SUMMARY OF CONOWINGO DAM WEST FISH LIFT OPERATIONS – 2012

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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 West Fish Lift operational to provide brood fish for egg collection efforts and biological samples for 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 2012 was derived from annual contributions by the PA Fish and Boat Commission and Maryland DNR. 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 the Alliance contracted with Normandeau Associates to operate the WFL.

The objectives of Conowingo West Fish Lift operations in 2012 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. American shad collected from the WFL were also used for special studies in 2012. The Conowingo adult shad turbine survival study required 323 fish, the Conowingo EFL upstream fish passage effectiveness study required 35 adult shad, the York Haven downstream fish passage study required 64 shad, and 148 shad were utilized for the PPL Holtwood PIT-tag study.

METHODS

West Fish Lift operational procedures adopted by the SRTC included limiting the period of operation to the peak six weeks of the run (late April through the first week in June) and limiting daily lift operations to 8 hours (1100-1900 hrs.). Within these parameters the West Fish Lift 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. Normandeau Associates, Inc. (NAI) was contracted to operate both Conowingo fish lifts and to conduct American shad tank spawning trials with egg deliveries to Van Dyke hatchery.

Average daily river flow at Conowingo suffered 4 minor peaks and one major peak between April 1 and June 6 (Figure 1). Water temperature during the same period increased more or less gradually from 55 to 79° F. Lift operations began on April 23 and occurred on 37 days through June 1. Total fishing effort over this period amounted to 404 lifts and a fishing time of 244 hours.

American shad collected in the lift 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 2012. Every 50th shad in the West Fish Lift 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 West Fish Lift caught 322,053 fish of 40 taxa (Table 1). Gizzard shad comprised 95% of the total catch and the next three most numerous species, channel catfish, comely shiner and American shad comprised 3% of the total. Some 1,486 American shad were caught, representing 0.5% of the total catch (Table 2). Some seven blueback herring were also caught. Catch of American shad averaged 40 per operating day with a peak day catch of 135 shad on May 5. Normandeau Associates used 481 American shad at the lift site for tank spawning. Of the 121 shad sacrificed for hatchery vs. wild analysis by PFBC, 24% were shown to be of hatchery origin. Males averaged 440 mm in total length and 757 g while females averaged 511 mm and 1,319 g. Overall male to female sex ratio of shad in the West Fish Lift in 2012 was 1.0 to 1.3 (Table 3).

DISCUSSION

An early spring and low river flows in 2012 resulted in an early start for West Fish Lift operation on April 1. Peak catch occurred on May 5 with a catch of 135 American shad. West Fish Lift catch per effort of 6.1 shad per fishing hour was well below the long term average of 30 shad per fishing hour (Table 4). Operations and fish catch at the West Fish Lift during 1985-2011 are summarized in Table 5.

TABLES

TABLE 1. Catch of fishes at the Conowingo Dam West Fish Lift, 2012.

Number of Days	**37**
Number of Lifts	**404**
Fishing Time (hours : minutes)	**243:57**
Number of Taxa	**37**
AMERICAN SHAD	1,486
HICKORY SHAD	0
BLUEBACK HERRING	7
ALEWIFE	0
GIZZARD SHAD	306,895
STRIPED BASS	508
HYBRID STRIPED BASS	22
CARP	898
White Perch	1,555
American Eel	138
Brook Trout	5
Brown Trout	4
Goldfish	1
Golden Shiner	1
Comely Shiner	3,174
Spotfin Shiner	43
Spottail Shiner	7
Swallowtail Shiner	1
Mimic Shiner	1
Quillback	85
White Sucker	6
Shorthead Redhorse	322
Brown Bullhead	98
Yellow Bullhead	1
Channel Catfish	4,940
Flathead Catfish	209
Rock Bass	68
Redbreast Sunfish	6
Green Sunfish	2
Pumpkinseed	32
Bluegill	167
Smallmouth Bass	280
Largemouth Bass	26
White Crappie	4
Black Crappie	1
Yellow Perch	44
Walleye	614
Tesselated Darter	3
Atlantic Needlefish	366
Sea Lamprey	33
Total	**322,053**

TABLE 2. Daily summary of fishes collected at the Conowingo Dam West Fish Lift, 23 April - 1 June, 2012.

Date:	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	**for the Week**
Number of Lifts:	0	14	7	13	5	10	0	49
Time of First Lift:		9:05	8:30	8:40	12:15	8:40		
Time of Last lift:		15:30	13:50	15:50	15:00	15:15		
Operating time (hours):	0:00	6:25	5:20	7:10	2:45	6:35	0:00	28:15:00
Average Water Temperature (°F):		64.0	62.6	62.5	63.1	62.3		
American shad		82	46	101	43	9		281
Blueback herring		0	0	0	0	0		0
Alewife		0	0	0	0	0		0
Gizzard shad		11,175	4,750	12,300	4,500	16,650		49,375
Hickory shad		0	0	0	0	0		0
Striped bass		0	0	0	0	1		1
Carp		199	30	2	2	12		245
Other species		170	152	134	122	229		807
Total		11,626	4,978	12,537	4,667	16,901		50,709

Date:	29-Apr	30-Apr	1-May	2-May	3-May	4-May	5-May	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	**for the Week**
Number of Lifts:	11	10	10	10	12	12	13	78
Time of First Lift:	8:45	9:30	10:00	8:45	8:35	8:30	8:30	
Time of Last lift:	15:30	15:30	15:30	15:30	15:15	15:30	15:30	
Operating time (hours):	6:45	6:00	5:30	6:45	6:40	7:00	7:00	45:40:00
Average Water Temperature (°F):	59.0	58.6	57.7	57.8	58.8	59.5	61.4	
American shad	21	45	10	27	48	40	135	326
Blueback herring	0	0	0	0	0	1	0	1
Alewife	0	0	0	0	0	0	0	0
Gizzard shad	8,435	5,250	5,525	4,800	13,975	11,500	13,850	63,335
Hickory shad	0	0	0	0	0	0	0	0
Striped bass	0	0	2	3	0	0	18	23
Carp	15	0	0	1	2	0	2	20
Other species	85	41	41	100	78	190	802	1,337
Total	8,556	5,336	5,578	4,931	14,103	11,731	14,807	65,042

Table 2. (continued).

Date:	6-May	7-May	8-May	9-May	10-May	11-May	12-May	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	**for the Week**
Number of Lifts:	6	10	9	13	16	13	19	86
Time of First Lift:	11:20	8:45	8:30	8:15	8:30	8:15	8:28	
Time of Last lift:	15:15	15:30	15:30	15:30	15:30	15:30	15:45	
Operating time (hours):	3:55	6:45	7:00	7:15	7:00	7:15	7:17	46:27:00
Average Water Temperature (°F):	63.2	64.9	66.0	67.9	66.4	65.2	65.3	
American shad	121	7	35	38	10	22	32	265
Blueback herring	1	0	0	0	0	0	0	1
Alewife	0	0	0	0	0	0	0	0
Gizzard shad	2,750	14,800	7,250	10,700	20,850	10,650	25,000	92,000
Hickory shad	0	0	0	0	0	0	0	0
Striped bass	2	1	6	48	33	12	18	120
Carp	1	88	6	15	26	14	19	169
Other species	241	186	892	670	620	308	138	3,055
Total	3,116	15,082	8,189	11,471	21,539	11,006	25,207	95,610

Date:	13-May	14-May	15-May	16-May	17-May	18-May	19-May	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	**for the Week**
Number of Lifts:	15	16	11	17	11	14		84
Time of First Lift:	8:20	8:20	6:10	8:15	8:30	8:30		
Time of Last lift:	15:30	15:15	13:30	15:30	15:30	15:30		
Operating time (hours):	7:10	6:55	7:20	7:15	7:00	7:00	0:00	42:40:00
Average Water Temperature (°F):	65.4	65.8	65.8	67.2	67.6	67.6		
American shad	6	23	43	75	3	3		153
Blueback herring	0	0	0	1	0	0		1
Alewife	0	0	0	0	0	0		0
Gizzard shad	17,450	12,800	4,225	13,600	5,100	14,750		67,925
Hickory shad	0	0	0	0	0	0		0
Striped bass	12	13	57	40	5	5		132
Carp	45	14	2	44	220	77		402
Other species	133	198	370	181	358	406		1,646
Total	17,646	13,048	4,697	13,941	5,686	15,241		70,259

Table 2. (continued)

Date:	20-May	21-May	22-May	23-May	24-May	25-May	26-May	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	**for the Week**
Number of Lifts:	10	11	15	9	8	10		63
Time of First Lift:	8:40	8:30	8:20	8:20	8:30	8:15		
Time of Last lift:	15:30	15:30	15:30	15:30	15:30	15:30		
Operating time (hours):	6:50	7:00	7:10	7:10	7:00	7:15	0:00	42:25:00
Average Water Temperature (°F):	68.1	68.6	69.9	69.8	71.2	71.4		
American shad	28	61	54	102	59	22		326
Blueback herring	0	4	0	0	0	0		4
Alewife	0	0	0	0	0	0		0
Gizzard shad	7,950	4,450	7,970	1,427	2,880	2,706		27,383
Hickory shad	0	0	0	0	0	0		0
Striped bass	3	13	18	22	15	2		73
Carp	7	10	15	3	3	1		39
Other species	170	313	191	292	388	211		1,565
Total	8,158	4,851	8,248	1,846	3,345	2,942		29,390

Date:	27-May	28-May	29-May	30-May	31-May	1-Jun	**Total**	**Total**
Day:	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	**for the Week**	**for the Year**
Number of Lifts:	7	6	8	9	7	7	44	**404**
Time of First Lift:	9:00	10:10	8:30	8:05	8:30	9:15		
Time of Last lift:	15:30	15:30	15:30	15:30	15:30	14:30		
Operating time (hours):	6:30	5:20	7:00	7:25	7:00	5:15	38:30:00	**243:57:00**
Average Water Temperature (°F):	74.4	75.9	78.0	79.1	79.9	78.8		
American shad	50	11	12	18	43	1	135	**1,486**
Blueback herring	0	0	0	0	0	0	0	**7**
Alewife	0	0	0	0	0	0	0	**0**
Gizzard shad	565	445	2,485	2,352	622	408	6,877	**306,895**
Hickory shad	0	0	0	0	0	0	0	**0**
Striped bass	16	18	25	19	40	41	159	**508**
Carp	1	0	7	5	8	2	23	**898**
Other species	792	475	447	890	844	401	3,849	**12,259**
Total	1,424	949	2,976	3,284	1,557	853	11,043	**322,053**

TABLE 3. American shad sex ratio information, Conowingo West Fish Lift, 2012. No operation on 28 April, 19 May, and 26 May.

Date	Sample size	Males	Females	Male:Female Ratio
23-Apr	**82**	55	27	1: 0.5
24-Apr	**46**	28	18	1: 0.6
25-Apr	**101**	64	36	1: 0.6
26-Apr	**43**	25	18	1: 0.7
27-Apr	**9**	5	4	1: 0.8
29-Apr	**21**	11	10	1: 0.9
30-Apr	**45**	25	20	1: 0.8
1-May	**10**	6	4	1: 0.7
2-May	**27**	16	11	1: 0.7
3-May	**48**	31	17	1: 0.5
4-May	**40**	25	15	1: 0.6
5-May	**135**	87	48	1: 0.6
6-May	**121**	67	23	1: 0.3
7-May	**7**	5	2	1: 0.4
8-May	**35**	20	15	1: 0.8
9-May	**38**	31	7	1: 0.2
10-May	**10**	3	7	1: 2.3
11-May	**22**	16	6	1: 0.4
12-May	**32**	18	14	1: 0.8
13-May	**6**	4	2	1: 0.0
14-May	**23**	15	8	1: 0.5
15-May	**43**	27	16	1: 0.6
16-May	**75**	40	35	1: 0.9
17-May	**3**	1	2	1: 2.0
18-May	**3**	1	2	1: 2.0
20-May	**28**	12	16	1: 1.3
21-May	**61**	29	32	1: 1.1
22-May	**54**	19	35	1: 1.8
23-May	**102**	28	74	1: 2.6
24-May	**59**	23	36	1: 1.6
25-May	**22**	7	15	1: 1.6
27-May	**50**	13	37	1: 2.8
28-May	**11**	2	9	1: 4.5
29-May	**12**	7	5	1: 0.7
30-May	**18**	3	15	1: 5.0
31-May	**43**	7	36	1: 5.1
1-Jun	**1**	0	1	1: 0.0
Totals	**1,486**	**776**	**678**	**1: 0.9**

Table 4. Catch and effort of American shad taken at the Conowingo Dam West Fish Lift during primary collection periods,* 1985-2012.

Year	Number Days	Number Lifts	Fishing Hours	Total Catch	Catch Per Day	Catch Per Lift	Catch Per 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**	**243.9**	**1,486**	**40**	**4**	**6.1**

*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 West Fish Lift, 1985 - 2012.

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**	**37**	**1,486**	**0**	**0**	**7**

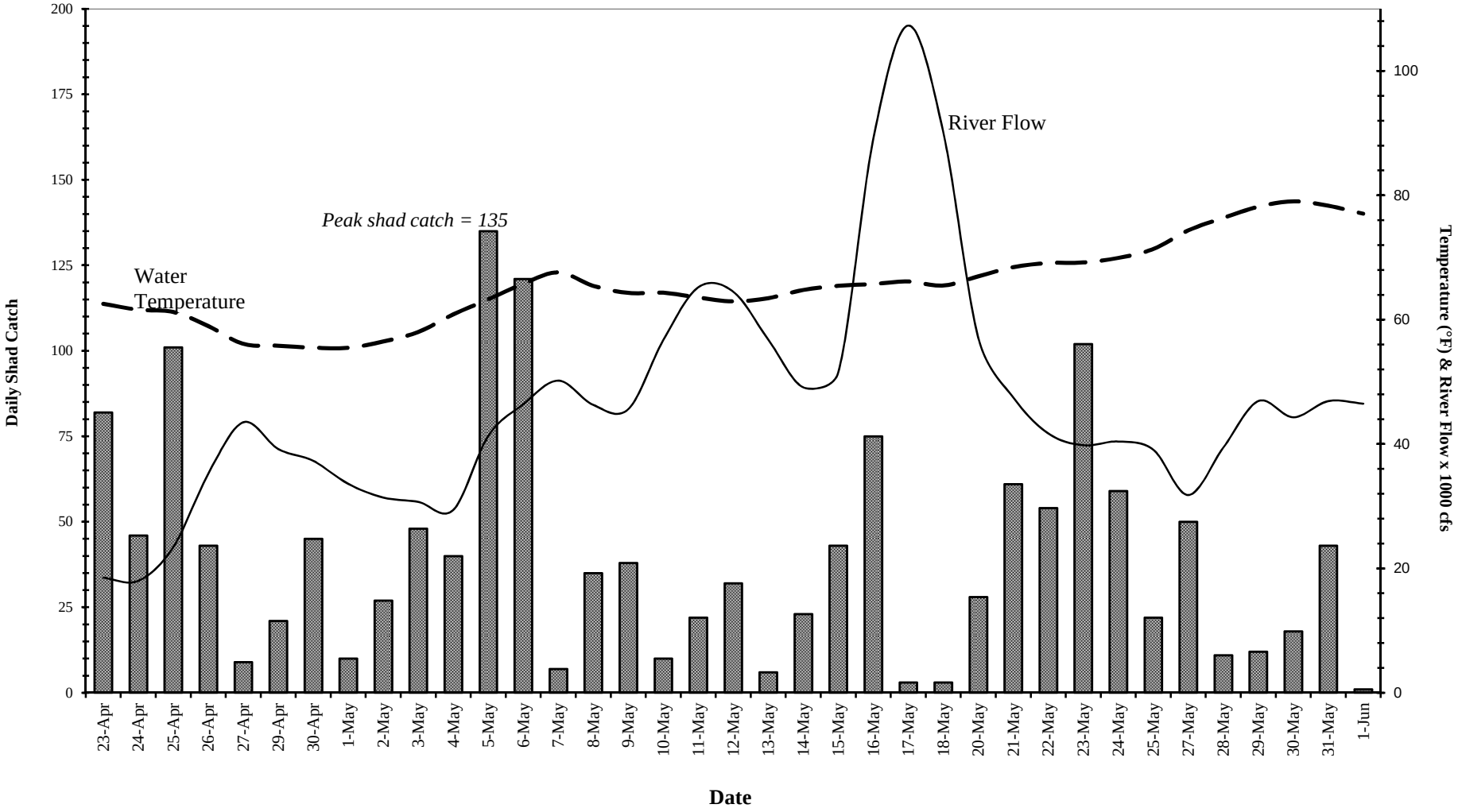

Figure 1 A plot of river flow (x 1000 cfs) and water temperature (°F) in relation to the daily American shad catch at the Conowingo West Fish Lift, spring 2012. The West Lift was not operated on 28 April, 19 May, and 26 May.