

SUMMARY OF CONOWINGO DAM WEST FISH LIFT OPERATIONS – 2015

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INTRODUCTION

The shore-based trapping device at Conowingo Dam known as the West Fish Lift (WFL) has operated every spring since 1972 for the purpose of collecting and counting American Shad, river herring, other migratory species and resident fishes in the tailrace. Since 1985, most shad collected here have been sorted from the daily catch, placed into circular transport tanks, and stocked into suitable spawning waters upstream of the mainstem hydroelectric dams. During the spring runs of 1991 through 1996 the newer East Fish Lift at Conowingo Dam also served this purpose. With fish passage available at Holtwood and Safe Harbor dams since 1997, the Conowingo East Fish Lift was operated to pass all fish into the project head pond. Upstream licensees are no longer obligated to pay for trap and transport activities from Conowingo Dam but Exelon has agreed to keep the WFL operational to provide brood fish for egg collection efforts and biological samples for Atlantic States Marine Fisheries Commission (ASMFC) required fishery independent monitoring. Project details are coordinated with the resource agencies through the Susquehanna River Technical Committee (SRTC). Funding for contractor expenses for WFL operation, as well as shad tank spawning trials in 2015 was derived from annual contributions by the PA Fish and Boat Commission (PFBC) and Maryland DNR (MDNR). In the past, these contributed funds had been administered by the USFWS Susquehanna Coordinator. With the re-assignment of the USFWS Coordinator, PFBC made arrangements for The Alliance for the Chesapeake Bay to administer the funds and contract Normandeau Associates (NAI) to operate the WFL.

The objectives of Conowingo WFL operations in 2015 included: collection and enumeration of shad, river herring, and other migratory and resident fishes; and obtaining adult shad for an on-site tank spawning and shad egg collection program conducted at Conowingo Dam. Shad taken here are also monitored for DNR tags and sex ratios, and scale and head samples are taken for

age and otolith analysis. In addition to above objectives, Exelon operated the WFL to capture study fish (Gizzard Shad and American Shad) for radio-telemetry evaluations within the Conowingo Dam tailrace and fish lifts. This radio-telemetry study was a sole undertaking by Exelon in 2015; study results were not available prior to the drafting of this summary report. No shad or river herring were transported upstream in 2015.

METHODS

WFL operational procedures adopted by the SRTC included limiting the period of operation to a 7-week period from mid-April through early June (focusing on the period of peak shad migration) and to maximize egg production from tank spawning. Within these parameters the WFL was operated as in past years, maintaining appropriate entrance velocities and curbing use of adjacent units 1 and 2 whenever river flow dropped below 60,000 cfs. NAI was contracted to operate both Conowingo fish lifts and to conduct American Shad tank spawning trials with egg deliveries to the Van Dyke hatchery.

Average daily river flow at Conowingo Dam steadily decreased from 53,000cfs in late April to 21,000cfs in mid-May, followed by low and stable flows through the end of May (Figure 1). Water temperature during the same period increased from 56 to 74° F. Lift operations began on April 29 and occurred on 19 days through May 27 (compared to 27 days of operation in 2014). Total fishing effort over this period amounted to 194 lifts and a fishing time of 100.5 hours (compared to 321 lifts over 173 hours in 2014).

American Shad collected in the WFL were counted and either placed into holding or spawning tanks. Shad in excess of those needed for on-site spawning or for biological data were returned alive to the tailrace. Other species were identified, enumerated and returned to the tailrace. No live shad brood fish were provided to Maryland DNR for tank spawning in 2015. Every 25th shad in the WFL collection was sacrificed for otoliths and a scale sample was taken. Lengths and weights were measured, and sex ratios of shad in daily catches were recorded.

RESULTS

The WFL caught 242,208 fish of 29 taxa (Table 1). Gizzard shad comprised 95.5% of the total catch, with the next three most abundant species including White Perch (1.7%), Spottail Shiner (0.5%) and Shorthead Redhorse (0.5%). Some 875 American Shad were caught at the WFL, representing 0.4% of the total catch (Table 1). Daily catch and lift operations are summarized in Table 2. A total of 17 Blueback Herring and 29 Alewife were also caught at the WFL in 2015. Catch of American shad averaged 46 per operating day which was an improvement of the 19 per operating day in 2014. Peak American Shad catch occurred on May 13 (298 shad). A total of eight MDNR tagged American Shad were recapture in 2015; a single yellow tagged shad from 2014 tagging efforts (sacrificed for otolith analysis) and seven blue tagged shad from 2015 (returned live to the tailrace).

NAI used 558 American Shad at the WFL site for tank spawning. Of the 167 shad sacrificed for hatchery vs. wild analysis by PFBC, 38.6% were shown to be of hatchery origin in 2015. Males averaged 440 mm total length and 750g in weight, while females averaged 510mm and 1,238g. Overall male to female sex ratio of shad caught in the WFL was 1 to 0.63 (Table 3).

DISCUSSION

A total of 875 American Shad were captured at the WFL in 2015. This was an improvement of 2014 (513 total catch); although, 2015 was the second lowest catch total recorded since 1985. Peak American Shad catch occurred on May 13 (298 individuals) at a water temperature of 73.6° F (compared to the peak catch of 290 shad on April 29, 2014 at 56.9° F). WFL catch per effort of 8.7 shad per fishing hour was well below the long term average of 28 shad per fishing hour; although, this was a slight improvement over the 3.0 shad per fishing hour documented in 2014 (Table 4). River herring catch in 2015 showed a slight improvement over prior years. Only 13 Alewife were documented in the WFL catch of 2015, but this marked the second time in the last 10 years where more than 10 Alewife were captured in a single collection season. Blueback Herring catch totaled 233, which was the most documented since 2004. Despite the slight improvements in shad and river herring catch observed in 2015, annual catch of these species are still very depressed when compared to historical catches prior to the early 2000s. Operations and fish catch at the WFL during 1985-2015 are summarized in Table 5.

Figure 1. A plot of river flow (x 1000 cfs) as recorded at Marietta and water temperature (°F) recorded at Conowingo Dam versus the daily American shad catch at the West Fish Lift, spring 2015. The West Lift was not operated on 1, 4-5, 10, 14, 20, and 22-25 May 2015.

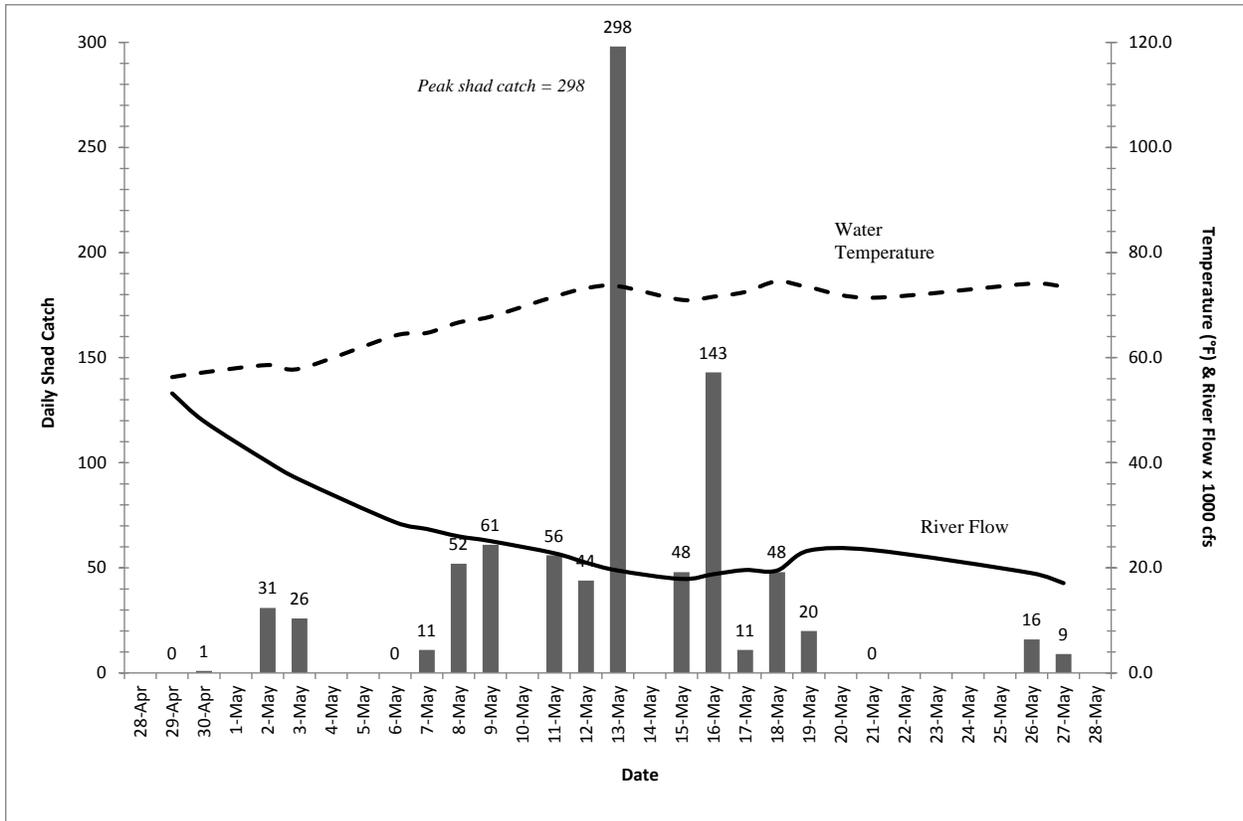


Table 1. Catch of fishes at the Conowingo Dam West Fish Lift, 2015.

Number of Days	19
Number of Lifts	194
Fishing Time (hours : minutes)	100:30
Number of Taxa	29
AMERICAN SHAD	875
HICKORY SHAD	0
BLUEBACK	
HERRING	17
ALEWIFE	29
GIZZARD SHAD	231,345
STRIPED BASS	883
AMERICAN EEL	64
Carp	57
White Perch	4,118
Hybrid Striped Bass*	12
Tiger Muskie*	6
Brown Trout	5
Quillback	7
Shorthead Redhorse	1,221
Brown Bullhead	185
Channel Catfish	583
Flathead Catfish	124
Rock Bass	34
Redbreast Sunfish	15
Green Sunfish	7
Pumpkinseed	23
Bluegill	136
Smallmouth Bass	275
Largemouth Bass	21
White Crappie	3
Black Crappie	4
Yellow Perch	53
Walleye	637
Atlantic Needlefish	34
Sea Lamprey	10
Comely Shiner	145
Spottail Shiner	1,280
Total	242,208

* Denotes hybrid fish

Table 2. Daily summary of fishes caught at Conowingo West Fish Lift, April 29 through May 27, 2015.

Date:	29-Apr	30-Apr	2-May	3-May	6-May	7-May	8-May	9-May
Day:	WEDNESDAY	THURSDAY	SATURDAY	SUNDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Number of Lifts:	3	13	15	10	7	16	15	15
Time of First Lift:	14:10	9:45	9:30	9:30	12:15	9:30	9:15	9:30
Time of Last lift:	15:30	16:30	16:40	14:45	16:30	16:30	16:30	16:40
Operating time (hours):	1:20	6:45	7:10	5:15	4:15	7:00	7:15	7:10
Average Water Temperature (°F):	56.3	57.2	58.6	57.9	64.2	64.7	66.7	67.8
American shad	0	1	31	26	0	11	52	61
Blueback herring	0	0	0	0	0	1	0	15
Alewife	0	0	4	24	0	0	0	1
Gizzard shad	3,300	22,525	21,180	10,885	12,525	25,350	23,100	24,325
Hickory shad	0	0	0	0	0	0	0	0
Striped bass	0	0	0	0	1	2	4	8
Hybrid Striped Bass	0	0	0	0	1	1	4	2
Carp	2	1	7	1	0	0	1	8
Other species	55	65	436	407	719	610	972	853
Total	3,357	22,592	21,658	11,343	13,246	25,975	24,133	25,273

Date:	11-May	12-May	13-May	15-May	16-May	17-May	18-May	19-May
Day:	MONDAY	TUESDAY	WEDNESDAY	FRIDAY	SATURDAY	SUNDAY	MONDAY	TUESDAY
Number of Lifts:	13	15	8	12	7	6	10	8
Time of First Lift:	9:30	10:40	9:55	11:50	9:25	12:45	9:35	12:30
Time of Last lift:	16:40	16:40	16:20	16:30	13:00	15:35	15:40	16:30
Operating time (hours):	7:10	6:00	6:25	4:40	3:35	2:50	6:05	4:00
Average Water Temperature (°F):	71.6	73.2	73.6	71.0	71.6	72.5	74.5	73.4
American shad	56	44	298	48	143	11	48	20
Blueback herring	1	0	0	0	0	0	0	0
Alewife	0	0	0	0	0	0	0	0
Gizzard shad	17,025	20,500	8,100	16,575	2,315	5,725	3,115	8,075
Hickory shad	0	0	0	0	0	0	0	0
Striped Bass	223	235	20	41	75	1	112	113
Hybrid Striped bass	1	0	0	0	0	0	1	0
Carp	7	7	2	5	0	5	2	5
Other species	1,987	971	424	133	394	127	295	142
Total	19,300	21,757	8,844	16,802	2,927	5,869	3,573	8,355

Table 2. Continued.

Date:	21-May	26-May	27-May	Total for
Day:	THURSDAY	TUESDAY	WEDNESDAY	the Year
Number of Lifts:	3	9	9	194
Time of First Lift:	10:05	9:25	8:30	
Time of Last lift:	12:20	14:15	15:00	
Operating time (hours):	2:15	4:50	6:30	100:30:00
Average Water Temperature (°F):	71.4	74.1	73.5	68.1
American shad	0	16	9	875
Blueback herring	0	0	0	17
Alewife	0	0	0	29
Gizzard shad	250	6090	385	231,345
Hickory shad	0	0	0	0
Striped bass	8	15	25	883
Hybrid Striped Bass	0	2	0	12
Carp	0	3	1	57
Other species	52	115	233	8,990
Total	310	6,241	653	242,208

Table 3. American Shad sex ratio information, Conowingo Dam West Fish Lift, 2015. No lift operations on May 1, 4-5, 10, 14, 20, and 22-25.

Date	Sample size	Males	Females	Male:Female Ratio
29-Apr	0	0	0	N/A
30-Apr	1	0	1	1: 0.00
2-May	31	19	12	1: 0.63
3-May	26	17	9	1: 0.53
6-May	0	0	0	N/A
7-May	11	8	3	1: 0.38
8-May	52	33	19	1: 0.58
9-May	61	33	28	1: 0.85
11-May	56	44	12	1: 0.27
12-May	44	29	15	1: 0.52
13-May	298	54	47	1: 0.87
15-May	48	34	14	1: 0.41
16-May	143	60	40	1: 0.67
17-May	11	6	5	1: 0.83
18-May	48	27	21	1: 0.78
19-May	20	16	4	1: 0.25
21-May	0	0	0	N/A
26-May	16	6	10	1: 1.67
27-May	9	3	6	1: 2.00
TOTAL	875	389	246	1: 0.63

Table 4. Catch and effort of American Shad taken at the Conowingo Dam West Fish Lift during primary collection periods,* 1985-2015.

Year	Number	Number	Fishing	Total Catch	Catch Per	Catch Per	Catch Per
	Days	Lifts	Hours		Day	Lift	Hour
1985	37	839	328.6	1,518	41	2	4.6
1986	53	737	431.5	5,136	97	7	11.9
1987	49	1,295	506.5	7,659	156	6	15.1
1988	54	1,166	471.7	5,137	95	4	10.9
1989	46	1,034	447.2	8,216	179	8	18.4
1990	62	1,247	541.0	15,958	257	13	29.5
1991	59	1,123	478.5	13,273	225	12	27.7
1992	61	1,517	566.0	10,323	169	7	18.2
1993	41	971	398.0	5,328	130	5	13.4
1994	44	918	414.0	5,595	127	6	13.5
1995	64	1,216	632.2	15,588	244	13	24.7
1996	27	441	245.2	11,458	424	26	46.7
1997	44	611	295.1	12,974	295	21	44.0
1998	26	476	238.6	6,577	253	14	27.6
1999	43	709	312.6	9,658	225	14	30.9
2000	34	424	206.5	9,785	288	23	47.4
2001	41	425	195.1	10,940	267	26	56.1
2002	31	417	147.1	9,347	302	22	63.5
2003	31	637	171.8	9,802	316	27	57.0
2004	14	151	74.3	3,426	245	23	46.1
2005	30	295	165.9	3,896	130	13	23.5
2006	37	394	214.9	3,970	107	10	18.5
2007	29	288	135.3	4,272	147	15	31.6
2008	34	481	174.4	2,627	77	5	15.1
2009	28	282	144.1	6,534	233	23	45.3
2010	27	238	138.2	5,605	208	24	40.6
2011	15	144	85.6	3,074	205	21	35.9
2012	37	404	244.0	1,486	40	4	6.1
2013	24	288	134.1	2,030	85	7	15.1
2014	27	321	173.1	513	19	2	3.0
2015	19	194	100.5	875	46	4	8.7

*Only applies to 1985-1995 data. Excludes early and late season catch and effort when less than 10 shad/day were taken.

Table 5. Operations and fish catch at Conowingo Dam West Fish Lift, 1985 - 2015.

Year	Number of Days	Total Fish (Millions)	Number of Taxa	American Shad	Hickory Shad	Alewife	Blueback Herring
1985	55	2.318	41	1,546	9	377	6,763
1986	59	1.831	43	5,195	45	2,822	6,327
1987	60	2.593	43	7,667	35	357	5,861
1988	60	1.602	49	5,169	64	712	14,570
1989	53	1.066	45	8,311	28	1,902	3,611
1990	72	1.188	44	15,964	77	425	9,658
1991	63	0.533	45	13,330	120	2,649	15,616
1992	64	1.560	46	10,335	376	3,344	27,533
1993	45	0.713	37	5,343	0	572	4,052
1994	47	0.564	46	5,615	1	70	2,603
1995	68	0.995	44	15,588	36	5,405	93,859
1996	28	1.233	39	11,473	0	1	871
1997	44	0.346	39	12,974	118	11	133,257
1998	41	0.575	38	6,577	6	31	5,511
1999	43	0.722	34	9,658	32	1,795	8,546
2000	34	0.458	37	9,785	1	9,189	14,326
2001	41	0.310	38	10,940	36	7,824	16,320
2002	31	0.419	35	9,347	0	141	428
2003	31	0.147	30	9,802	1	16	183
2004	14	0.039	30	3,426	0	0	1
2005	30	0.094	36	3,896	0	0	0
2006	37	0.163	38	3,970	0	2	6
2007	29	0.159	36	4,272	0	7	153
2008	34	0.733	37	2,627	0	2	7
2009	28	0.226	39	6,534	4	20	165
2010	27	0.158	36	5,605	1	1	81
2011	15	0.100	32	3,074	0	0	0
2012	37	0.322	38	1,486	0	0	7
2013	24	0.489	33	2,030	0	0	2
2014	27	0.597	33	513	0	13	233
2015	19	0.242	29	875	0	29	17