

MARYLAND - VIRGINIA  
*"Potomac River Compact of 1958"*

**Potomac River Fisheries Commission**

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**Potomac River Fisheries Commission's  
American Shad  
Sustainable Fishery Management Plan**

Submitted to the  
Atlantic States Marine Fisheries Commission

August 11, 2017

## **1. Sustainable Fishery Plan**

In accordance with the guidelines provided in Amendment 3 to the Interstate Fishery Management Plan (IFMP) for Shad and River Herring, the Potomac River Fisheries Commission (PRFC) submits the following American Shad Sustainable Fishery Plan.

### **1a. Request for Fishery**

The PRFC requests that the Shad and River Herring Management Board consider this request to continue a limited commercial by-catch allowance of American shad in the portion of the Potomac River under PRFC jurisdiction (Figure 1). Accordingly, the PRFC justifies this request based on the fact that the Board accepted the 2007 Shad Stock Assessment which established a benchmark goal for American shad recovery in the Potomac River and required the PRFC to continue monitoring the pound net fishery's by-catch allowance of American shad, including discards. The Stock Assessment stated "to continue stock rebuilding, there should be no new expansion of the fishery until the benchmark is reached". The benchmark goal identified in the 2007 Stock Assessment was approved as a restoration target and has been exceeded each year since 2011 (Figure 2).

### **1b. Definition of Sustainability**

Amendment 3 to the IFMP for Shad and River Herring defines a sustainable fishery as one that will not diminish potential future stock reproduction and recruitment. The PRFC proposes to continue with the mandatory daily harvest reporting program with the fishermen on the Potomac River, in which they record daily harvest, effort and discard data. The continuation of this data collection enhances the long term data set that the PRFC maintains, updates and utilizes to monitor the progress of the American shad stock rebuilding and recovery in the Potomac River. The long-term American shad juvenile abundance index (JAI) for the Potomac River is provided by Maryland Department of Natural Resources (MD DNR) and will continue on an annual basis (Figure 3).

### **1c. Summary of current stock status**

The Potomac River has been closed to the commercial and recreational directed harvest of American shad since March 1, 1982. The only allowable commercial harvest since then has been via a pound net by-catch provision that allowed up to two percent by volume of the total catch in possession to be American shad. Starting in 1996, the pound net by-catch provision was further limited to two percent by volume, but could not exceed one bushel per day per licensee. In 2004, a one-bushel limit of American shad by-catch for the gill net fishery was approved by the ASMFC Shad and River Herring Technical Committee and Board, and established by the PRFC. In 2012, ASMFC approval was obtained to increase the by-catch limits from one bushel to two bushels per day per licensee for pound nets and gill nets. Currently in the Potomac River, all directed commercial, recreational and charter boat fisheries for American shad remain closed.

### **1d. Benchmark goals and objectives or restoration goals/targets**

In the 2007 ASMFC Shad Stock Assessment, a benchmark for American shad in the Potomac River was defined as the geometric mean (GM) CPUE of pound net landings reported in Walburg and Sykes (1957) for the years 1944 to 1952, or 31.1 pounds per net-day. It was concluded in the assessment that among Chesapeake Bay stocks of American shad, the Potomac River

population showed the most promising signs of recovery. The gill net index, the pound net index, and the JAI depicted strongly increasing trends in relative abundance. To continue stock rebuilding in the Potomac River, it was recommended that there should be no new expansion of the fishery until the benchmark goal is reached, and that this requires continued monitoring of the pound net fishery, including discards.

The ASMFC Shad and River Herring Management Board accepted the 2007 Shad Stock Assessment Report, which included the Potomac River benchmark. This benchmark goal of 31.1 became the restoration target for the Potomac River and was approved by the ASMFC Shad and River Herring Technical Committee. The GM was calculated for CPUEs of total pound net data (catch + discards) and the GM exceeded the benchmark goal and restoration target in 2011 with a value of 32.0 pounds per net-day (Figure 2). The GM has increased every year since 2002, so achieving the target in 2011 was not unexpected; however, we have continued to exceed the restoration target each year. The PRFC has reported this information in their annual compliance report.

### **1e. Proposed time frame for achievement**

The benchmark goal identified in the 2007 Stock Assessment and approved as a restoration target was first exceeded in 2011, and continues to be exceeded each following year.

### **1f. Discussion of management measure(s) to be taken if sustainable target is not achieved within indicated timeframe**

The restoration target in the Potomac River was achieved in 2011, and continues to be exceeded during each of the following years. The PRFC will continue monitoring the total pound net CPUE data as well as the MD DNR survey data.

If the GM for CPUEs of the total pound net data (catch + discards) drops below the restoration target for three consecutive years, then the PRFC will consider potential restrictions including: reducing or eliminating the two bushel by-catch allowance for pound nets and gill nets; and limiting or restricting the take of broodstock / egg collections by other agencies for shad restoration projects.

## **2. Stock Monitoring Programs**

### **2a. Fishery Independent**

American shad have been taken from the Potomac River as brood stock for hatchery production by several agencies under special collection permits issued by the PRFC since 1995. The Interstate Commission on the Potomac River Basin (ICPRB), participated in the Potomac Restoration Stocking Program for American shad from 1995 – 2002, at which time recovery was considered sufficient for natural reproduction. In 2003, restoration stocking of the Rappahannock River started using Potomac River origin eggs through a partnership between ICPRB, the Virginia Department of Game and Inland Fisheries (VDGIF), and the U. S. Fish & Wildlife Service (USFWS) Harrison Lake National Fish Hatchery. Stocking of the Potomac River continues, but now as “replacement stocking” to account for the Potomac shad sacrificed for another river system. Since 1995, the ICPRB has released over 22 million fry into the Potomac. ICPRB continues to collect some American shad each year from the Potomac River for their schools and educational components, and incorporates significant public involvement into this project with a “Schools-in-Schools” partnership. In 2017, volunteers helped over 1,300 students from 28

Washington metropolitan area schools hatch shad in their classrooms and stock them in the Potomac and Anacostia Rivers. The students' efforts to help replenish American shad populations are notable, but more important is the link between students, volunteers, the river, watermen, biologists and our shared fishery heritage.

The Maryland Department of Natural Resources (MD DNR) (since 2001), VDGIF (2003 – 2009, and 2017), the USFWS (since 2004) and the District of Columbia's Fisheries and Wildlife Division of the Department of Energy and Environment (DOEE) (since 2005) have all collected American shad for brood stock under special collection permits issued by this Commission. The PRFC's Scientific Collection Permits require data reports, and scale/otolith samples of ten percent of the "kept" American shad for analysis, together with their length, weight and sex. In addition, ten to fifteen percent of all shad fry resulting from the use of this permit are to be restocked in the Potomac River as close to the capture site as is feasible.

The MD DNR began replacement stocking in 2007, and has released about 1.4 million fry into the Anacostia River, a tributary of the Potomac River in Washington D.C. and 1.2 million fry into the Potomac River. The DOEE has released approximately 8.6 million fry into the Anacostia River. The VDGIF reported a total of 4.6 million fry stocked in the Potomac, and the USFWS reported 902,000 fry stocked in the Potomac River as mitigation for egg collections. In addition, the USFWS released approximately 2.2 million viable eggs back into the Potomac River for mitigation. The Potomac River has been the egg source for all of Maryland's shad restoration projects, Virginia's shad restoration program in the Rappahannock River, as well as the Susquehanna River (MD/PA) and some of Delaware's rivers since 2002.

#### **i. Juvenile abundance indices**

Maryland is required to provide an American shad juvenile index for the Potomac River and several other river systems throughout its portion of the Chesapeake Bay. The annual juvenile abundance survey has been conducted since 1954, with American shad data collected from 1959 to present. Fixed stations and some auxiliary stations are used each year for a beach haul seine survey in which the juveniles of all species encountered are identified and recorded. The American shad juvenile index for the Potomac River is derived from the Maryland DNR state wide annual young of the year survey as geometric mean CPUEs (Figure 3). The 2016 value of 3.84 was significantly lower than the 2015 value of 19.81, which was a record high value. <http://www.dnr.state.md.us/fisheries/juvinde/index.html>

#### **ii. Adult stock monitoring**

Durell and Weedon (2015) report that Maryland DNR has conducted a Striped Bass Spawning Stock Survey since 1985, using multi-panel drift gill nets in the Potomac River. Since 1997, adult American shad that were incidentally caught were processed to obtain length, sex and age (scale samples) and repeat spawning determination (Figure 4).

### **2b. Fishery Dependent**

#### **i. Commercial Fishery**

The non-directed Potomac River pound net by-catch harvest in 2016 consisted of 1,145 pounds of American shad (Table 1). The PRFC's mandatory commercial daily harvest reporting system is the source of these data, collecting harvest as well as discards or released fish. The 2016 discards/released by-catch of American shad in excess of the daily landing limit from pound nets was 3,500 pounds. The 2016 pound net harvest data was combined with the 2016 pound net discard data to identify the total CPUE. There were 4 pounds of American shad reported as

harvested by gill nets and 2 pounds of gill net discards in 2016.

Pound net effort is expressed as “pound net fishing day” which is one net fished one time. During 2016, one hundred pound nets were licensed in the Potomac River; however only a few of them were set during the early spring months (the shad run). The pound net fishery is a ‘limited entry’ fishery capped at 100 licenses (each net is licensed separately). Effort included 50 pound net fishing days for the American shad by-catch harvest.

**Regulation effective January 1, 2011** – all pound nets in the Potomac River must have at least six PRFC approved fish cull panels properly installed in each pound net to help release undersize fish. This regulation will have a beneficial impact on the release of river herring, but will not be effective in the release of adult shad. These fish cull panels were being used for by-catch reduction by some pound netters on a voluntary basis prior to 2011; they are now mandatory.

## **ii. Recreational Fishery**

The Potomac River, under PRFC jurisdiction, recreational and charter boat fisheries for American shad remained closed in 2016. The American shad fishery has been closed since 1982 in this portion of the Potomac River. We are unaware of any historical or current recreational activity within the PRFC’s jurisdiction. A historical recreational fishery existed in the D.C. portion of the Potomac River, but that fishery is now closed.

## **Literature Cited**

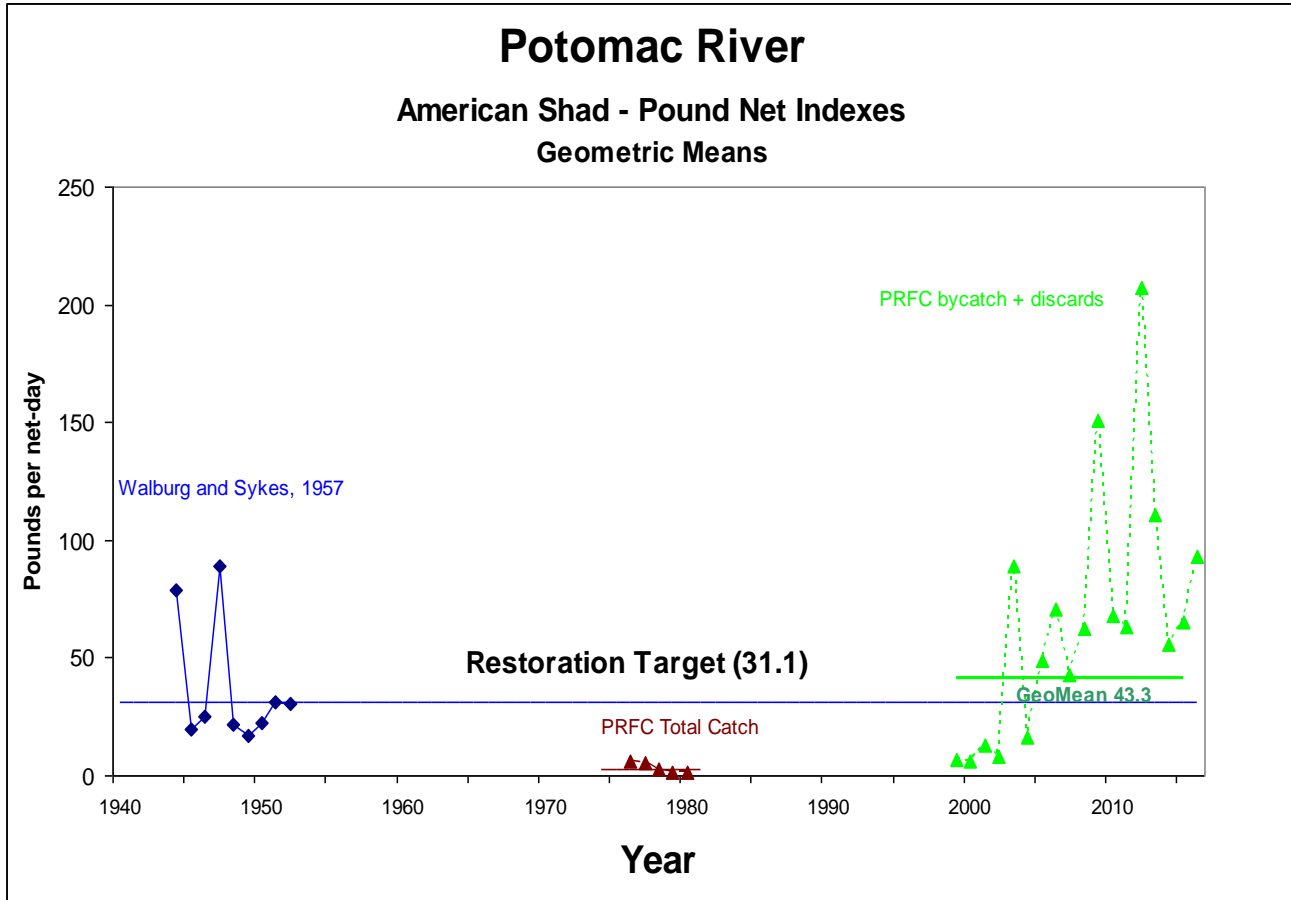
Durell, E. Q. and C. Weedon. 2015. Striped Bass Seine Survey Juvenile Index Web Page. <http://dnr2.maryland.gov/fisheries/Pages/juvenile-index.aspx>. Maryland Department of Natural Resources, Fisheries Service.

Walburg, C. H. and J. E. Sykes. 1957. Shad fishery of Chesapeake Bay with special emphasis on the fishery of Virginia. U.S. Fish Wildlife Service, Research Report 48, 26 p.

**Figure 1.** Potomac River – PRFC jurisdiction is the main stem of the Potomac River downstream of Washington, DC



Figure 2

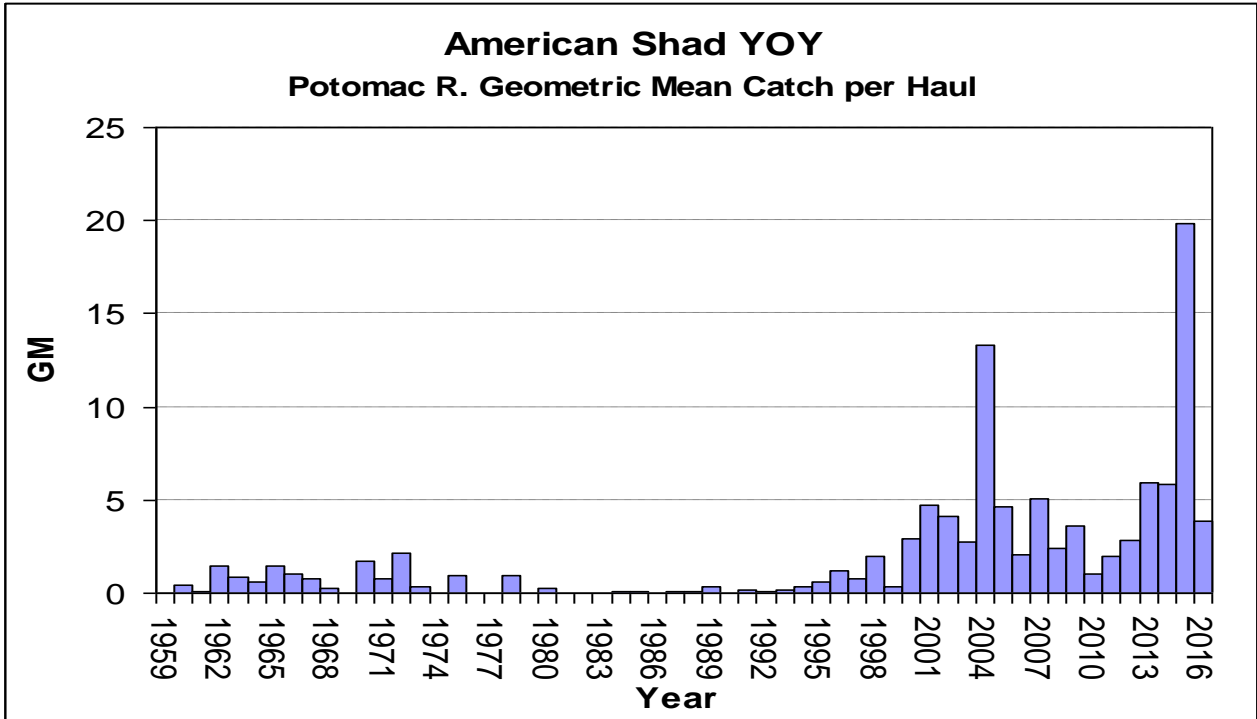


Source: PRFC

Geometric Mean (GM) of Pound Net CPUE Data												
Time Series	1944-1952	1976-1980	1999-2002	1999-2003	1999-2004	1999-2005	1999-2006	1999-2007	1999-2008	1999-2009	1999-2010	1999-2011
GM	31.1	3.0	8.1	13.1	13.6	16.3	19.6	21.3	23.8	28.1	30.2	32.0

Geometric Mean (GM) of Pound Net CPUE Data												
Time Series	1999-2012	1999-2013	1999-2014	1999-2015	1999-2016							
GM	36.6	39.4	40.3	41.4	43.3							

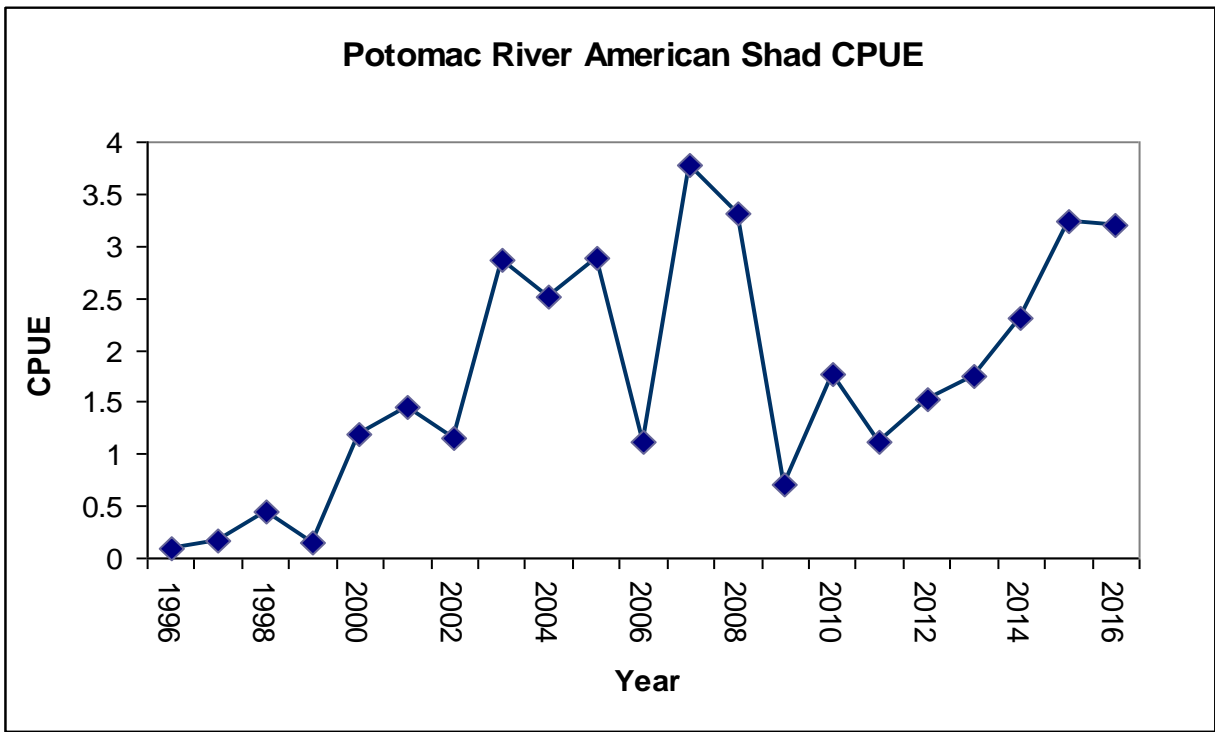
Figure 3



Source: <http://dnr2.maryland.gov/fisheries/Pages/striped-bass/juvenile-index.aspx>

Figure 4





Effort corrected catch of American shad on the Potomac River during the MD DNR striped bass spawning stock survey. CPUE is standardized as the number of fish caught per 1000 square yards of drift gill net per hour. Source: MD DNR

Table 1 POTOMAC RIVER FISHERIES COMMISSION  
 AMERICAN SHAD  
 Commercial Harvest (pounds) and Discard (pounds)

Year	HARVEST					DISCARD						PN CPUE C+D	
	Pound Net				Gill Net	Pound Net		Gill Net		Other Gear			Total
	Roe	Buck	Total	Net-days	Total	Roe	Buck	Roe	Buck	Roe	Buck		
-													
1988	766	1,128	1,894	2,021									
1989	543	525	1,068	1,574									
1990	1,299	983	2,282	1,361									
1991	1,062	856	1,918	1,208									
1992	939	526	1,465	703									
1993	1,480	1,447	2,927	611									
1994	677	628	1,305	758									
1995	1,458	1,180	2,638	743									
1996	1,357	935	2,292	553									
1997	2,773	2,310	5,083	737									
1998	1,680	571	2,251	335									
1999	1,049	917	1,966	388		376	213	14	10			613	6.59
2000	897	611	1,508	258		28	56	55				139	6.17
2001	3,347	1,492	4,839	433		800	56	53		25		934	13.15
2002	1,727	1,035	2,762	348			59	25	2			86	8.11
2003	6,971	1,170	8,141	547		22,790	17,566	9,393	670	204	73	50,696	88.66
2004	4,408	643	5,051	493	293	1,800	1,100	1,053	54			4,007	16.13
2005	5,255	764	6,019	493	801	15,171	3,008	170	0			18,349	49.08
2006	3,847	409	4,256	260	413	10,178	4,000	17	4			14,199	70.90
2007	5,662	942	6,604	388	2,310	8,622	1,323	90		4		10,039	42.65
2008	6,310	505	6,815	274	160	8,282	2,000					10,282	62.40
2009	4,402	603	5,005	197	209	19,150	5,500			2		24,652	150.53
2010	3,790	95	3,885	117	31	3,907	131					4,038	67.72
2011	2,167	252	2,419	77	0	2,015	450					2,465	63.43
2012	2,478	1,641	4,119	177	623	21,515	11,040			4		32,559	207.20
2013	2,943	853	3,796	110	3	4,150	4,250	3				8,403	110.87
2014	2,822	1,181	4,003	80	10	320	106	13		24	10	473	55.95
2015	1,135	754	1,889	58	12	1,700	200			86	3	1,989	65.12
2016	556	589	1,145	50	4	3,500		2				3,500	92.90

Source: PRFC

Table 2. USFWS - Summary of American Shad collected and Eggs Produced from the Potomac River

	2004	2005	2006*	2007*	2008*	2009*	2010*	2011*	2012*	2013*	2014*	2015*	2016*	Totals
# Females Caught			673	1,110	1,291	451	1,569	1,021	1,611	1,732	2,277	2,456	1,637	15,828
# Males Caught			117	272	284	510	1,196	404	475	266	758	284	331	4,897
Ripe Females	50			515	501	451	955	368	712	539	1090	793	702	6,676
Ripe Males	39			271	284	510								1,104
# Shad Released	125		395	596	790	787	614	652	899	1,193	1,187	1,663	935	9,836
Total Shad Kept	89		382	786	785	771	2,151	772	1,187	805	1,848	1,077	1,033	11,686
Total Shad Caught	214	296	777	1,382	1,575	1,558	2,765	1,425	2,086	1,998	3,035	2,740	1,968	21,819
Avg.CPUE (shad/hr/ft <sup>2</sup> )			0.001	0.002										
Volume(L) of Eggs			99.3	183.9	194.4	132.2	375.0	137.4	258.0	118.1	316.7	170.5	165.6	2,151
# of Eggs			4,511,426	7,488,716	8,503,709	6,380,784	17,843,432	6,216,484	11,183,457	7,512,761	14,407,614	8,850,523	8,385,914	101,284,820
Viable Eggs			2,003,222	2,875,455	3,491,069	1,885,500	6,874,612	2,714,435	5,664,920	1,603,498	5,671,992	2,044,013	2,138,510	36,967,226
Viability (%)			44%	42%	41%	30%	39%	44%	51%	21%	39%	23%	25%	
# Fry stocked				259,119	188,739		365,000	90,000						902,858
Viable Eggs stocked									670,292	277,864	555,650	298,476	155,125	1,957,407

\* Scales & otoliths taken on 5% of fish

<b>American Shad Age, Length, and Weight Potomac River - 2015 (USFWS)</b>					
Year Class	2008	2009	2010	2011	Total
Age	7	6	5	4	
<b>Males</b>					
Number	4	2	4	0	10
% by year class	40%	20%	40%	0%	
Av. TL (mm)	489	484	475		
Av. Wt. (kg)	1.02	0.94	0.96		
<b>Females</b>					
Number	5	17	16	2	40
% by year class	12%	42%	40%	5%	
Av. TL (mm)	512	499	495	470	
Av. Wt. (kg)	1.43	1.27	1.20	0.98	
<b>Sexes Combined</b>					
Number	9	19	20	2	50
% by year class	18%	38%	40%	4%	
Av. TL (mm)	502	497	494	470	
Av. Wt. (kg)	1.25	1.24	1.15	0.98	

<b>American Shad Age, Length, and Weight Potomac River - 2014 (USFWS)</b>					
Year Class	2007	2008	2009	2010	Total
Age	7	6	5	4	
<b>Males</b>					
Number	7	21	12	1	41
% by year class	17%	51%	29%	2%	
Av. TL (mm)	490	482	404	478	
Av. Wt. (kg)	1.04	1.02	0.97	0.85	
<b>Females</b>					
Number	11	18	12		41
% by year class	27%	44%	29%		
Av. TL (mm)	519	516	502		
Av. Wt. (kg)	1.21	1.26	1.24		
<b>Sexes Combined</b>					
Number	18	39	24	1	82
% by year class	22%	48%	29%	1%	
Av. TL (mm)	508	498	453	478	
Av. Wt. (kg)	1.14	1.13	1.10	0.85	

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**American Shad Age, Length, and Weight  
Potomac River - 2016 (USFWS)**

<b>Year Class</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>
<b>Age</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	
<b>Males</b>						
Number		1	1	2	1	5
% by year class		20%	20%	40%	20%	
Av. TL (mm)		514	479	462	382	
Av. Wt. (kg)		1.04	0.88	0.52	0.46	
<b>Females</b>						
Number	1	5	11	17	1	35
% by year class	2.8%	14.3%	31.4%	48.6%	2.8%	
Av. TL (mm)	540	532	507	451	470	
Av. Wt. (kg)	1.34	1.23	1.18	1.02	0.96	
<b>Sexes Combined</b>						
Number	1	6	12	19	2	40
% by year class	2.5%	15%	30%	47.5%	5%	
Av. TL (mm)	540	529	505	452	426	
Av. Wt. (kg)	1.34	1.20	1.15	0.97	0.71	

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Table 3. MD DNR AMERICAN SHAD MITIGATION REPORT - POTOMAC RIVER

<b>Species</b>	<b>Year</b>	<b>Date</b>	<b>River</b>	<b>Stocking site</b>	<b>Number</b>	<b>Cultured By:</b>	<b>Stocked For:</b>
American Shad	2007	5/15/07	Potomac	Anacotia	200,000	DC Fisheries	MD DNR mitigation
American Shad	2008	4/24/08	Potomac	Anacotia	170,000	DC Fisheries	MD DNR mitigation
American Shad	2008	5/12/08	Potomac	Anacotia	30,000	DC Fisheries	MD DNR mitigation
American Shad	2009	5/6/09	Potomac	Anacotia	200,000	DC Fisheries	MD DNR mitigation
American Shad	2010	n/a	Potomac	Anacotia	400,000	DC Fisheries	MD DNR mitigation
American Shad	2011		Potomac	Marshal Hall	263,000	MD DNR	MD DNR mitigation
American Shad	2012	4/16/12	Potomac	Marshal Hall	165,000	MD DNR	MD DNR mitigation
American Shad	2012	4/5/12	Potomac	Anacostia	200,000	DC Fisheries	MD DNR mitigation
American Shad	2013	5/1/13	Potomac	Anacostia	200,000	DC Fisheries	MD DNR mitigation
American Shad	2013	4/29/13	Potomac	Marshall Hall	3,000	MD DNR	MD DNR mitigation
American Shad	2013	5/10/13	Potomac	Marshall Hall	220,000	MD DNR	MD DNR mitigation
American Shad	2013	5/21/13	Potomac	Marshall Hall	57,400	MD DNR	MD DNR mitigation
American Shad	2014	4/14/14	Potomac	Marshall Hall	10,300	MD DNR	MD DNR mitigation
American Shad	2014	4/16/14	Potomac	Marshall Hall	20,700	MD DNR	MD DNR mitigation
American Shad	2014	4/23/14	Potomac	Marshall Hall	10,300	MD DNR	MD DNR mitigation
American Shad	2014	5/8/14	Potomac	Marshall Hall	31,000	MD DNR	MD DNR mitigation
American Shad	2014	5/16/14	Potomac	Marshall Hall	20,700	MD DNR	MD DNR mitigation
American Shad	2014	4/29/14	Potomac	Marshall Hall	166,000	DC Fisheries	MD DNR mitigation
American Shad	2015	4/24/15	Potomac	Marshall Hall	10,800	MD DNR	MD DNR mitigation
American Shad	2015	5/7/15	Potomac	Marshall Hall	172,700	MD DNR	MD DNR mitigation
American Shad	2016	4/13/16	Potomac	Marshall Hall	30,800	MD DNR	MD DNR mitigation
American Shad	2016	4/26/16	Potomac	Marshall Hall	30,800	MD DNR	MD DNR mitigation
					<u>2,612,500</u>		

Table 4. Summary of American Shad Collected from the Potomac River by MD DNR and Eggs Obtained

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
# Ripe Females	298	568	458	231	561	472	567	401	425	599
# Green Females		205	351	276	446	314	438	405	277	288
# Spent Females		147	60	183	192	98	178	141	144	150
# Males	143	1083	490	286	385	223	213	476	467	604
Total Shad	441	2,003	1,359	976	1,584	1,107	1,396	1,423	1,313	1,641
Liters of Eggs	101.8	309.6	222.6	137.5	246.0	249.0	294.7	213.5	205.5	299.0
Total # of Eggs	3,906,375	11,501,975	8,337,225	5,742,950	9,514,400	9,350,900	10,222,090	7,918,150	7,557,855	11,463,350
Total Fertile Eggs	1,687,629	5,898,446	3,260,799	3,268,708	4,466,611	3,207,860	3,508,795	3,921,239	4,554,483	7,882,600
# Re-stocked Fry							200,000	200,000	200,000	400,000

Table 4. Continued Summary of American Shad Collected from the Potomac River by MD DNR and Eggs Obtained

	2011	2012	2013	2014	2015	2016	Totals
# Ripe Females	304	1,828	1,168	579	569	947	9,975
# Green Females	355	1,744	1,199	1,065	1,482	907	9,752
# Spent Females	80	223	146	34	126	152	2,054
# Males	417	1,250	354	1,543	585	340	8,859
Total Shad	1,156	5,045	2,867	3,221	2,762	2,346	30,640
Liters of Eggs	168.5	619.5	441	180	174		3,862
Total # of Eggs	5,957,600	25,540,150	15,834,815	6,564,000	7,126,200		
Total Fertile Eggs	3,964,097	11,294,187	8,306,826	3,346,406	3,199,264		
# Re-stocked Fry	263,000	365,000	480,400	259,000	183,500	61,600	2,612,500

**American Shad Age, Length, and Weight  
Potomac River - 2016 (MD DNR)**

Year Class Age	2007	2008	2009	2010	2011	2012	Total
	9	8	7	6	5	4	
<b>Males</b>							
Number			4	9	14	3	30
% by year class			13%	30%	47%	10%	100%
Av. TL (mm)			502	497	463	420	
Av. Wt. (kg)			1.01	0.98	0.84	0.64	
<b>Females</b>							
Number	1	4	7	59	18	1	90
% by year class	1%	4%	8%	66%	20%	1%	100%
Av. TL (mm)	535	535	523	502	477	455	
Av. Wt. (kg)	1.42	1.43	1.13	1.09	1.02	0.79	
<b>Sexes Combined</b>							
Number	1	5	11	68	32	4	120
% by year class	0.8%	4%	9%	57%	27%	3%	100%
Av. TL (mm)	535	535	516	501	470	429	
Av. Wt. (kg)	1.42	1.43	1.09	1.07	0.94	0.68	

**American Shad Age, Length, and Weight  
Potomac River - 2015 (MD DNR)**

Year Class Age	2007	2008	2009	2010	2011	2012	Total
	8	7	6	5	4	3	
<b>Males</b>							
Number	4	9	30	28	8		79
% by year class	5%	11%	38%	35%	10%		100%
Av. TL (mm)	479	485	479	477	476		
Av. Wt. (kg)	1.19	1.13	1.13	1.12	1.13		
<b>Females</b>							
Number			7	22	11	2	42
% by year class			17%	52%	26%	5%	100%
Av. TL (mm)			515	507	494	447	
Av. Wt. (kg)			1.53	1.42	1.31	1.08	
<b>Sexes Combined</b>							
Number	4	9	37	50	19	2	121
% by year class	3%	7%	31%	41%	16%	2%	100%
Av. TL (mm)	479	485	486	490	487	447	
Av. Wt. (kg)	1.19	1.13	1.20	1.25	1.23	1.08	

**American Shad Age, Length, and Weight  
Potomac River - 2014 (MD DNR)**

<b>Year Class Age</b>	<b>2006 8</b>	<b>2007 7</b>	<b>2008 6</b>	<b>2009 5</b>	<b>Total</b>
<b>Males</b>					
Number	3	14	32	12	61
% by year class	5%	23%	52%	20%	100%
Av. TL (mm)	502	477	471	477	
Av. Wt. (kg)	1.17	1.09	1.04	1.03	
<b>Females</b>					
Number	5	4	20	12	41
% by year class	12%	10%	49%	29%	100%
Av. TL (mm)	543	502	499	510	
Av. Wt. (kg)	1.48	1.07	1.16	1.25	
<b>Sexes Combined</b>					
Number	8	18	52	24	102
% by year class	8%	18%	51%	24%	100%
Av. TL (mm)	528	483	482	493	
Av. Wt. (kg)	1.36	1.08	1.08	1.14	

**American Shad Age, Length, and Weight  
Potomac River - 2013 (MD DNR)**

<b>Year Class Age</b>	<b>2006 7</b>	<b>2007 6</b>	<b>2008 5</b>	<b>2009 4</b>	<b>2010 3</b>	<b>Total</b>
<b>Males</b>						
Number	0	8	17	22	1	48
% by Year class	0.00%	16.67%	35.42%	45.83%	2.08%	
Av.TL (mm)	0.00	488.75	476.94	475.05	469.00	
Av. Wt. (kg)	0.00	1.07	1.00	1.02	1.08	
<b>Females</b>						
Number	2	16	34	25	0	77
% by Year class	2.60%	20.78%	44.16%	32.47%	0.00%	
Av.TL (mm)	495.00	511.56	502.71	509.28	0	
Av. Wt. (kg)	1.12	1.29	1.22	1.27	0	
<b>Sexes Combined</b>						
Number	2	24	51	47	1	125
% by Year class	1.60%	19.20%	40.80%	37.60%	0.80%	
Av. TL (mm)	495.00	503.96	494.12	493.26	469.00	
Av. Wt. (kg)	1.12	1.22	1.14	1.15	1.08	



Table 5. Summary of American Shad collected and Eggs Produced by DDOE from the Potomac River

	2006	2007	2008	2009	2010	2012	2013	2014	2015	2016	Totals
# Ripe Females	19	148	65	151	158	177	203	103	71	244	1,339
# Green Females	8	348	80	158	170	337	189	160	115	213	1,778
# Spent Females	4	55	28	56	30	21	44	34	27	78	377
# Males	1	43	18	115	128	185	85	218	51	55	899
Total Shad	32	594	191	480	486	720	521	515	213	590	4,342
Liters of Eggs	4.3	64.8	34.8	81.0	87.5	102.2	94.5	42.8	0	33.0	544.8
Liters of Viable Eggs	3.4	46.2	14.8	41.1	60.3	64.9	59.8	27.4	0	0	317.9
Viable Eggs/Female	3,831	9,355	8,550	12,334	15,058	13,252	7,143	10,003	0	0	79,526
# Stocked Fry	114,920	963,600	461,710	1,122,650	2,072,411	1,920,612	1,216,443	796,787	0	0	8,669,133

in Anacostia River

Filtration system failure

Source: DDOE

Year Class	2008	2009	2010	2011	2012	Total
Age	7	6	5	4	3	
<b>Males</b>						
Number	1	7	4	3	1	16
% by year class	6%	44%	25%	19%	6%	100%
Av. TL (mm)	473	485	480	467	430	
Av. Wt. (kg)	1.05	1.09	1.05	1.03	1.03	
<b>Females</b>						
Number	1	0	11	6	0	18
% by year class	6%	0%	61%	33%	0%	100%
Av. TL (mm)	495		492	499		
Av. Wt. (kg)	1.42		1.33	1.29		
<b>Sexes Combined</b>						
Number	2	7	15	9	1	34
% by year class	6%	21%	44%	26%	3%	100%
Av. TL (mm)	484	485	489	488	430	
Av. Wt. (kg)	1.24	1.09	1.25	1.20	1.03	

Year Class	2009	2010	2011	2012	2013	Total
Age	7	6	5	4	3	
<b>Males</b>						
Number	0	1	3	5	4	13
% by year class	0%	8%	23%	38%	31%	100%
Av. TL (mm)		495	493	481	428	
Av. Wt. (kg)		1.00	0.96	0.89	0.70	
<b>Females</b>						
Number	2	11	15	15	4	47
% by year class	4%	23%	32%	32%	9%	100%
Av. TL (mm)	528	511	488	482	461	
Av. Wt. (kg)	1.27	1.18	1.10	0.95	0.96	
<b>Sexes Combined</b>						
Number	2	12	18	20	8	60
% by year class	3%	20%	30%	33%	13%	100%
Av. TL (mm)	528	510	489	482	444	
Av. Wt. (kg)	1.27	1.17	1.08	0.94	0.83	