Mandatory Regulations at Four USACE Lakes In Northern Mississippi

How Have Wear Rates Held Up Six Years Later?

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(Arkabutla Lake, Enid Lake, Grenada Lake, Sardis Lake)

Introduction.

In 2017 at the request of the US Army Corps of Engineers (USACE) and the US Coast Guard, JSI arranged for a limited set of observations to be conducted in four Northern Mississippi Lakes where mandatory regulations have been in place since 2009. Of particular interest was to determine to what extent the substantial increases in wear rates that were observed during the official experimental period (2009 to 2011) have been sustained six years later (in 2017). After the official evaluation period was completed, initial plans were to remove the regulations. However, lake managers were so impressed with boaters' responses and the success in reducing drownings that they requested a permanent continuation of these mandatory regulations which was approved. This report documents to what degree the success of the mandatory regulations was maintained in 2017, six years after the official close of the evaluation.

Three observations were conducted on different weekends at each of the four lakes; one observation in early to mid-August, one in early to mid-September and one in early to mid-October. The August observations were completed by one of the JSI trained teams still living in the area, whereas the September observations were completed by USACE Rangers on shore and October observations by USACE volunteers. All observation teams were trained using JSI's life jacket observation on-line training course. There were no dramatic differences in wear rates associated with the different teams, indicating that observation procedures remained consistent across the observer teams.

The imposed mandatory regulations required life jacket use by teenagers and adults in all boats under 16 feet whether moving or drifting or anchored; and all boats 16 to 26 feet that were underway. Children under 13 years of age continued to be covered by mandatory age-specific regulations for all types of boats. Non-regulated boats included any boats over 26 feet and boats 16 to 26 feet that were drifting or anchored. Data presented throughout this report represents only regulated boats/boaters unless otherwise indicated.

The official evaluation period in which regulations were in effect covered three years -from 2009 to 2011. JSI also conducted more observations in 2012 since the regulations were extended permanently at the request of the lake managers to USACE headquarters. Fewer observations were conducted in 2012 resulting in about a third as many observations gathered compared to previous years. Thus, data from 2012 are included throughout this report, but it should be noted that rates from 2009 and 2011 are more reliable due to larger and more generalizable sample sizes. Observations were also conducted during the summer of 2017 following the same observation procedures as outlined above, but like 2012 were observed for fewer weekends and hence fewer boaters. Thus, like 2012, the number of observations gathered in 2017 were noticeably fewer than in the first three years of evaluation, but still offer compelling insight into the longer-term impact of mandatory regulations on adult and teen life jacket use.

Trend Totals for All 4 Lakes Together and Individually (Table 1).

Six years after the last official year of the experimental assessment period (2011), the 2017 wear rates for ADULTS in all four regulated lakes was 62.3% compared to 67.7% in 2011 and 53.9% in 2012. These wear rates do not include in the totals any boats that were non-regulated (powered boats greater than 26 feet or powered boats 16-26 feet that were drifting or anchored). In 2017 the four individual lakes showed the following wear rates: Arkabutla (59.6%); Enid (58.7%); Grenada (60.6%) and Sardis (67.4%). Sardis actually showed about a 6% increase over the 2011 wear rates whereas the other three lakes decreased somewhat. The overall results, however, show a notable level of stability in the effectiveness of the mandatory regulations. Compared to Mississippi lakes in which no mandatory regulation were in effect, all four regulated lakes showed substantially higher life jacket use in the first three evaluation years. This difference is undoubtedly still present, as national life jacket rate data show only small increases in adult use on powerboats throughout the last decade.

Table 1. Trends in Adult Wear Rates, By Lakes	***Pre-Regulation (2008)***	***Year 1 Post Regulation (2009)***	***Year 2 Post Regulation (2010)***	***Year 3 Post Regulation (2011)***	***Year 4 Post Regulation (2012)***	***2017 Update (Year 9)***
All Intervention Lakes, Adults, No PWC/WS (% Wearing)	**13.8%**	**75.6%**	**69.8%**	**67.7%**	**53.9%**	**62.3%**
. . . N Wearing	314	4549	4536	4187	768	327
. . . N Total Observed	2271	6020	6496	6189	1425	525
Arkabutla Lake (% Wearing)	**21.1%**	**83.8%**	**83.6%**	**77.5%**	**38.3%**	**59.6%**
. . . N Wearing	117	883	607	859	36	28
. . . N Total Observed	554	1054	726	1109	94	47
Enid Lake (% Wearing)	**13.1%**	**80.2%**	**61.7%**	**69.5%**	**62.5%**	**58.7%**
. . . N Wearing	97	1085	791	799	110	74
. . . N Total Observed	741	1353	1281	1149	176	126
Grenada Lake (% Wearing)	**7.1%**	**78.7%**	**69.6%**	**67.8%**	**58.8%**	**60.6%**
. . . N Wearing	31	1416	1431	1099	359	109
. . . N Total Observed	438	1799	2056	1621	611	180
Sardis Lake (% Wearing)	**12.8%**	**64.2%**	**70.2%**	**61.9%**	**48.3%**	**67.4%**
. . . N Wearing	69	1165	1707	1430	263	116
. . . N Total Observed	538	1814	2433	2310	544	172
All Control Lakes, Adults, No PWC/WS (% Wearing)	**13.3%**	**9.5%**	**8.3%**	**6.7%**		
. . . N Wearing	120	453	469	293	.	
. . . N Total Observed	901	4769	5628	4403	.	
Bay Springs Lock and Dam (% Wearing)	**14.3%**	**9.3%**	**10.2%**	**6.0%**		
. . . N Wearing	53	162	226	117	.	
. . . N Total Observed	370	1735	2215	1957	.	
Ross R Barnett Reservoir (% Wearing)	**12.6%**	**9.6%**	**7.1%**	**7.2%**		
. . . N Wearing	67	291	243	176	.	
. . . N Total Observed	531	3034	3413	2446	.	

Age and Gender Trends for all Lakes Combined (Table 2).

Children ages 0-12 (which were already mandated to wear before the regulations were implemented) have maintained very high wear rates in 2017 (95.1%) compared to 2011 (94.5) and 94.3% in 2008 the pre-implementation period. Wear rates for teenagers (13-17) (who were not mandated to wear before regulations were implemented) have also maintained high wear rates in 2017 (84.6%) compared to 2011 (87.8%) and was substantially higher than pre-implementation levels in 2008 (47.8%). Comparisons of ADULT life jacket use showed somewhat greater decreases in female wear rates compared to male rates from 2011 to 2017 (males decreased from 67.6% in 2011 to 64.3% in 2017, whereas females decreased from 67.7% in 2011 to 57.9% in 2017, respectively).

Table 2. Trends in Wear Rates, By Boater Characteristics	***Pre-Regulation (2008)***	***Year 1 Post Regulation (2009)***	***Year 2 Post Regulation (2010)***	***Year 3 Post Regulation (2011)***	***Year 4 Post Regulation (2012)***	***2017 Update (Year 9)***
Adults, No PWC/WS						
---Intervention (% Wearing)	**13.8%**	**75.6%**	**69.8%**	**67.7%**	**53.9%**	**62.3%**
. . . N Wearing	314	4549	4536	4187	768	327
. . . N Total Observed	2271	6020	6496	6189	1425	525
---Control (% Wearing)	13.3%	9.5%	8.3%	6.7%		
. . . N Wearing	120	453	469	293	.	
. . . N Total Observed	901	4769	5628	4403	.	
Age 0-12, No PWC/WS						
---Intervention (% Wearing)	**94.3%**	**96.4%**	**97.8%**	**94.5%**	**95.0%**	**95.1%**
. . . N Wearing	282	895	741	814	172	78
. . . N Total Observed	299	929	758	861	181	82
---Control (% Wearing)	96.6%	84.1%	87.7%	86.1%		
. . . N Wearing	86	530	625	596	.	
. . . N Total Observed	89	630	713	692	.	
Age 13-17, No PWC/WS						
---Intervention (% Wearing)	**47.8%**	**88.2%**	**87.0%**	**87.8%**	**84.2%**	**84.6%**
. . . N Wearing	76	611	450	382	101	33
. . . N Total Observed	160	693	517	435	120	39
---Control (% Wearing)	25.4%	37.7%	28.3%	28.5%		
. . . N Wearing	16	126	91	91	.	
. . . N Total Observed	63	334	321	319	.	
Adult-Males, No PWC/WS						
---Intervention (% Wearing)	**15.9%**	**76.9%**	**71.1%**	**67.6%**	**53.8%**	**64.3%**
. . . N Wearing	251	3264	3208	2981	532	227
. . . N Total Observed	1577	4243	4515	4408	989	353
---Control (% Wearing)	15.4%	12.2%	10.8%	8.7%		
. . . N Wearing	106	371	371	230	.	
. . . N Total Observed	687	3038	3445	2650	.	
Adult-Females, No PWC/WS						
---Intervention (% Wearing)	**9.1%**	**72.3%**	**67.2%**	**67.7%**	**54.1%**	**57.9%**
. . . N Wearing	63	1281	1324	1206	236	99
. . . N Total Observed	693	1771	1971	1781	436	171
---Control (% Wearing)	6.5%	4.7%	4.5%	3.6%		
. . . N Wearing	14	82	98	63	.	
. . . N Total Observed	214	1730	2174	1753	.	

Open Motor Boats versus All Powered Boats (Table 3).

Data are presented for all powered boats primarily including skiffs, runabouts and pontoon boats as well as a smaller number of cabin cruisers (as in the national data, PWCs are not included in the powered boat wear rates). Open motor boats include just skiffs and runabouts. Powered boats make up almost all of the types of boats seen on the four regulated lakes (there are almost no paddle craft or sail boats observed). Wear rates for open-motor boats have always been slightly higher compared to rates among all powered boats included due to consistently lower wear rates among pontoon boaters. Open motor boats had wear rates of 65.0% in 2017 compared to 70.5% in 2011, which is less than a 5% decrease in life jacket use. All powered boats had life jacket wear rates of 62.2% in 2017 compared to 67.7% in 2011, a decrease in life jacket use of just over 5%.

Table 3. Trends in Adults Wear Rates, By Power Boat & Open Motor Boats	***Pre-Regulation (2008)***	***Year 1 Post Regulation (2009)***	***Year 2 Post Regulation (2010)***	***Year 3 Post Regulation (2011)***	***Year 4 Post Regulation (2012)***	***2017 Update (Year 9)***
All Power Boats, No PWC/WS						
---Intervention (% Wearing)	**13.5%**	**75.6%**	**69.8%**	**67.7%**	**53.9%**	**62.2%**
. . . N Wearing	297	4428	4464	4146	759	324
. . . N Total Observed	2200	5854	6399	6128	1409	521
---Control (% Wearing)	**13.0%**	**8.9%**	**7.5%**	**6.1%**		
. . . N Wearing	115	415	409	262	.	
. . . N Total Observed	888	4655	5480	4295	.	
Open Motor Boats						
---Intervention (% Wearing)	**16.1%**	**77.9%**	**72.9%**	**70.5%**	**56.8%**	**65.0%**
. . . N Wearing	271	3518	3496	3317	580	236
. . . N Total Observed	1687	4514	4798	4703	1021	363
---Control (% Wearing)	**15.5%**	**11.7%**	**9.8%**	**8.4%**		
. . . N Wearing	111	387	370	241	.	
. . . N Total Observed	716	3311	3795	2855	.	

Wear Rates for Individual Types of Power Boats (Table 4).

Skiffs historically show the highest wear rates among power boats given the fact that these boats are usually smaller in size and that boaters are often engaged in fishing activities, both risks which are known to contribute to higher life jacket use. In 2017 skiff wear rates increased to 78.7% compared to 73.4% in 2011**.**

Speedboats/Runabouts showed some of the lowest wear rates, which in 2017 were 48.8%, a substantial decrease from 66.3% in 2011.

Pontoon boats showed wear rates in-between skiffs and speedboat/runabouts. In 2017 about 56.5% of pontoon boaters were observed wearing life jackets, a slight decrease from 2011 (58.3%)

Cabin cruiser wear rates are not reported because only 1 regulated cabin cruiser was observed.

Table 4. Trends in Adults Wear Rates, By Type of Power Boat	***Pre-Regulation (2008)***	***Year 1 Post Regulation (2009)***	***Year 2 Post Regulation (2010)***	***Year 3 Post Regulation (2011)***	***Year 4 Post Regulation (2012)***	***2017 Update (Year 9)***
Skiffs						
---Intervention (% Wearing)	**27.0%**	**83.7%**	**79.2%**	**73.4%**	**58.2%**	**78.7%**
. . . N Wearing	236	1963	1949	2047	297	155
. . . N Total Observed	876	2346	2461	2788	510	197
---Control (% Wearing)	**20.9%**	**26.9%**	**24.8%**	**24.7%**		
. . . N Wearing	98	332	296	216	.	
. . . N Total Observed	469	1235	1195	875	.	
Speedboats						
---Intervention (% Wearing)	**4.3%**	**71.7%**	**66.3%**	**66.3%**	**55.4%**	**48.8%**
. . . N Wearing	35	1555	1547	1270	283	81
. . . N Total Observed	811	2168	2334	1915	511	166
---Control (% Wearing)	**5.3%**	**2.7%**	**2.8%**	**1.3%**		
. . . N Wearing	13	55	74	25	.	
. . . N Total Observed	247	2076	2600	1980	.	
Cabin Cruiser						
---Intervention (% Wearing)	**0.0%**	**38.9%**	**0.0%**	**52.9%**	**42.9%**	**.**
. . . N Wearing	.	7	.	18	3	.
. . . N Total Observed	6	18	7	34	7	.
---Control (% Wearing)	**0.0%**	**4.1%**	**0.0%**	**1.0%**		
. . . N Wearing	.	3	.	1	.	
. . . N Total Observed	19	74	65	103	.	
Pontoon						
---Intervention (% Wearing)	**5.1%**	**68.4%**	**60.6%**	**58.3%**	**46.5%**	**56.5%**
. . . N Wearing	26	903	964	811	175	87
. . . N Total Observed	507	1321	1591	1390	376	154
---Control (% Wearing)	**2.7%**	**2.0%**	**2.4%**	**1.5%**		
. . . N Wearing	4	25	38	20	.	
. . . N Total Observed	149	1262	1611	1331	.	

Wear Rates by Size of Power Boat (Table 5).

Power boats that were less than **16 feet** in length had an observed 2017 wear rate of 59.3% which was slightly higher than the 2011 wear rate of 56.4%.

Power boats that were **16 to 21 feet** in length (and were underway) remained relatively stable, with an observed 2017 wear rate of 73.6% compared to 74.2% in 2011.

Power boats that were **21 to 26 feet** in length and underway showed life jacket wear rates of 48.9% in 2017 compared to 62.3% in 2011—a noticeable decrease in use.

Among power boats that were *not regulated* (16-26 not underway or 26+ feet in length) observed rates in 2011 (20.3%) were higher than pre-regulation rates of 12.0% but even higher in 2017 (29.2%).

Table 5. Trends in Adult Wear Rates, By Size of Power Boat	***Pre-Regulation (2008)***	***Year 1 Post Regulation (2009)***	***Year 2 Post Regulation (2010)***	***Year 3 Post Regulation (2011)***	***Year 4 Post Regulation (2012)***	***2017 Update (Year 9)***
All Power Boats, No PWC/WS						
---Intervention (% Wearing)	**13.5%**	**75.6%**	**69.8%**	**67.7%**	**53.9%**	**62.2%**
---Control (% Wearing)	**13.0%**	**8.9%**	**7.5%**	**6.1%**		
Power Boat Size <16ft						
---Intervention (% Wearing)	**21.7%**	**72.2%**	**62.7%**	**56.4%**	**38.3%**	**59.3%**
. . . N Wearing	44	552	381	490	75	16
. . . N Total Observed	204	765	608	869	196	27
---Control (% Wearing)	**18.7%**	**17.9%**	**15.1%**	**10.7%**		
. . . N Wearing	20	57	33	19	.	
. . . N Total Observed	107	319	219	177	.	
Power Boat Size 16-20.9ft						
---Intervention (% Wearing)	**14.6%**	**79.0%**	**75.9%**	**74.2%**	**61.7%**	**73.6%**
. . . N Wearing	222	2161	2599	2376	381	198
. . . N Total Observed	1522	2734	3424	3204	618	269
---Control (% Wearing)	**14.1%**	**13.0%**	**9.0%**	**7.6%**		
. . . N Wearing	84	290	243	164	.	
. . . N Total Observed	594	2233	2691	2151	.	
Power Boat Size 21ft-26ft						
---Intervention (% Wearing)	**6.5%**	**72.8%**	**62.7%**	**62.3%**	**50.9%**	**48.9%**
. . . N Wearing	31	1715	1484	1280	303	110
. . . N Total Observed	474	2355	2367	2055	595	225
---Control (% Wearing)	**5.9%**	**3.2%**	**5.2%**	**4.0%**		
. . . N Wearing	11	68	133	79	.	
. . . N Total Observed	187	2103	2570	1967	.	
Powered Boats 26ft+ & Drifting/Anchored 16-26ft Boats						
---Intervention (% Wearing)	**12.0%**	**35.6%**	**28.2%**	**20.3%**	**23.4%**	**29.2%**
. . . N Wearing	30	192	196	171	65	42
. . . N Total Observed	251	539	696	841	278	144
---Control (% Wearing)	**5.8%**	**3.4%**	**3.8%**	**3.1%**		
. . . N Wearing	14	24	32	14	.	
. . . N Total Observed	241	709	846	450	.	

Wear Rates for Non-Regulated Boats (Table 6).

Non-regulated boats are determined dependent on their size and movement (drifting/anchored vs. underway). Boats under 16 feet in length are always regulated regardless of its movement. Boats 16-21 feet and 21-26 feet in length are regulated if they are underway but non-regulated if they are anchored or drifting (a situation most likely seen for boats involved in fishing). Boats 26+ feet in length are always non-regulated regardless of being underway or not.

During the experimental period, life jacket wear rates among non-regulated boats were higher than during the pre-regulation period, a finding that has interesting and important implications. Unregulated **boats 16-21 feet** in length that were anchored or drifting showed wear rates of 13.9% before regulations were implemented and ranged from 29.6% to 9.2% between 2009 and 2012. In 2017 the wear rate was even larger at 33.3%, although it should be noted that this sample included relatively few boaters (n=27). Unregulated **boats 21-26 feet** in length that were anchored or drifting showed wear rates of 5.0% pre-regulation and ranged from 17.6% to 31.8% from 2009 to 2012. In 2017 the wear rate was 16.7% but again for a very small number of boaters (n=18). Unregulated **boats 26+ feet in** length showed wear rates of 0.0% before the mandated use period (note that this rate derives from a small sample size of 9 boaters) but showed substantial increases with wear rates ranging from 36.8% to 50.0% between 2009 and 2012. In 2017 the wear rates were 30.3%, still notably higher than the pre-regulation rate.

These findings have important implications and represent a "spill-over" effect of regulations on boaters' decisions to wear life jackets. Boats between 16 and 26 feet in length are not required to wear life jackets when anchored or drifting, yet wear rates are noticeably higher in these boating situations that before the regulation period. Similarly, boats greater than 26 feet in length are never required to wear life jackets, but perhaps higher life jacket use among all other boats may be influencing boaters in larger vessels to also wear their lifejackets.

This situation is also similar to fishing tournament mandatory requirements; in tournaments boaters have to wear a life jacket when underway but not when anchored or drifting. There is a little bit of questionable logic here since for anglers the risks of falling into the water are higher when the boat is anchored or drifting and anglers are often standing in the boat while attempting to catch fish or casting or reaching over the side to net a caught fish. So the spill-over effect for these boats are ones where they need to wear their life-jacket when underway but when they stop to fish, about half the boaters elect to keep their lifejackets on. For boats over 26 feet that are never required to wear, but seeing approximately 65% of the boaters around them wearing, it seems to influence these boaters to also wear their lifejackets at very high rates (30.3%) for this sized power boat.

Table 6. Trends in Adult Wear Rates, By Boat Size & Propulsion For Non-Regulated Boats	*Pre-Regulation (2008)*	*Year 1 Post Regulation (2009)*	*Year 2 Post Regulation (2010)*	*Year 3 Post Regulation (2011)*	*Year 4 Post Regulation (2012)*	*2017 Update (Year 9)*
Powered Boats 16-21ft, Anchored/Drifting						
---Intervention (% Wearing)	**13.9%**	**29.6%**	**26.4%**	**15.6%**	**9.2%**	**33.3%**
. . . N Wearing	28	81	94	96	12	9
. . . N Total Observed	202	274	356	614	131	27
---Control (% Wearing)	**7.9%**	**9.8%**	**14.6%**	**11.8%**		
. . . N Wearing	14	19	23	14	.	
. . . N Total Observed	178	194	157	119	.	
Powered Boats 21-26ft, Anchored/Drifting						
---Intervention (% Wearing)	**5.0%**	**25.8%**	**20.4%**	**17.6%**	**31.8%**	**16.7%**
. . . N Wearing	2	23	31	15	7	3
. . . N Total Observed	40	89	152	85	22	18
---Control (% Wearing)	**0.0%**	**6.0%**	**5.3%**	**0.0%**		
. . . N Wearing	.	3	5	.	.	
. . . N Total Observed	4	50	94	27	.	
All Powered Boats 26ft+						
---Intervention (% Wearing)	**0.0%**	**50.0%**	**37.8%**	**42.3%**	**36.8%**	**30.3%**
. . . N Wearing	.	88	71	60	46	30
. . . N Total Observed	9	176	188	142	125	99
---Control (% Wearing)	**0.0%**	**0.4%**	**0.7%**	**0.0%**		
. . . N Wearing	.	2	4	.	.	
. . . N Total Observed	59	465	595	304	.	

Influence on Adult Wear Rates of Kids on Board and Fishing Activity (Table 7)

The mandated life jacket regulations instituted in 2009 presented a unique opportunity to assess the extent to which adult life jacket use is influenced by the presence of children on board. Children aged 0 to 12 years old are more likely to be wearing a life jacket while boating, which may influence accompanying adults to comply with the new regulations and wear their own life jackets. During the evaluation period adults boating with children aged 0 to 12 years old had exhibited higher wear rates than boats which had only adults and teens on board. In 2008 before mandated use, the life jacket wear rate was 6.9% among adults boating with at least one child on board and 7.8% among adults boating without any children on board. Between 2009 and 2012, adult boaters in the presence of children had higher life jacket rates than adults boating without children on board, and the difference in life jacket wear rate ranged between 5.3% and 9.4%. In 2017 this same pattern held with 10.7% greater adult wear rate (63.6% versus 52.9%) among adults with kids on board compared to adults boating without children.

In general, boaters involved in fishing-related activities (fishing or intent to fish) have higher rates of life jacket use than boaters who are not fishing or intending to fish. There are multiple factors that may influence this difference. Fishing tournaments institute life jacket use requirements to all participants while underway in order to qualify for prizes, and fishing is more often conducted in smaller boats, which are also associated with higher rates of life jacket use. Before the regulation went into effect, the life jacket wear rate among boaters engaged in fishing-related activities was 27.6%, which was almost 20% greater than boaters engaged in other activities (8.3%). After the regulations went into effect in 2009, this difference in life jacket wear rate decreased, but the same pattern was observed—boaters engaged in fishing-related activities had higher wear rates than non-fishing boaters, with differences ranging from 7.3% to 13.7% between 2009 and 2012. In 2017, the same pattern was observed between groups, but the difference in life jacket wear rate had grown to 16.1% (73.2% versus 57.1%).

Table 7. Trends in Adult Wear Rates, By Boat Passengers & Boat Activity	*Pre-Regulation (2008)*	*Year 1 Post Regulation (2009)*	*Year 2 Post Regulation (2010)*	*Year 3 Post Regulation (2011)*	*Year 4 Post Regulation (2012)*	*2017 Update (Year 9)*
Adults on Power Boats for Pleasure, No PWC/Water Skiing						
---Intervention - No Kids (% Wearing)	**7.8%**	**67.7%**	**63.8%**	**61.3%**	**52.7%**	**52.9%**
. . . N Wearing	85	1628	1852	1422	365	117
. . . N Total Observed	1084	2406	2905	2321	693	221
---Intervention - Kids (% Wearing)	**6.9%**	**75.9%**	**68.5%**	**70.7%**	**59.1%**	**63.6%**
. . . N Wearing	32	988	930	918	176	84
. . . N Total Observed	464	1301	1357	1298	298	132
Control - No Kids (% Wearing)	**2.4%**	**3.1%**	**3.2%**	**2.2%**		
. . . N Wearing	9	87	113	58	.	
. . . N Total Observed	372	2776	3572	2595	.	
Control - With Kids (% Wearing)	**6.5%**	**3.6%**	**4.6%**	**3.1%**		
. . . N Wearing	7	33	55	35	.	
. . . N Total Observed	107	915	1184	1119	.	
Fishing/Intent to Fish, No PWC/WS						
--- Intervention (% Wearing)	**27.6%**	**84.4%**	**78.6%**	**72.0%**	**52.2%**	**73.2%**
. . . N Wearing	180	1812	1682	1807	218	123
. . . N Total Observed	652	2147	2140	2510	418	168
--- Control (% Wearing)	**24.9%**	**30.6%**	**33.3%**	**29.2%**		
. . . N Wearing	103	295	241	170	.	
. . . N Total Observed	413	964	724	582	.	
All other activities, No PWC/WS						
--- Intervention (% Wearing)	**8.3%**	**70.7%**	**65.5%**	**64.7%**	**54.6%**	**57.1%**
. . . N Wearing	134	2737	2854	2380	550	204
. . . N Total Observed	1619	3873	4356	3679	1007	357
--- Control (% Wearing)	**3.5%**	**4.2%**	**4.7%**	**3.2%**		
. . . N Wearing	17	158	228	123	.	
. . . N Total Observed	488	3805	4904	3821	.	

Proportion of Life Jacket Users Wearing Inflatable Style Life Jackets (Table 8)

Given the heat and humidity present in Mississippi during the summer months, it was thought that when the mandatory regulations went into effect, a lot of adult boaters who would comply would adopt wearing inflatable life jackets just because they would be cooler and less bulky. What is interesting to see in Table 8 is that although use of inflatable life jackets among those who were wearing life jackets did increase, the increase was substantially lower than one might reasonably expect. Among all adult boaters wearing life jackets across all four lakes in 2008 (pre-regulation) inflatable life jacket use was 6.1% and in 2017 rates of inflatable life jacket use had risen to 18.0%.

When looking at proportion of inflatable life jacket users among those wearing life jackets by type of boat, length of boat and boating activity engaged in, an interesting pattern emerges. In 2017 the highest proportion of inflatable life jackets were worn by boaters on skiffs (25.0%); boats 16 to 21 feet in length (22.0%); and boaters involved in fishing or intent to fish activities (30.1%). Although wear rates were lower in 2008 (pre-regulation) the same pattern emerges. When looking at the n's of those wearing inflatables it is apparent that these are almost the same boaters in each of these groups. Clearly fishing/intent to fish is the circumstance that leads boaters to use inflatable life jackets. This is reasonable given the freedom of movement inflatables provide as well as convenience when participating in fishing tournaments (e.g. not having to take a life jacket on and off when stopping to cast).

Table 8. Proportion of Adult Life Jacket Users Wearing Inflatable Style Jackets	Pre-Regulation (2008)	2017 Update (Year 9)
All Lakes--% Wearing Inflatables	6.1% (19/314)	18.0% (59/327)
Types of Boats		
Skiffs	8.1% (19/236)	25.0% (38/155)
Runabout/Speedboats	0.0% (0/35)	9.9% (8/81)
Pontoon	0.0% (0/26)	14.1% (13/87)
Length of Boat		
Less Than 16 ft	6.7% (3/45)	5.9% (1/17)
16-21 ft	6.8% (16/234)	22.0% (44/198)
21-26 ft	0.0% (0/35)	12.5% (14/112)
Activity		
Fishing/Intent to Fish	7.2% (13/180)	30.1% (37/123)
All Other Activities	4.5% (6/134)	10.8% (22/204)

Conclusion

Six years after the end of the official evaluation period, with mandatory regulations still in effect at all four northern Mississippi USACE lakes, wear rates for power boats maintained substantially higher wear rates after nine years compared to the pre-regulation wear rates. The wear rates of approximately 60% among the common power boats observed (skiffs, runabout/speedboats and pontoon boats) are dramatically higher than observed in national data in unregulated areas (2017 national data for skiffs (10.8%); speedboat/runabouts (4.6%); and pontoons (3.4%).

It is our opinion that the coverage of the mandatory regulations to encompass most of the boats operating on these lakes was one important facet of their success. Boaters seeing many other boaters out on the water wearing life jackets was a constant reminder of the existence of the regulations but also reinforcement of a true change in normative behaviors. The fact that a large number of boaters continued to wear life jackets when their boats were drifting or anchored (and they were hence not required to keep them on), speaks to the wearing lifejackets becoming habitual. Furthermore, we feel the large number of anglers on these lakes with frequent fishing tournaments with their own mandatory life jacket regulations also provided a synergism for compliance with the regulations.

The maintenance of high wear rates on these four lakes in spite of hot/humid weather and the passage of time speaks to the efficiency of mandatory regulations to produce substantial changes in life jacket wear behavior particularly when supported by educational and promotional efforts from clear signage at launch areas as well as reminders from the Lake Rangers both at boat launch areas and through on-the-water patrols. Of course behind the promotion and education about the mandatory regulations there was an implicit threat of Rangers being able to give out tickets with monetary fines. But in reality over the nine year period of the regulations almost no tickets were in fact given out.