more likely to wear a PFD than motor boat occupants and kayak occupants were almost 5 times more likely to wear a PFD than motor boat occupants.

PFD use was low among people who were swimming off their boats. 50% of boaters who were swimming off their boats wore a PFD. Non-PFD use while swimming off a boat presents a risk. The majority of fatal drowning occur while swimming in lakes or rivers. The depth of water, water temperature, distance from shore, and difficulties climbing back into a boat can put a boater at risk for drowning if they tire or the boat moves locations.

Children and youth fisherpersons had the highest rate of PFD use while adult fisherpersons had the lowest rate of PFD use compared to all children, youth, and adults. Children and youth age 0-17 were more likely to wear PFDs than all children. 93% of children age 6-12 who were fishing wore a PFD compared to 80% of all children the same age. 78% of youth age 13-17 who were fishing wore a PFD compared to 50% of all youth. 22% of adults age 18-64 who were fishing or intending to fish wore a PFD compared to 30% of all adults age 18-64. Results may not be representative of fisherpersons because observations were conducted during a low fishing activity period.

Children and youth were more likely to wear a PFD if any adult in the boat was wearing a PFD. 95% of children less than 6 years old wore a PFD if an adult wore a PFD compared to 89% for all children less than 6 years. 93% of 6-12 year olds wore PFDs if an adult wore a PFD compared to 80% for all children 6-12 years old. 78% of 13-17 year olds wore a PFD if an adult was wearing a PFD compared to 50% for all youth.

PFD use was highest in groups that are legally mandated to wear PFDs. Water skiers, PWC users, and children <13 years old in boats under 19 feet are all required to wear PFDs by law. PFD use by water skiers was 93%, by PWC users 97%, and by children <13 years 82%. This suggests that PFD mandates work.

Several non-mandated boats, such as paddlers, had higher PFD use than other boats. More kayakers than canoers were observed wearing PFDs, a finding consistent with national studies.

Emerging water sports users represent a potential high risk group. Less than two thirds of paddle boarders were wearing PFDs. They were small in numbers but may be a group at risk as this sport gains in popularity.

Of the water conditions evaluated, PFD use was only higher in choppy water. Boaters may perceive waves as a higher risk for capsizing. The significantly lower use of PFDs during rainy weather suggests confounding factors exist. These results may reflect the activity and type of boaters who continued to boat in those conditions.

Inflatable PFD use was low. Inflatable PFDs represented 6% of all life jackets worn. Men age 18-64 had the highest use of inflatable PFDs. Men were 2 times more likely to wear inflatable PFDs than women. Men may be early adopters in wearing inflatable PFDs. Cost may be a large factor in inflatable ownership. The greater use by those on sailboats suggests that the sailing community has done more to promote the use of inflatables.

Youth PFD use and PFD use in smaller boats increased between 2000 and 2010. However, the age groups observed differed between 2000 and this observation period. The increase in PFD use may be due to several factors: a) youth and their families may have been influenced by the PFD law that has required preteen PFD use over the past decade; b) teens and their families may have grown up familiar and comfortable with and therefore familiar with PFD use; c) changes in PFD design may have made PFDs more attractive; d) efforts to increase statewide visibility and availability of PFDs through PFD loaner programs, manufacturer marketing; and e) continued efforts to increase parental awareness. Overall PFD use in smaller boats increased between 2000 and 2010 from 29 to 35%.

Recommendations for Increasing PFD Use in Washington State

Based on the 2010 PFD observation study results boating organizations and advocates may want to consider the following recommendations:

- ✓ **Improve enforcement of existing PFD mandate among 0-12 year olds.** PFD use in WA State was mandated in 1998 for children less than 13 years of age in boats under 19 feet in length. Although children less than 13 have high rates of PFD use, they had lower PFD use than PWC users and water skiers who are also mandated to wear PFDs. Greater enforcement of the existing mandate may increase PFD use among children age 0-12 as greater enforcement led to higher seatbelt use in Washington State.
- ✓ **Increase the PFD mandate to age 17.** The rate of PFD use decreased from 80% for age 6-12 to 50% for age 13-17. However, youth are at risk of drowning. From 2000-2009, all but one youth who drowned in boating accidents were not wearing PFDs. Education and social media about PFDs are important components of policy change.
- ✓ **Require PFDs for all boats under 18 feet and all paddle craft.** PFD use was between 23-57% for boats 18 feet and under, which is a concern. Most drownings occur in boats under 18 feet and in paddle craft. This is a nationally recognized problem. The National Boating Safety Advisory Council recommends that the US Coast Guard consider requiring PFD use while underway or riding in or upon PWC regardless of length, human powered vessels (e.g. canoes, kayaks, rowboats) regardless of length, any vessel < 18 feet, and any person towed while engaged in watersports. Washington State has an opportunity to educate policymakers, boaters and others in this proposed legislation and to pursue state requirements.

- ✓ **Encourage boaters to wear PFDs when they swim off the boat.** Swimming off a boat poses a risk due to distance from shore, water temperature, fatigue, and difficulty getting back into the boat. Their risk increases when they do not wear PFDs.
- ✓ **Advocate for PFD use among fisherpersons.** Fisherpersons have the lowest rate of PFD use. Show fisherpersons and motor boaters wearing PFDs at fishing shows, and boating shows and in publications, television, and other media outlets.
- ✓ **Encourage adults to wear PFDs when children and youth are in boats – “Protect the ones you love.”** There were great differences in PFD use between children and youth when at least one adult in a boat wore a PFD compared to when no adult wore a PFD in a boat. Role modeling is critical to child and youth PFD use. PFD use among age 13-17 was high when an adult wore a PFD compared to all youth age 13-17: 78% v 50%. These findings are consistent with adult bike helmet and seatbelt role modeling. Adult use of bike helmets and seatbelts have been shown to significantly increase use among children and youth. Including role modeling messages in PFD education and marketing will help promote increased PFD use. A policy requiring PFD use by adults when children and youth are in the boat would contribute to the safety of all boat occupants.
- ✓ **Advocate for PFD use in all water conditions.** PFD use was highest when the water was choppy. People may perceive a greater risk of drowning in choppy water. However, there is still a risk of drowning when the water is calm. Washington State waters are cold even in the summer when water may be calmer. Promotion of PFD use in all water conditions, especially calm water, may increase people’s awareness of their risk and improve PFD use.
- ✓ **Increase promotion of and education about Inflatable PFDs.** More promotion of and education about inflatable PFDs are needed to increase their use. Helping boaters find less expensive inflatable options is important. Fisherpersons and people in small motor boats who have low rates of PFD use may benefit from the promotion of inflatable PFDs. Inflatable PFDs can be promoted as a comfortable, easy-to-use option.
- ✓ **Conduct PFD observations and focus groups with fisherpersons and hunters.** A PFD observation of fishers and hunters can be conducted during high fishing season – Fall and early Spring – which may provide more information on PFD use among this group. Focus groups and surveys of fisherpersons and motor boaters would also be helpful in understanding PFD use differences and how to motivate fisherpersons to use PFDs.
- ✓ **Conduct focus groups and surveys with kayakers and canoeists to understand the differences in PFD use.** In national studies of kayakers and canoeists, kayakers have higher PFD rates and canoeists have higher drowning rates. These drowning rates may reflect differences in water experience and skills, however, more information is needed. Information gathered from focus group may help explain the differences in PFD use. This information can be used to develop strategies to increase PFD use among canoeists.
- ✓ **Continue surveillance for emerging water sport users.** PFD use was low among paddle boarders. This group may potentially be an at risk group.

Appendix A. WA PFD Observation Study Variables Compared to JSI Variables

Table 3. WA State PFD Observation Study Variables Compared to JSI Variables		
	WA State 2010 Observation	JSI
Observer name	Observer name	Observer name
Site name	Site name	Site name
Location	City (Prefill)	City (Prefill)
	Water site (Prefill)	Water Site Prefill
	County	
Date	Date	Date
Day of the week	Fri, Sat, Sun, Mon	Sat, Sun
Start time	Start time	Start time
End time	End time	End time
Time increment	90 minutes	90 minutes
Type of body of water	Bay/Inlet or sound	Bay/Inlet or sound
	River	Intercoastal waterway
	Lake or reservoir	River, stream, creek, or canal
	Harbor	Lake, pond, reservoir, Great Lake
		Harbor
Air temp	Fill in boxes	Fill in boxes
Water temp Fahrenheit	Fill in boxes	Fill in boxes
Water conditions	No Waves	Calm (less than 6")
	Calm (less than 6")	Choppy (6" to 2')
	Choppy (6" to 2')	Rough (over 2")
	Rough (over 2')	
Current	Strong	Strong
	Moderate	Moderate
	Weak/none	Weak/none
Visibility	Good	Good
	Fair	Fair
	Poor	Poor
Weather conditions	Sunny	Sunny
	Partly cloudy	Partly cloudy

	Cloudy	Cloudy
	Raining	Raining
	Stormy	Stormy
Powerboat	Open Motor boat	Skiff/utility
	Cabin Motor boat	Cabin Cruiser
	PWC	PWC
		Pontoon
		Runabout/speedboat
Paddle	Kayak	Kayak
	Canoe	Canoe
	Rowboat/dinghy	Rowboat/dinghy
	Paddleboard	
Sailboat	Sailboard	Sailboard
	Sailboat	Day sailor
		Cabin sailboat
Other	Inflatable/Raft	Inflatable/Raft
	Paddleboat	Houseboat
	Inner tubes	Other
	Other	
Propulsion	(category was not included)	Outboard
		Inboard
		Paddles/oars
		Air fan
		Other
		Sail only
		Sail and motor
Boat Size	Under 16 ft	Under 16 ft
	16-20 ft	16-20 ft
	21-25 ft	21-25 ft
	Over 25 ft	Over 25 ft
Movement/Operation	Motoring	Motoring
	Sailing	Sailing
	Rowing/Paddling	Rowing/paddling
	Drifting	Drifting
	Anchored	Anchored
Activity	Fishing	Fishing
	Intent to fish	Intent to fish
	Water skiing	Water skiing
	White water	White water
	Racing/high speed	Racing/high speed

	Swimming	Swimming
	Pleasure	Pleasure
	Other	Other
Gender	Female	Female
	Male	Male
	Unable to determine	Unable to determine
Age (years)	0-5	0-5
	6-12	6-12
	13-17	13-17
	18-64	18-64
	65+	65+
PFD	Yes, inflatable style	Yes
	Yes, traditional style	No
	No	New-inflatable style
	Unk (unknown)	Old-traditional style
Waterskier	Yes	Yes
	No	

- Water skiers were considered boat occupants per the JSI protocol and state law.
- Boat occupants whose activity was labeled as intent to fish and actively fishing were combined.
- Pontoon, inflatable with motors, open and cabin motor boats were combined with motorboats.
- Sailboard/paddleboard/were combined.
- Occupants of inner tubes were analyzed separately because inner tubes are not uniformly regulated as vessels.

Appendix B. Organizations Providing Observers

Table 4: Observer Affiliated Organizations
Beach Watchers
Western Washington University
Community Health Clinics
General Community
Dive Rescue
Elks Lodge
Explorer Scouts
Safe Kayaking Initiative
Safe Kids Coalition
Seattle Children's Hospital
Sheriff Marine Patrol
USCG Auxiliary
US Power Squadrons
Washington State Parks Boating Safety Advisory Council
911 Education

Appendix C: Recommendations for Future Observational Studies

Overall:

- Over the last ten years, JSI has conducted observations in the Central EMS region of Washington. We did not have sufficient information to compare this with earlier observations or with the 2010 observations. Recommend contracting with JSI to conduct the next set of observations and to scan and analyze the data. This will help in comparing state data with other state and national data that JSI is collecting.

Training:

- Hold training outside of business hours so that observers are not put in a position of choosing to spend time on non work activities at work (especially important for government employees)
- Conduct training as a webinar. This should minimize participant distractions by cell phones, etc we encountered.

Sites:

- Consider changing sites that had fewer than 60 observations:
 - Potholes- Grant County
 - Loon Lake- Stevens County
 - Bumping Lake- Yakima County
 - Swallows Park, Snake River- Asotin County
 - Lake Whatcom, Whatcom County
 - Quileute River, Clallum County
 - Alder Lake, Pierce County
 - Salisbury Point, Kitsap County
- Other: The volunteer at Columbia River Park West Boat Launch suggested observing at Columbia River-Columbia Point next time as that site has more boater traffic.

Observation Times:

- Consider limiting the observation time to 2:00 pm -6:00 pm to increase observations during higher boater volume times.

Location:

- Some observers commented that observation from a boat instead of on the shore may be helpful in increasing the ability to observe a greater number of boats. However, this is not the protocol that JSI uses. We chose to adhere to the JSI methodology so that Washington State data can be compared to data from other states collected by JSI.

Scanning:

- There were delays in scanning the forms because the scanning machine used was an older program and required an older version of windows.
 - The pencil marks were not picked up by the machine and all forms had to be marked with a sharpie.
 - Observers could mark forms with a Sharpie when observing
 - In the future recommend contracting with JSI for data scanning or identify a local company that could do cost effective data entry.

Appendix D: Number of Occupants by Observation Sites

Table 5. Number of Occupants by Observation Site (excluding inner tubes)		
Observation Site	County	Occupants
Swallows Park Boat Launch, Snake River	Asotin	47
Columbia Park West Ramp, Columbia River	Benton	623
Lake Chelan County Park	Chelan	266
Quileyute River, LaPush at mouth of river	Clallam	14
Vancouver Boat Launch, Columbia River	Clark	101
Lake Merwin	Cowlitz	89
Crescent Bar Launch, Columbia River	Grant	124
Moses Lake	Grant	125
O'Sullivan/Potholes Reservoir	Grant	57
Park Lake	Grant	229
Cornet Bay on Whidbey Island, Puget Sound	Island	195
Coulon Park, Lake Washington	King	239
Lake Sammamish	King	152
University of Washington Waterfront Activities Center, Lake Washington	King	397
Kitsap Lake	Kitsap	72
Long Lake	Kitsap	61
Brownsville Marina, Puget Sound	Kitsap	116
Salisbury Point, Puget Sound	Kitsap	43
Mayfield Lake	Lewis	259
Alder Lake	Pierce	57
Lake Tapps	Pierce	216
Pt. Defiance Marina, Puget Sound	Pierce	131
10th St Everett, Puget Sound	Snohomish	252
Loon Lake	Stevens	45
Black Lake	Thurston	142
Boston Harbor Launch, Puget Sound	Thurston	237
Luhr Beach Launch Site, Nisqually River	Thurston	112
Hood Park, Snake River	Walla Walla	605
Larrabee State Park, Bellingham Bay	Whatcom	68
Fairhaven Boat Launch, Bellingham Bay	Whatcom	124
Lake Whatcom	Whatcom	55
Bumping Lake	Yakima	20
Yakima Canyon, Yakima River	Yakima	33
Total		5,306

Appendix E. Occupant Characteristic Data Tables

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	89	89	11	11	100
6-12	80	340	20	85	425
13-17	50	221	50	225	446
18-64	22	854	78	3,065	3,919
65+	18	23	82	103	126
Total	30	1,527	70	3,489	5,016

Age	Prevalence Ratio	Confidence Intervals (95%)
0-5	4.6	3.0, 7.2
6-12	4.1	2.7, 6.3
13-17	2.0	1.3, 3.0
18-64	1.0	0.6, 1.4

Gender	PFD		No PFD		Total
	%	n	%	n	
Male	28	899	72	2,324	3,223
Female	34	618	66	1,209	1,827
Total	30	1,517	70	3,553	5,040

Gender	Prevalence Ratio	Confidence Intervals (95%)
Female	1.1	1.0, 1.1

	Age	PFD		No PFD		Total
		%	n	%	n	
Male	0-5	85	39	15	7	46
	6-12	82	152	18	34	186
	13-17	45	102	55	123	225
	18-64	22	569	78	2043	2612
	65+	18	17	82	78	95
	Total	28	879	72	2,285	3164
Female	0-5	91	40	9	4	44
	6-12	75	161	15	43	214
	13-17	55	116	45	96	212
	18-64	21	275	79	1012	1287
	65+	19	6	81	25	31
Total	34	598	66	1180	1778	

Appendix F. Boat Characteristic Data Tables

Table 11. PFD Use by Boat Characteristic						
		PFD		No PFD		Total
		%	n	%	n	
Boat Type	Motor Boat	21	877	79	3,283	4,160
	PWC	97	333	3	11	344
	Kayak	80	166	20	42	208
	Canoe	60	88	40	59	147
	Rowboat/Dinghy	45	23	55	28	51
	Paddleboard/Sailboard	62	31	38	19	50
	Sailboat	32	39	68	84	123
	Inflatable/Raft	43	26	57	34	60
	Total	31	1,583	69	3,560	5,143
Boat Length	< 16 feet	57	762	43	580	1,342
	16-20 feet	23	556	77	1,872	2,428
	21-25 feet	20	194	80	791	985
	>25 feet	15	58	85	319	377
	Total	31	1,570	69	3,562	5,132
Boat Movement	Motoring	27	1,157	73	3,083	4,240
	Sailing	39	29	61	45	74
	Rowing/Paddling	68	314	32	151	465
	Drifting	22	57	78	205	262
	Anchored	17	10	83	48	58
	Total	31	1,567	69	3,532	5,099

Table 12. PFD Use in Non-Motor Boats Compared to Motor Boats		
Boat Type	Prevalence Ratio	Confidence Intervals (95%)
PWC	5.0	4.5, 5.6
Kayak	4.9	4.2, 5.6
Canoe	2.8	2.3, 3.4
Rowboat /dinghy	2.4	1.7, 3.4
Paddleboard/Sailboard	2.8	2.0, 3.9
Sailboat	2.0	1.4, 2.8
Inflatable/Raft	1.8	1.3, 2.7

Table 13. PFD Use in Boats <25 feet Compared to Boats >25 feet		
Boat Size	Prevalence Ratio	Confidence Intervals (95%)
< 16 feet	2.2	1.5, 3.3
16-20 feet	1.7	1.1, 2.4
21-25 feet	1.5	1.0, 2.2

Table 14. PFD Use in Moving Boats Compared to Anchored Boats

Boat Movement	Prevalence Ratio	Confidence Intervals (95%)
Motoring	0.9	0.4, 2.0
Sailing	1.6	0.5, 4.9
Rowing/paddling	1.3	0.5, 3.4
Drifting	0.9	0.4, 2.0

Table 15. PFD Use by Activity

Activity	PFD		No PFD		Total
	%	n	%	n	
Fishing/Intent to Fish	21	191	79	710	901
Waterskiing	44	214	56	269	483
Racing/High Speed	57	111	43	84	195
Swimming off of boat	50	8	50	8	16
Pleasure	30	1,038	70	2,440	3,478
Other Activity	73	16	27	6	22
Total	69	3,527	31	1,568	5,095

Table 16. PFD Use in Non-Fishing Activities Compared to Fishing

Activity	Prevalence Ratio	Confidence Intervals (95%)
Water skiing	2.1	1.7, 2.6
Racing	2.7	2.1, 3.5
Swimming off of boat	2.4	0.9, 6.3
Pleasure	1.4	1.2, 1.7
Other	1.3	0.4, 3.8

Appendix G: Water and Weather Conditions Data Tables

Table 17. PFD Use in Other Currents Compared to Strong Currents		
Water Current	Prevalence Ratio	Confidence Intervals (95%)
Moderate	0.9	0.8, 1.1
Weak	1.0	0.8, 1.2

Table 18. PFD Use in Other Water Conditions Compared to No Waves		
Water Conditions	Prevalence Ratio	Confidence Intervals (95%)
Calm	1.1	1.0, 1.2
Choppy	1.4	1.2, 1.6

Table 19. PFD Use in Water Temp >60°F Compared to Water Temp <60°F		
Water Temp °F	Prevalence Ratio	Confidence Intervals (95%)
60-69	1.0	0.9, 1.2
70-79	1.0	0.8, 1.2
80-89	1.7	1.3, 2.2

Table 20. PFD Use when Raining Compared to Other Weather		
Weather	Prevalence Ratio	Confidence Intervals (95%)
Sunny	2.7	1.6, 4.5
Partly cloudy	2.6	1.5, 4.4
Cloudy	2.5	1.5, 4.3

Table 21. PFD Use when Fair Visibility Compared to Good Visibility		
Visibility	Prevalence Ratio	Confidence Intervals (95%)
Fair	1.2	0.9, 1.5

Table 22. PFD Use in Air Temp >60°F Compared to Air Temp <60°F		
Air Temp °F	Prevalence Ratio	Confidence Intervals (95%)
60-69	1.6	1.0, 2.6
70-79	1.5	0.9, 2.5
80-92	1.6	1.0, 2.6

Table 23. PFD Use by Day of Week					
Day of Week	PFD		No PFD		Total
	%	n	%	n	
Friday	29	349	71	849	1,198
Saturday	34	593	66	1,136	1,729
Sunday	30	530	70	1,212	1,742
Monday (Labor day)	23	113	77	375	488
Total	31	1,585	69	3,572	5,157

Table 24. PFD Use on Fridays Compared to Other Days of the Week		
Day of week	Prevalence Ratio	Confidence Intervals (95%)
Saturday	1.1	1.0, 1.3
Sunday	1.0	0.9, 1.1
Monday	0.9	0.8, 1.1

Appendix H: Special Groups Data Tables

Table 25. PFD Use among Fisherpersons by Gender

Gender	PFD		No PFD		Total
	%	n	%	n	
Male	21	155	79	587	742
Female	22	34	78	120	154
Total	21	188	79	708	896

Table 26. PFD Use among Fisherpersons by Age

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	95	88	9	1	11
6-12	93	330	15	6	39
13-17	78	215	62	28	45
18-64	16	121	84	640	761
65+	22	8	78	28	36
Total	21	189	79	703	892

Table 27. Child PFD Use When At Least One Adult Wore PFD

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	95	88	5	5	93
6-12	93	330	7	25	355
13-17	78	215	22	62	277
Total	87	633	13	92	725

Table 28. Child PFD Use by Age and No Adult PFD Use

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	14	1	86	6	7
6-12	6	4	94	60	64
13-17	1	2	99	163	165
Total	3	7	97	229	236

Table 29. PFD Use among Children 12 and Under in Boats <20 feet

Child Age 12 and Under	PFD		No PFD		Total
	%	n	%	n	
	86	327	14	52	379

	PFD		No PFD		Total
	%	n	%	n	
Water skier	94	125	6	8	133
PWC	97	323	3	11	334
Total	96	448	4	19	467

	Prevalence Ratio	Confidence Intervals (95%)
Water skier	2.8	2.3, 3.3

		Inflatable		Non-Inflatable		Total
		%	n	%	n	
Age	0-5	8	1	99	88	89
	6-12	2	7	98	334	341
	13-17	3	6	97	215	221
	18-64	8	71	92	785	856
	65+	2	2	98	21	23
	Total	6	87	94	1443	1534
Gender	Male	8	71	92	830	901
	Female	3	17	97	602	619
	Total	6	88	94	1432	1520
Boat Type	Motor Boat	9	76	91	807	883
	PWC	1	4	99	329	333
	Kayak	3	6	97	160	166
	Canoe	1	1	99	87	88
	Rowboat/Dinghy	0	0	100	23	23
	Paddleboard/Sailboard	6	2	94	29	31
	Sailboat	13	5	87	34	39
	Inflatable/Raft	4	1	96	25	26
Total	6	89	94	1,49	1583	

	PFD		No PFD		Total
	%	n	%	n	
Inner Tubes	9	3	91	32	35

	Inflatable		Non-Inflatable		Total
	%	n	%	n	
Water skiers	0	0		125	125

Appendix I: County PFD Use by Age, Gender, and Boat Type

	PFD		No PFD		
Age	%	n	%	n	Total
0-5					
6-12	100	3	0	0	3
13-17	100	4	0	0	4
18-64	24	9	76	29	38
65+	0	0	100	1	1
Total	35	16	65	30	46
Gender	%	n	%	n	Total
Male	31	8	69	18	26
Female	35	6	65	11	17
Total	33	14	67	29	43
Boat Type	%	n	%	n	Total
Motor Boat	32	14	68	30	44
PWC	100	2	0	0	2
Kayak					
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	35	16	65	30	46

	PFD		No PFD		
Age	%	n	%	n	Total
0-5	89	24	11	3	27
6-12	96	51	4	2	53
13-17	45	17	55	21	38
18-64	10	45	90	413	458
65+	18	2	82	9	11
Total	24	139	76	448	587
Gender	%	n	%	n	Total
Male	22	80	78	287	369
Female	26	61	74	175	236
Total	23	141	77	462	603
Boat Type	%	n	%	n	Total
Motor Boat	19	109	80	453	562
PWC	100	24	0	0	562
Kayak	47	8	53	9	100
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	23	141	77	462	603

Table 37. Chelan County PFD Use					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5					
6-12	55	16	45	13	29
13-17	14	2	86	12	14
18-64	31	64	69	144	208
65+					
Total	33	82	67	169	251
Gender	%	n	%	n	Total
Male	35	58	65	106	164
Female	31	31	69	68	99
Total	34	89	66	174	263
Boat Type	%	n	%	n	Total
Motor Boat	16	33	84	175	208
PWC	100	44	0	0	44
Kayak	100	2	0	0	2
Canoe	100	4	0	0	4
Rowboat/Dinghy	100	2	0	0	2
Paddleboard/Sailboard	100	2	0	0	2
Sailboat	100	2	0	0	2
Inflatable/Raft					
Total	34	89	66	175	264

Table 38. Clallum County PFD Use					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5					
6-12					
13-17					
18-64	36	4	64	7	11
65+	0	0	100	1	1
Total	33	4	67	8	12
Gender	%	n	%	n	Total
Male	36	4	64	7	11
Female	0	0	100	1	1
Total	33	4	67	8	12
Boat Type	%	n	%	n	Total
Motor Boat	33	4	67	8	12
PWC					
Kayak					
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	33	4	67	8	12

Table 39. Clark County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5					
6-12	100	4	0	0	4
13-17	13	1	88	7	8
18-64	7	5	93	71	76
65+	20	1	80	4	5
Total	12	11	88	82	93
Gender	%	n	%	n	Total
Male	12	8	88	61	69
Female	3	12	88	22	25
Total	21	20	79	83	94
Boat Type	%	n	%	n	Total
Motor Boat	8	7	92	80	87
PWC	100	4	0	0	4
Kayak					
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat	0	0	100	6	6
Inflatable/Raft					
Total	11	11	89	86	97

Table 40. Cowlitz County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	1	0	0	1
6-12	100	4	0	0	4
13-17	80	12	20	3	15
18-64	32	19	68	40	59
65+	50	2	50	2	4
Total	46	38	54	45	83
Gender	%	n	%	n	Total
Male	38	15	62	24	39
Female	52	23	48	21	44
Total	46	38	54	45	83
Boat Type	%	n	%	n	Total
Motor Boat	40	30	60	45	75
PWC					
Kayak	100	6	0	0	6
Canoe					
Rowboat/Dinghy	100	2	0	0	2
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	46	38	54	45	83

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	80	8	20	2	10
6-12	77	27	23	8	35
13-17	48	38	53	42	80
18-64	26	94	74	274	368
65+	0	0	100	9	9
Total	33	167	67	335	502
Gender	%	n	%	n	Total
Male	29	85	71	208	293
Female	37	77	63	131	208
Total	32	162	68	339	501
Boat Type	%	n	%	n	Total
Motor Boat	23	92	77	314	406
PWC	98	43	2	1	44
Kayak	33	2	68	4	6
Canoe					
Rowboat/Dinghy	56	5	44	4	9
Paddleboard/Sailboard	58	19	42	14	33
Sailboat					
Inflatable/Raft	60	6	40	4	10
Total	33	167	67	341	508

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	50	2	50	2	4
6-12	80	4	20	1	5
13-17	65	11	35	6	17
18-64	18	27	82	126	153
65+	40	4	60	6	10
Total	25	48	75	141	189
Gender	%	n	%	n	Total
Male	24	31	76	99	130
Female	29	17	71	42	59
Total	26	48	74	141	189
Boat Type	%	n	%	n	Total
Motor Boat	24	45	76	141	186
PWC					
Kayak	100	5	0	0	5
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	26	50	74	141	191

Table 43. King County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	13	0	0	13
6-12	74	43	26	15	58
13-17	67	18	33	9	27
18-64	24	158	76	497	655
65+	50	5	50	5	10
Total	31	237	69	526	763
Gender	%	n	%	n	Total
Male	30	132	70	303	435
Female	29	92	71	228	320
Total	30	224	70	531	755
Boat Type	%	n	%	n	Total
Motor Boat	12	65	88	456	521
PWC	100	51	0	0	51
Kayak	90	47	10	5	52
Canoe	63	65	38	39	104
Rowboat/Dinghy	43	3	57	4	7
Paddleboard/Sailboard	0	0	100	3	3
Sailboat	18	6	82	27	33
Inflatable/Raft					
Total	31	237	69	534	771

Table 44. Kitsap County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	67	2	33	1	3
6-12	65	13	35	7	20
13-17	68	26	32	12	38
18-64	21	45	79	168	213
65+	13	1	88	7	8
Total	31	87	69	195	282
Gender	%	n	%	n	Total
Male	28	58	72	150	208
Female	40	31	60	46	77
Total	31	89	69	196	285
Boat Type	%	n	%	n	Total
Motor Boat	29	63	71	156	219
PWC	100	8	0	0	8
Kayak	75	6	25	2	8
Canoe	0	0	100	2	2
Rowboat/Dinghy	8	1	92	11	12
Paddleboard/Sailboard	100	2	0	0	2
Sailboat	31	9	69	20	29
Inflatable/Raft					
Total	32	89	68	191	280

Table 45. Lewis County PFD Use2					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	1	0	0	1
6-12	71	15	29	6	21
13-17	44	18	56	23	41
18-64	15	19	85	106	125
65+	0	0	100	7	7
Total	27	53	73	142	195
Gender	%	n	%	n	Total
Male	25	32	75	95	127
Female	33	24	67	49	73
Total	28	56	72	144	200
Boat Type	%	n	%	n	Total
Motor Boats	27	56	73	149	205
PWC	89	16	111	2	18
Kayak					
Canoe	0	0	100	3	3
Rowboat/Dinghy	50	1	50	1	2
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft	80	4	20	1	5
Total	33	77	67	156	233

Table 46. Pierce County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	75	3	25	1	4
6-12	53	16	47	14	30
13-17	48	23	52	25	48
18-64	21	61	79	226	287
65+	0	0	100	13	13
Total	27	103	73	279	382
Gender	%	n	%	n	Total
Male	24	64	76	205	269
Female	31	33	69	73	106
Total	26	97	74	278	375
Boat Type	%	n	%	n	Total
Motor Boats	15	48	85	271	319
PWC	98	40	3	1	41
Kayak	0	0	100	4	4
Canoe	75	3	25	1	4
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat	64	7	36	4	11
Inflatable/Raft	63	5	38	3	8
Total	27	103	73	284	387

Table 47. Snohomish County PFD Use					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5	100	3	0	0	3
6-12	75	12	25	4	16
13-17	4	1	96	22	23
18-64	6	11	94	174	185
65+	8	2	92	23	25
Total	12	29	88	223	252
Gender	%	n	%	n	Total
Male	9	18	91	185	203
Female	22	11	78	38	49
Total	12	29	88	223	252
Boat Type	%	n	%	n	Total
Motor Boat	8	19	92	223	242
PWC	100	3	0	0	3
Kayak	100	6	0	0	6
Canoe					
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat	100	1	0	0	1
Inflatable/Raft					
Total	12	29	88	223	252

Table 48. Stevens County PFD Use					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5					
6-12					
13-17	50	2	50	2	4
18-64	45	18	55	22	40
65+					
Total	45	20	55	24	44
Gender	%	n	%	n	Total
Male	46	16	54	19	35
Female	57	4	43	3	7
Total	45	20	55	22	42
Boat Type	%	n	%	n	Total
Motor Boat	23	6	77	20	26
PWC	100	13	0	0	13
Kayak	100	1	0	0	1
Canoe	0	0	100	2	2
Rowboat/Dinghy	0	0	100	2	2
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	45	20	55	24	44

Table 49. Thurston County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	93	13	7	1	14
6-12	81	38	19	9	47
13-17	50	7	50	7	14
18-64	30	110	70	259	369
65+	42	5	58	7	12
Total	38	173	62	283	456
Gender	%	n	%	n	Total
Male	35	97	65	182	279
Female	44	80	56	102	182
Total	38	177	62	284	461
Boat Type	%	n	%	n	Total
Motor Boat	25	85	75	250	335
PWC	100	21	0	0	21
Kayak	86	59	14	10	69
Canoe	73	8	27	3	11
Rowboat/Dinghy	67	2	33	1	3
Paddleboard/Sailboard	50	1	50	1	2
Sailboat	30	8	70	19	27
Inflatable/Raft					
Total	39	184	61	284	468

Table 50. Walla Walla County PFD Use					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	13	0	0	13
6-12	95	60	5	3	63
13-17	60	32	40	21	53
18-64	18	79	82	368	447
65+	10	1	90	9	10
Total	32	185	68	401	586
Gender	%	n	%	n	Total
Male	28	104	72	263	367
Female	36	83	64	147	230
Total	31	187	69	410	597
Boat Type	%	n	%	n	Total
Motor Boat	25	133	75	399	532
PWC	90	57	10	6	63
Kayak	50	1	50	1	2
Canoe	100	1	0	0	1
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft	0	0	100	4	4
Total	32	192	68	410	602

Table 51. Whatcom County PFD Use

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	83	5	17	1	6
6-12	90	26	10	3	29
13-17	60	9	40	6	15
18-64	38	70	115	62	185
65+					
Total	47	110	53	125	235
Gender	%	n	%	n	Total
Male	46	79	54	92	171
Female	45	32	55	39	71
Total	46	111	54	131	242
Boat Type	%	n	%	n	Total
Motor Boat	38	60	63	100	160
PWC	80	4	20	1	5
Kayak	78	21	22	6	27
Canoe	45	5	55	6	11
Rowboat/Dinghy	50	5	50	5	10
Paddleboard/Sailboard	100	4	0	0	4
Sailboat	43	6	57	8	14
Inflatable/Raft	46	6	54	7	13
Total	45	111	55	133	244

Table 52. Yakima County PFD Use

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	100	1	0	0	1
6-12	100	8	0	0	8
13-17	0	0	100	7	7
18-64	38	16	62	26	42
65+					
Total	43	25	57	33	58
Gender	%	n	%	n	Total
Male	33	10	67	20	30
Female	43	10	57	13	23
Total		20	57	33	53
Boat Type	%	n	%	n	Total
Motor Boat	38	8	62	13	21
PWC	100	3	0	0	3
Kayak	67	2	33	1	3
Canoe	40	2	60	3	5
Rowboat/Dinghy	100	2	0	0	2
Paddleboard/Sailboard	75	3	25	1	4
Sailboat					
Inflatable/Raft	25	5	75	15	20
Total	43	25	57	33	58

Appendix J: PFD Use by EMS Region

Table 53. Central Region (King County)					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	13	0	0	13
6-12	74	43	26	15	58
13-17	67	18	33	9	27
18-64	24	158	76	497	655
65+	50	5	50	5	10
Total	31	237	69	526	763
Gender	%	n	%	n	Total
Male	30	132	70	303	435
Female	29	92	71	228	320
Total	30	224	70	531	755
Boat Type	%	n	%	n	Total
Motor Boat	12	65	88	456	521
PWC	100	51	0	0	51
Kayak	90	47	10	5	52
Canoe	62	65	38	39	104
Rowboat/Dinghy	43	3	57	4	7
Paddleboard/Sailboard	0	0	100	3	3
Sailboat	18	6	82	27	33
Inflatable/Raft					
Total	31	237	69	534	771

Table 54. North Central Region (Chelan, Grant Counties)					
Age	PFD		No PFD		Total
	%	n	%	n	
0-5	80	8	20	2	10
6-12	66	43	34	22	65
13-17	41	40	59	58	98
18-64	27	158	73	420	578
65+	0	0	100	9	9
Total	33	249	67	511	760
Gender	%	n	%	n	Total
Male	31	143	69	319	462
Female	35	108	65	201	309
Total	32	251	68	520	771
Boat Type	%	n	%	n	Total
Motor Boat	20	125	80	489	614
PWC	99	87	1	1	88
Kayak	50	4	50	4	8
Canoe	100	4	0	0	4
Rowboat/Dinghy	64	7	36	4	11
Paddleboard/Sailboard	60	21	40	14	35
Sailboat	100	2	0	0	2
Inflatable/Raft	60	6	40	4	10
Total	33	256	67	523	779

Table 55. South Central-Yakima Region (Yakima County)2

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	100	1	0	0	1
6-12	100	9	0	0	9
13-17	27	18	73	49	67
18-64	27	18	73	49	67
65+					
Total	33	28	67	58	86
Gender	%	n	%	n	Total
Male	30	12	70	28	40
Female	27	11	73	30	41
Total	33	23	67	58	81
Boat Type	%	n	%	n	Total
Motor Boat	38	8	62	13	21
PWC	100	3	0	0	3
Kayak	67	2	33	1	3
Canoe	40	2	60	3	5
Rowboat/Dinghy	100	2	0	0	2
Paddleboard/Sailboard	75	3	25	1	4
Sailboat					
Inflatable/Raft	25	5	75	15	20
Total	33	28	67	58	86

Table 56. South Central- Tri-Cities Region (Benton, Walla Walla Counties)

Age	PFD		No PFD		Total
	%	n	%	n	
0-5	93	37	7	3	40
6-12	96	111	4	5	116
13-17	54	49	46	42	91
18-64	14	124	86	781	905
65+	14	3	86	18	21
Total	28	324	72	849	1,173
Gender	%	n	%	n	Total
Male	25	184	75	550	734
Female	31	144	69	322	466
Total	28	328	72	872	1,200
Boat Type	%	n	%	n	Total
Motor Boat	22	242	78	852	1,094
PWC	93	81	7	6	87
Kayak	47	9	53	10	19
Canoe	100	1	0	0	1
Rowboat/Dinghy					
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft	0	0	100	4	4
Total	28	333	72	872	1,205

Table 57. East Region (Asotin, Spokane, Stevens Counties)					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5					
6-12	100	3	0	0	3
13-17	75	6	25	2	8
18-64	35	27	65	51	78
65+	0	0	100	1	1
Total	40	36	60	54	90
Gender	%	n	%	n	Total
Male	39	24	61	37	61
Female	42	10	58	14	24
Total	40	34	60	51	85
Boat Type	%	n	%	n	Total
Motor Boat	29	20	71	50	70
PWC	100	15	0	0	15
Kayak	100	1	0	0	1
Canoe	0	0	100	2	2
Rowboat/Dinghy	0	0	100	2	2
Paddleboard/Sailboard					
Sailboat					
Inflatable/Raft					
Total	40	36	60	54	90

Table 58. West Region (Pierce, Thurston, Lewis Counties)					
	PFD		No PFD		
Age	%	n	%	n	Total
0-5	89	17	11	2	19
6-12	70	69	30	29	98
13-17	47	48	53	55	103
18-64	24	190	76	591	781
65+	16	5	84	27	32
Total	32	329	68	704	1,033
Gender	%	n	%	n	Total
Male	29	193	71	482	675
Female	38	137	62	224	361
Total	32	330	68	706	1,036
Boat Type	%	n	%	n	Total
Motor Boat	22	189	78	670	859
PWC	96	77	4	3	80
Kayak	81	60	19	14	73
Canoe	61	11	39	7	18
Rowboat/Dinghy	60	3	40	2	5
Paddleboard/Sailboard	50	1	50	1	2
Sailboat	39	15	61	23	38
Inflatable/Raft	69	9	31	4	13
Total	33	364	67	724	1,088

Table 59. Northwest Region (Kitsap County)

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	67	2	33	1	3
6-12	65	13	35	7	20
13-17	68	26	32	12	38
18-64	22	49	78	175	224
65+	11	1	89	8	9
Total	31	91	69	203	294
Gender	%	n	%	n	Total
Male	28	28	72	157	219
Female	40	31	60	47	78
Total	31	93	69	204	297
Boat Type	%	n	%	n	Total
Motor Boat	29	67	71	164	231
PWC	100	8	0	0	8
Kayak	75	6	25	2	8
Canoe	0	0	100	2	2
Rowboat/Dinghy	8	1	92	11	12
Paddleboard/Sailboard	100	2	0	0	2
Sailboat	31	9	69	20	29
Inflatable/Raft					
Total	32	93	68	199	292

Table 60. Southwest Region (Clark, Cowlitz Counties)

	PFD		No PFD		Total
	%	n	%	n	
Age					
0-5	100	1	0	0	1
6-12	100	8	0	0	8
13-17	57	13	43	10	23
18-64	18	24	82	111	135
65+	33	3	67	6	9
Total	28	49	72	127	176
Gender	%	n	%	n	Total
Male	21	23	79	85	108
Female	38	26	62	43	69
Total	28	49	72	128	177
Boat Type	%	n	%	n	Total
Motor Boat	23	37	77	125	162
PWC	100	4	0	0	4
Kayak	100	6	0	0	6
Canoe					
Rowboat/Dinghy	100	2	0	0	2
Paddleboard/Sailboard					
Sailboat	0	0	100	6	6
Inflatable/Raft					
Total	27	49	73	131	180

Table 61. North Region (Whatcom, Island, Snohomish Counties)

	PFD		No PFD		
Age	%	n	%	n	Total
0-5	77	10	23	3	13
6-12	84	42	16	8	50
13-17	38	21	62	34	55
18-64	21	108	79	415	523
65+	17	6	83	29	35
Total	28	187	72	489	676
Gender	%	n	%	n	Total
Male	25	128	75	376	504
Female	34	60	66	119	179
Total	28	188	72	495	683
Boat Type	%	n	%	n	Total
Motor Boat	21	124	79	464	588
PWC	88	7	13	1	8
Kayak	84	32	16	6	38
Canoe	45	5	55	6	11
Rowboat/Dinghy	50	5	50	5	10
Paddleboard/Sailboard	100	4	0	0	4
Sailboat	47	7	53	8	15
Inflatable/Raft	46	6	54	7	13
Total	28	190	72	497	687