# SUMMARY OF OPERATIONS AT THE CONOWINGO DAM EAST FISH PASSAGE FACILITY SPRING 2012

**NOVEMBER 2012**

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## EXECUTIVE SUMMARY

Operation of the Conowingo East Fish Lift (EFL) began April 2, 2012 due to river water temperatures greater than 50.0°F and favorable river flow levels. The EFL operated for 62 days in 2012; the third longest season behind 1995 (68 days) and 1997 (64 days). A total of 1,230 lifts were completed in 2012, which is the highest number of lifts conducted at the EFL since the facility became operational in 1991. EFL operations were terminated, with agency concurrence on June 5, 2012. The 2012 fish passage season marks the twenty-second season of overall operation and the sixteenth year of volitional passage operation at the Conowingo EFL.

The EFL passed 1,109,911 fish of 33 species and two hybrids; the second highest fish passage total since the start of volitional passage in 1997. Gizzard shad (1,070,672), American shad (22,143), channel catfish (12,224), and quillback (1,523), dominated the catch, and comprised nearly 100% of the total fish collected and passed. Gizzard shad alone accounted for 96% of the total fish collected and passed.

A total of 22,143 American shad were passed. The highest daily shad catch occurred on 24 April when 1,710 shad were passed upstream. On 4 of the 62 days of operation, American shad passage exceeded 1,000 fish. On a daily basis, overall shad passage was strongest through the fishway between 1400 hrs and 1759 hrs during which 53% of shad passage occurred.

Fishway operations were conducted at water temperatures ranging from 54.0°F to 79.0°F and river flows between 13,700 and 107,300 cfs. Spillage occurred on 2 of the 62 days of operation. River flows fluctuated throughout the passage season but were well within the operating parameters of the EFL excepting the two days when spillage occurred. .

In 2012, fish passage at the EFL was not shut down due to spill. Based on information gained in previous years, the standard operating procedure when spill conditions are in effect is to cease operation of the EFL until spill conditions end. This SOP was not put into effect because of the limited nature of the spill events in 2012.

For most of the season, water clarity was adequate, allowing the viewing technicians to identify American shad with attached Maryland DNR floy tags. The number of floy tags observed at the Conowingo EFL in 2012 was 26 (24 orange from 2012; 2 pink from 2011).

Future operations of the EFL will build on the past sixteen years of operation experience.

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# 1.0 INTRODUCTION

Exelon Generation Company, LLC, formerly the Susquehanna Electric Company (SECO), has operated a fish passage facility (West lift) at its Conowingo Hydroelectric Station since 1972. Lift operations are part of a cooperative private, state, and federal effort to restore American shad (*Alosa sapidissima*) and other migratory fishes to the Susquehanna River. In accordance with the restoration plan, the operational goal had been to monitor fish populations below Conowingo Dam and transport pre-spawned migratory fishes upriver.

In 1988, the former PECO Energy Company negotiated an agreement with state and federal resource agencies and private organizations to enhance restoration of American shad and other anadromous species to the Susquehanna River. A major element of this agreement was for PECO Energy Company to construct an East Fish Lift Passage Facility (EFL) at Conowingo Dam. Construction of the EFL commenced in April 1990 and it was operational by spring 1991.

With the completion of fishways at Holtwood, Safe Harbor, and York Haven dams, the EFL has been operated to pass fish directly into Conowingo Pond since spring 1997.

Objectives of 2012 operation were: (1) monitor passage of migratory and resident fishes through the fishway; (2) assess fishway and trough effectiveness and make modifications as feasible; and (3) assist in the conduction of studies relating to Conowingo Relicensing issues.

# 2.0 CONOWINGO OPERATION

## 2.1 Project Operation

The Conowingo Hydroelectric Station, built in 1928, is located at river mile 10 on the Susquehanna River (RMC 1992). The powerhouse has a peaking generating capacity of 549.5 MW and a hydraulic capacity of approximately 85,000 cfs. Flows in excess of station draft are spilled through two regulating and 50 crest gates. The powerhouse contains seven vertical Francis (numbered 1 through 7) and four Kaplan (numbered 8 through 11) turbines. The seven Francis units have been equipped with aeration systems that permit a unit to draw air into the unit (vented mode) or operate conventionally (unvented mode). The four original Kaplan turbines installed in 1964 were replaced over a period of four years (1992 to 1996), with more efficient mixed-flow Kaplan type turbines.

Minimum flow releases from the station during the spring spawning and fishway operating season follow the schedule outlined in the settlement agreement. Minimum flows of 10,000 cubic feet per second (cfs) or natural river flow, whichever is less, as measured at the United States Geological Survey (USGS) gage at Marietta, PA were maintained for the period 1 to 30 April. A minimum flow of 7,500 cfs or natural river flow (as previously noted) was maintained for the period 1 to 31 May. A minimum flow of 5,000 cfs or natural river flow (as previously noted) is maintained when fish lift operations occur in June.

## 2.2 Fishway Operation

The start of operation for the EFL began on April 2, 2012 due to water temperatures greater than 50.0°F and river flows less than 30,000 cfs. A total of 642 American shad were passed on the initial start date. Everyday operation began immediately, and continued through 5 June. On 5 June, operations were terminated with Exelon and Agency approval. The EFL operated for 62 days in 2012; the third longest season behind 1995 (68 days) and 1997 (64 days). A total of 1,230 lifts were completed in 2012, which is the highest number of lifts conducted at the EFL since the facility became operational in 1991. The passage of 1,109,911 fish (all species combined) is the second highest passage total since the onset of volitional passage in 1997.

Daily operation times were planned during optimal fish passage parameters. This year, operational methodologies were influenced by natural river flows, water temperatures, generation and spill conditions, daily/hourly fish passage numbers and testing of a different EFL operation scenario that was part of the radio telemetry study supporting the Conowingo relicensing effort. This EFL operation scenario involved completion of at least 2 lift cycles per hour and 6:00 am starts every other day from 24 April until 28 May. Table 1 provides an overview of all EFL operations since 1991 and Table 2 provides a summary view of the EFL volitional passage operations. Daily EFL operation was conducted by a staff of three people: a lift operator, a supervising biologist, and a biological technician.

The mechanical aspects of East lift operation in 2012 were similar to those described in RMC (1992) and Normandeau Associates, Inc. (1999). Fishing time and/or lift frequency was determined by fish abundance, but the hopper was cycled at least twice an hour throughout the day unless interrupted by mechanical breakdowns. The method of lift operation was also influenced by fish abundance. When a great number of fish were in the fishing channel, the crowder was not operated; instead the crowder screen was raised and then lowered trapping fish over the hopper. This mode of operation, called "fast fish", involved leaving the crowder in the normal fishing position and raising the hopper frequently to remove fish that accumulated in the holding channel.

As in previous years, records of mechanical problems and failures were recorded. Table 3 provides a summary of mechanical breakdowns and/or high river flow events resulting in interruptions to fish passage that have occurred during EFL operation in various years. During the 2012 season, the air hoses that open and close the hopper door tangled and snapped multiple times. Mechanical issues in 2012 resulted in the loss of approximately 57 hours of operation. Three complete days of operation were lost due to mechanical issues (April 11, 23, and 26), and the remainder of the lost time occurred mostly at the beginning of a day or near the end of a day resulting in the conduction of fewer lifts. It is believed that modifying the hopper air hose arrangement will improve fish lift reliability in future years.

The specific entrance(s) used to attract fishes was dictated by the station discharge and which turbine units were operating. For example, when turbine units 8, 9, 10, and 11 or any combination of large turbines were operating, entrance C was the primary entrance used to attract fishes. Under these conditions the attraction flow through the other entrances is negated or disrupted. Depending on flow, and or generation, entrance A or C was utilized throughout the 2012 season to attract fishes.

### 2.3 Fish Counts

Fish that were lifted and sluiced into the trough were guided by a series of fixed screens. The fixed screens directed the fish to swim up and through a 3 ft wide channel and past a 4 ft by 10 ft counting window located on the west wall of the trough. Fish passing the counting window were identified to species and enumerated by a biologist and/or technician. Passage of fish by the window and out of the trough system was controlled by a set of gates located downstream of the counting window. During periods of peak passage, two people were used to identify and count fish.

At the end of each hour, fish passage data were recorded on data sheets and entered into a Microsoft Excel worksheet on a Personal Computer. Data processing and reporting were PC based and accomplished by program scripts, or macros, created within Microsoft Excel software. After the technician verified the correctness of the raw data, a daily summary of fish passage was produced and distributed in hard copy to plant personnel. Each day's data were backed up to a diskette and stored off site. Daily reports and weekly summaries of fish passage were electronically distributed to plant personnel and other cooperators.

# 3.0 RESULTS

## 3.1 Relative Abundance

The number of fishes collected and passed by the Conowingo Dam East fish lift is presented in Table 4. A total of 1,109,911 fish of 33 species and 2 hybrids passed upstream into Conowingo Pond. Gizzard shad (1,070,672), American shad (22,143), channel catfish (12,224), and quillback (1,523), dominated the catch, and comprised nearly 100% of the total fish collected and passed. Gizzard shad alone accounted for 96% of the total fish collected and passed. Peak passage occurred on 7 May when 56,704 fish, (75% gizzard shad), were passed.

## 3.2 American Shad Passage

The East lift collected and passed 22,143 American shad (Table 4). The first 642 American shad passed on the initial day of operation (April 2). Collection and passage of shad varied daily with 37% (8,158) of the shad passed from April 2 to April 21, 39% (8,665) passed from April 22 to May 11, 24% (5,280) passed from May 12 to May 31, and 0.2% passed from June 1to June 5(Figures 1 and 2). On 4 of the 62 days of operation, American shad passage exceeded 1,000 fish. Peak passage occurred on April 24 when 1,710 American shad were passed.

American shad were collected at water temperatures of 54.0 to 79.0°F and at natural river flows of 13,700 to 107,300 cfs (Table 5, Figure 3). The average daily river flow on those days when American shad passage exceeded 1,000 fish was approximately 25,375 cfs. The average daily river flow during the operational season was 38,910 cfs.

The hourly passage of American shad at the EFL is given in Table 6. On a daily basis, overall shad passage was strongest through the fishway between 1400 hrs and 1759 hrs during which 53% of shad passage occurred. The highest hourly passage rate occurred from 1600 to 1659 hours.

## 3.3 Gizzard Shad Passage

The East lift collected and passed 1,070,672 Gizzard shad (Table 4). Gizzard shad accounted for 96% of the total fish collected and passed. On 11 of 62 days of operation, Gizzard shad passage exceeded 30,000 fish. Table 2 provides the ratio of American shad to Gizzard shad for the years of volitional passage (1997-2012). In years with a strong American shad run (>50,000) the ratio ranges from 1:2 – 1:14 (American shad: Gizzard shad) and in years without a strong American shad run (<50,000) the ratio ranges from 1:16 – 1:48.

## 3.4 Other Alosids

A small number of river herring, (27 alewife and 25 blueback herring) were passed during the 2012 season. No hickory shad were passed in spring 2012.

## 3.5 Maryland tag-recapture

During the 2012 season, the EFL passed a total of 26 American shad that were captured, floy-tagged and released downstream of Conowingo dam by the Maryland DNR. The total number of floy tags observed at the Conowingo EFL in 2012 was 26; 24 orange from 2012, 2 pink from 2011 (Table 5).

## 4.0 SUMMARY

The EFL operated for 62 days in 2012; the third longest season behind 1995 (68 days) and 1997 (64 days). A total of 1,230 lifts were completed in 2012, which is the highest number of lifts conducted at the EFL since the facility became operational in 1991. The passage of 1,109,911 fish (all species combined) is the second highest passage total since the onset of volitional passage in 1997.

EFL operation was initiated on April 2 with the first 642 American shad passed on that day. The EFL passed 22,143 American shad from April 2 through June 5. The total number of American shad passed during the 2012 season was lower than passage values recorded in 2009 and 2010 (Table 7). It is also the sixth consecutive year in which the EFL passed less than 50,000 American shad.

Modifications made to the fish trough, particularly the valve grating and hopper trough chute since 1999 have diminished the potential for the valve grating to clog with various types of debris and have decreased the number of American shad lift mortalities observed throughout the last several fish passage seasons. Since the valve grating was modified prior to the start of the 2000 season, loss of water flow in the trough has not occurred, particularly during high river flow periods when large amounts of debris may enter the trough through the fish trough exit. An aeration system was also installed prior to the 2000 passage season to diminish low dissolved oxygen levels when the American shad population is heavy in the trough. Prior to fishway operations in 2002, a 30 inch diameter fiberglass elbow was attached to the hopper extension chute, which had been installed in 2001. The modification allows fish to enter the trough center stream, instead of being directed toward the east trough wall. A decrease in lift mortalities has also been observed since the fiberglass elbow was installed. A total of 282 American shad lift mortalities, (1.3% of the total shad passed), was observed in 2012, slightly higher to lift mortalities observed in recent years (0.2% to 1.0%) but less than values observed during trap and transport operations (1.5% to 10.5%).

## 5.0 RECOMMENDATIONS

1) Continue to operate the EFL at Conowingo Dam per annual guidelines developed and approved by the Susquehanna River Technical Committee. Lift operation should adhere to the guidelines; however, flexibility must remain with operating personnel to maximize fishway performance and fish passage.

2) Continue the use of two fish counters during periods of increased fish passage to accurately reflect the number of fish that pass through the EFL.

3) Continue to inspect cables, limit switches, and lift components to enhance season operability, and continue to evaluate effectiveness of fish trough modifications.

## 6.0 LITERATURE CITED

Normandeau Associates, Inc. 1999. Summary of the operations at the Conowingo Dam East fish passage facility in spring, 1998. Prepared for Susquehanna Electric Company, Darlington, MD.

RMC. 1992. Summary of the operations of the Conowingo Dam fish passage facilities in spring 1991. Prepared for Susquehanna Electric Company, Darlington, MD.

# TABLES AND FIGURES

**Table 1**

**Table 1. Summary of selected operation and fish catch statistics at the Conowingo Dam East Fish Passage Facility, 1991 to 2012.**

| Year | Number of Days Operated | Number of Lifts | Operating Time (hrs) | Catch (millions) | Number of Species | American shad | Blueback herring | Alewife | Hickory shad |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | 60 | 1168 | 647.2 | 0.651 | 42 | 13,897 | 13,149 | 323 | 0 |
| 1992 | 49 | 599 | 454.1 | 0.492 | 35 | 26,040 | 261 | 3 | 0 |
| 1993 | 42 | 848 | 463.5 | 0.530 | 29 | 8,203 | 4,574 | 0 | 0 |
| 1994 | 55 | 955 | 574.8 | 1.062 | 36 | 26,715 | 248 | 5 | 1 |
| 1995 | 68 | 986 | 706.2 | 1.796 | 36 | 46,062 | 4,004 | 170 | 1 |
| 1996 | 49 | 599 | 454.1 | 0.492 | 35 | 26,040 | 261 | 3 | 0 |
| 1997 | 64 | 652 | 640.0 | 0.719 | 36 | 90,971 | 242,815 | 63 | 0 |
| 1998 | 50 | 652 | 640.0 | 0.713 | 33 | 39,904 | 700 | 6 | 0 |
| 1999 | 52 | 610 | 467.0 | 1.184 | 31 | 69,712 | 130,625 | 14 | 0 |
| 2000 | 45 | 570 | 367.8 | 0.494 | 30 | 153,546 | 14,963 | 2 | 0 |
| 2001 | 43 | 559 | 359.8 | 0.922 | 30 | 193,574 | 284,921 | 7,458 | 0 |
| 2002 | 49 | 560 | 440.7 | 0.657 | 31 | 108,001 | 2,037 | 74 | 6 |
| 2003 | 44 | 645 | 416.6 | 0.589 | 25 | 125,135 | 530 | 21 | 0 |
| 2004 | 44 | 590 | 390.3 | 0.716 | 30 | 109,360 | 101 | 89 | 0 |
| 2005 | 52 | 541 | 434.3 | 0.378 | 30 | 68,926 | 4 | 0 | 0 |
| 2006 | 61 | 619 | 429.8 | 0.715 | 32 | 56,899 | 0 | 0 | 4 |
| 2007 | 39 | 479 | 335.3 | 0.539 | 31 | 25,464 | 460 | 429 | 0 |
| 2008 | 51 | 483 | 407.0 | 0.944 | 29 | 19,914 | 1 | 4 | 0 |
| 2009 | 57 | 618 | 495.6 | 0.915 | 30 | 29,272 | 71 | 160 | 0 |
| 2010 | 59 | 685 | 526.2 | 0.857 | 38 | 37,757 | 4 | 1 | 0 |
| 2011 | 15 | 259 | 142.4 | 0.289 | 24 | 20,571 | 17 | 2 | 20 |
| **2012** | **62** | **1230** | **633.7** | **1.110** | **35** | **22,143** | **25** | **27** | **0** |

**Table 2.**

**Table 2. General Summary Information for Conowingo EFL Volitional Passage, 1997 through 2012.**

| Year | #Days of Ops | #Hrs of Ops | Total # of Lifts | # Fish passed | # Am. shad | # Gizzard shad | # Herring | Avg.#fish/lift | Ratio A.S./Gizz |
|---|---|---|---|---|---|---|---|---|---|
| 1997 | 64 | 640 | 652 | 719,297 | 90,971 | 344,332 | 242,815 | 1,103 | 1/4 |
| 1998 | 50 | 433 | 460 | 712,993 | 39,904 | 654,575 | 706 | 1,550 | 1/16 |
| 1999 | 52 | 467 | 610 | 1,184,101 | 69,712 | 950,500 | 130,639 | 1,941 | 1/14 |
| 2000 | 45 | 368 | 570 | 493,955 | 153,546 | 317,753 | 14,965 | 866 | 1/2 |
| 2001 | 43 | 360 | 559 | 921,916 | 193,574 | 429,461 | 292,379 | 1,649 | 1/2 |
| 2002 | 49 | 440 | 560 | 656,894 | 108,001 | 513,794 | 2,111 | 1,173 | 1/5 |
| 2003 | 44 | 416 | 645 | 589,177 | 125,135 | 459,634 | 551 | 913 | 1/4 |
| 2004 | 44 | 390 | 590 | 715,664 | 109,360 | 602,677 | 190 | 1,212 | 1/6 |
| 2005 | 52 | 434 | 541 | 377,762 | 68,926 | 305,378 | 4 | 698 | 1/4 |
| 2006 | 61 | 430 | 619 | 714,918 | 56,899 | 655,990 | 0 | 1,154 | 1/12 |
| 2007 | 39 | 335 | 479 | 539,203 | 25,464 | 508,627 | 889 | 1,125 | 1/20 |
| 2008 | 51 | 409 | 483 | 943,838 | 19,914 | 919,975 | 5 | 1,954 | 1/46 |
| 2009 | 57 | 495 | 618 | 915,417 | 29,272 | 876,412 | 231 | 1,481 | 1/30 |
| 2010 | 59 | 526 | 685 | 857,263 | 37,757 | 813,429 | 5 | 1,251 | 1/22 |
| 2011 | 15 | 142 | 259 | 289,453 | 20,571 | 257,522 | 19 | 1,117 | 1/13 |
| 2012 | 62 | 633 | 1,230 | 1,109,911 | 22,143 | 1,070,672 | 52 | 902 | 1/48 |

**Table 3**

**Table 3. Comparison of Shutdown events (mechanical or high river flow) summarizing impacts to fish passage at the Conowingo EFL for various years**

| Categories | Year 2000 | 2001 | 2002 | 2005 | 2006 | 2008 | 2009 | 2010 | 2012 |
|---|---|---|---|---|---|---|---|---|---|
| Operations | | | | | | | | | |
| 1st Day of Operation | 10-Apr | 23-Apr | 8-Apr | 15-Apr | 3-Apr | 16-Apr | 1-Apr | 5-Apr | 2-Apr |
| Water Temperature | 48.6°F | 52.7°F | 51.0°F | 52.7°F | 52.7°F | 57.8°F | 49.0°F | 58.2°F | 57.0° |
| Every Other Day Operation | 4/10-4/18 | 24-Apr | 4/8-4/12 | 4/15-4/20 | 4/3-4/7 | NA | 4/3-4/19 | 4/5-4/13 | NA |
| Total days operated | 45 | 43 | 49 | 52 | 61 | 51 | 57 | 59 | 62 |
| Number of Lifts | 570 | 559 | 560 | 541 | 619 | 483 | 618 | 685 | 1230 |
| Hours of operation | 368 | 360 | 440 | 434 | 429 | 409 | 495 | 526 | 633 |
| Breakdowns/Repairs | | | | | | | | | |
| Event 1 | Hopper Hoist Motor failure | Crowder cables snapped | Sheave Wheel bearing seizure | Sheave Wheel bearing | Hopper cables slack and wrapped around screen | Hopper cables slack and rebuilding of the Sheave block | Crowder and Crowder Screen Hoist | Debris in trough and hopper | Air line sheave guide cable snapped |
| Dates | 4/28-5/3 | 11-May | 4/27-4/29 | 5/15-5/16 | 4-May | 4/27-4/29 | 4/10-4/13 | 18-Apr | 10-Apr |
| Hours Lost | 51.5 | 6 | 22 | 13 | 10 | 22 | 11 | 5 | 11.5 |
| Number of Am. shad caught a week to ten days after repairs completed | 112,899 (5/4-5/11) | 24,066 (5/12-5/19) | 24,613 (4/30-5/8) | 11,122 (5/17-5/25) | 15,135 (5/5-5/12) | 4,522 (4/30-5/8) | 606 (4/15-4/26)* | 15,004 (4/19-4/25) | 4,100 (4/12-4/18) |
| Number of Gizzard shad caught a week to ten days after repairs completed | 101,119 (5/4-5/11) | 118,316 (5/12-5/19) | 147,558 (4/30-5/8) | 48,912 (5/17-5/25) | 161,019 (5/5-5/12) | 187,626 (4/30-5/8) | 195,516 (4/15-4/26)* | 139,769 (4/19-4/25) | 162,187 (4/12-4/18) |
| Event 2 | NA | Hopper Door Malfunction | NA | NA | NA | NA | Debris clogged hopper pit | NA | Main Hopper cable frayed and guide cable snapped |
| Dates | NA | 27-May | NA | NA | NA | NA | 21-May | NA | 4/22-4/27 |
| Hours Lost | NA | 5.5 | NA | NA | NA | NA | 6 | NA | 35.5 |
| Number of Am. shad caught a week to ten days after repairs completed | NA | 2,328 (5/28-6/4) | NA | NA | NA | NA | 4,781 (5/22-5/29) | NA | 5,084 (4/27-5/5) |
| Number of Gizzard shad caught a week to ten days after repairs completed | NA | 12,163 (5/28-6/4) | NA | NA | NA | NA | 55,943 (5/22-5/29) | NA | 219,459 (4/27-5/5) |

**Table 3 Continued**

| River flow shut downs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dates | 5/27-5/29 | NA | 5/15-5/22 | NA | NA | NA | NA | NA | NA |
| River flow | >100,000 cfs | NA | | NA | NA | NA | NA | NA | NA |
| Hours Lost | 30 | NA | 90 | NA | NA | NA | NA | NA | NA |
| Season Downtime b/c of events | | | | | | | | | |
| Number of Days | 9 | 0 | 11 | 0 | 1 | 1 | 1 | 0 | 3 |
| Approximate # of hours | 87.5 | 31.5* | 112 | 13 | 10 | 22 | 17 | 5 | 47 |
| American Shad Information | | | | | | | | | |
| Am. Shad Season Catch | 153,546 | 193,423 | 108,001 | 68,926 | 56,899 | 19,914 | 29,272 | 37,757 | 22,134 |
| Day 1st Shad caught | 18-Apr | 23-Apr | 10-Apr | 20-Apr | 3-Apr | 16-Apr | 19-Apr | 7-Apr | 2-Apr |
| Water Temperature | 53.8°F | 52.7° | 52.0°F | 58.9°F | 52.7°F | 57.8°F | 53.3°F | 59.4°F | 57.0°F |
| Highest Day/Amount caught | 5/5 = 22,565 | 5/5=26,415 | 5/8=12,323 | 5/11=5235 | 5/3=6,130 | 5/11=1,943 | 5/4=4,670 | 4/20=3,272 | 4/24=1,710 |
| Bulk of Seaon Passage | | | | | | | | | |
| Dates | 5/4-5/11 | 4/29-5/8 | 5/4-5/13 | 5/4-5/17 | 4/30-5/15 | 4/24-5/11 | 4/30-5/17 | 4/19-5/3 | 4/18-4-27 |
| # of shad | 112,899 | 131,432 | 57,151 | 43,427 | 29,845 | 10,425 | 21,780 | 18,136 | 6,649 |
| Percentage of run | 73% | 68% | 53% | 63% | 52% | 52% | 74% | 48% | 30% |
| Dates | 5/12-5/25 | NA | NA | NA | NA | 5/25-5/31 | NA | 5/7-5/17 | NA |
| # of shad | 35,981 | NA | NA | NA | NA | 4,590 | NA | 12,312 | NA |
| Percentage of run | 23% | NA | NA | NA | NA | 23% | NA | 33% | NA |
| Total Run Percentage combined | 96% | 68% | 53% | 63% | 52% | 75% | 74% | 81% | 30% |
| Comments | | 20 hours were lost to Radio Telem Tagging in EFL trough | | | | | * Every other day passage until 4/19 | | |

**Table 4**

**Table 4. Summary of the daily number of fish passed by the Conowingo Dam East Fish Passage Facility in 2012.**

| *Date:* | *4/2* | *4/3* | *4/4* | *4/5* | *4/6* | *4/7* | *4/8* | *4/9* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *11:00* | *9:00* | *8:30* | *9:00* | *8:00* | *8:15* | *10:00* | *8:00* |
| *End Fishing Time:* | *18:30* | *18:29* | *18:30* | *18:30* | *18:30* | *18:30* | *18:30* | *18:30* |
| *Hours of Operation:* | *7.5* | *9.5* | *10.0* | *9.5* | *10.5* | *10.3* | *8.5* | *10.5* |
| *Number of Lifts:* | *15* | *16* | *20* | *19* | *20* | *20* | *17* | *17* |
| *Water Temperature (°F):* | *57.0* | *56.0* | *56.3* | *56.5* | *56.7* | *56.7* | *57.2* | *58.1* |
| AMERICAN SHAD | 642 | 80 | 571 | 232 | 152 | 298 | 313 | 176 |
| BLUEBACK HERRING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ALEWIFE | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| GIZZARD SHAD | 3,506 | 9,852 | 7,353 | 4,789 | 15,550 | 16,604 | 10,708 | 6,869 |
| STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| SEA LAMPREY | 1 | 5 | 1 | 0 | 0 | 0 | 1 | 1 |
| RAINBOW TROUT | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| BROWN TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| QUILLBACK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CHANNEL CATFISH | 9 | 7 | 22 | 26 | 22 | 7 | 7 | 12 |
| WHITE PERCH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HYBRID STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| SMALLMOUTH BASS | 0 | 3 | 3 | 5 | 0 | 1 | 1 | 3 |
| LARGEMOUTH BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| YELLOW PERCH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WALLEYE | 1 | 3 | 4 | 13 | 5 | 2 | 3 | 3 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | 4,169 | 9,950 | 7,955 | 5,068 | 15,729 | 16,912 | 11,034 | 7,070 |

**Table 4**

**Continued.**

| *Date:* | *4/10* | *4/11* | *4/12* | *4/13* | *4/14* | *4/15* | *4/16* | *4/17* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *8:50* | *9:30* | *8:30* | *8:20* | *8:00* | *8:00* | *8:15* | *8:15* |
| *End Fishing Time:* | *17:30* | *9:31* | *18:30* | *16:30* | *19:00* | *17:00* | *15:30* | *16:20* |
| *Hours of Operation:* | *8.7* | *0.0* | *10.0* | *8.2* | *11.0* | *7.5* | *7.3* | *8.1* |
| *Number of Lifts:* | *16* | *0* | *20* | *20* | *22* | *12* | *12* | *15* |
| *Water Temperature (°F):* | *58.3* | *58.3* | *57.2* | *58.1* | *58.7* | *59.4* | *62.6* | *64.1* |
| AMERICAN SHAD | 107 | 14 | 159 | 435 | 668 | 479 | 344 | 571 |
| BLUEBACK HERRING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ALEWIFE | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | 16,173 | 24 | 10,260 | 19,457 | 38,080 | 10,951 | 30,144 | 38,939 |
| STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SEA LAMPREY | 2 | 0 | 1 | 6 | 2 | 2 | 2 | 3 |
| RAINBOW TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| BROWN TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 |
| QUILLBACK | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | 0 | 0 | 0 | 2 | 1 | 3 | 0 | 0 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CHANNEL CATFISH | 28 | 0 | 24 | 73 | 7 | 34 | 31 | 24 |
| WHITE PERCH | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| HYBRID STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SMALLMOUTH BASS | 1 | 0 | 2 | 1 | 3 | 1 | 1 | 4 |
| LARGEMOUTH BASS | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| YELLOW PERCH | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| WALLEYE | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 0 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | 16,314 | 38 | 10,446 | 19,997 | 38,762 | 11,473 | 30,527 | 39,550 |

**Table 4**

**Continued.**

| *Date:* | *4/18* | *4/19* | *4/20* | *4/21* | *4/22* | *4/23* | *4/24* | *4/25* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *13:30* | *9:00* | *8:00* | *8:00* | *8:00* | | *6:00* | *8:00* |
| *End Fishing Time:* | *19:30* | *9:10* | *18:30* | *18:30* | *10:30* | | *19:00* | *11:15* |
| *Hours of Operation:* | *6.0* | *10.2* | *10.5* | *10.5* | *2.5* | | *13.0* | *3.3* |
| *Number of Lifts:* | *12* | *20* | *21* | *19* | *5* | | *25* | *6* |
| *Water Temperature (°F):* | *63.1* | *61.7* | *62.6* | *63.5* | *64.9* | | *62.3* | *63.3* |
| AMERICAN SHAD | 1,444 | 608 | 487 | 378 | 113 | | 1,710 | 239 |
| BLUEBACK HERRING | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| ALEWIFE | 0 | 1 | 0 | 0 | 0 | | 0 | 0 |
| GIZZARD SHAD | 14,356 | 25,644 | 25,404 | 14,751 | 4,971 | | 23,792 | 28,527 |
| STRIPED BASS | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| SEA LAMPREY | 1 | 3 | 2 | 3 | 1 | | 2 | 1 |
| RAINBOW TROUT | 0 | 0 | 0 | 0 | 0 | | 1 | 0 |
| BROWN TROUT | 0 | 0 | 0 | 1 | 0 | | 0 | 0 |
| MUSKELLUNGE | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| TIGER MUSKIE | 0 | 1 | 0 | 0 | 0 | | 0 | 0 |
| CARP | 3 | 5 | 0 | 7 | 18 | | 2 | 2 |
| QUILLBACK | 9 | 12 | 72 | 156 | 16 | | 45 | 1 |
| WHITE SUCKER | 0 | 1 | 0 | 0 | 0 | | 0 | 0 |
| SHORTHEAD REDHORSE | 0 | 1 | 8 | 6 | 5 | | 27 | 2 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| BROWN BULLHEAD | 0 | 0 | 7 | 14 | 0 | | 11 | 0 |
| CHANNEL CATFISH | 80 | 18 | 72 | 97 | 44 | | 102 | 35 |
| WHITE PERCH | 0 | 0 | 1 | 0 | 0 | | 0 | 0 |
| HYBRID STRIPED BASS | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| ROCK BASS | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| GREEN SUNFISH | 0 | 1 | 0 | 0 | 0 | | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| BLUEGILL | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| SMALLMOUTH BASS | 1 | 2 | 4 | 2 | 4 | | 15 | 14 |
| LARGEMOUTH BASS | 0 | 0 | 0 | 0 | 0 | | 1 | 2 |
| YELLOW PERCH | 0 | 0 | 0 | 1 | 0 | | 1 | 0 |
| WALLEYE | 1 | 1 | 1 | 0 | 0 | | 14 | 36 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | | 4 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| *Total* | 15,895 | 26,298 | 26,058 | 15,416 | 5,172 | | 25,727 | 28,859 |

**Table 4**

**Continued.**

| *Date:* | *4/26* | *4/27* | *4/28* | *4/29* | *4/30* | *5/1* | *5/2* | *5/3* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | | *8:10* | *5:45* | *8:00* | *9:15* | *8:30* | *8:00* | *8:00* |
| *End Fishing Time:* | | *18:30* | *18:15* | *17:00* | *18:30* | *18:00* | *19:00* | *18:00* |
| *Hours of Operation:* | | *10.3* | *12.5* | *9.0* | *9.3* | *9.5* | *11.0* | *10.0* |
| *Number of Lifts:* | | *20* | *24* | *16* | *11* | *19* | *22* | *20* |
| *Water Temperature (°F):* | | *61.7* | *60.0* | *59.5* | *58.8* | *58.1* | *59.6* | *60.0* |
| AMERICAN SHAD | | 1,670 | 227 | 154 | 215 | 89 | 521 | 88 |
| BLUEBACK HERRING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ALEWIFE | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | | 35,645 | 33,252 | 25,871 | 21,266 | 8,064 | 13,010 | 30,892 |
| STRIPED BASS | | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| SEA LAMPREY | | 3 | 4 | 0 | 6 | 2 | 0 | 3 |
| RAINBOW TROUT | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN TROUT | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| MUSKELLUNGE | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| TIGER MUSKIE | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | | 1 | 3 | 1 | 2 | 4 | 5 | 0 |
| QUILLBACK | | 9 | 15 | 1 | 1 | 7 | 11 | 1 |
| WHITE SUCKER | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | | 9 | 0 | 1 | 1 | 0 | 1 | 1 |
| YELLOW BULLHEAD | | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | | 14 | 1 | 0 | 0 | 0 | 0 | 4 |
| CHANNEL CATFISH | | 38 | 60 | 17 | 23 | 29 | 13 | 28 |
| WHITE PERCH | | 0 | 1 | 0 | 0 | 0 | 4 | 3 |
| HYBRID STRIPED BASS | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| GREEN SUNFISH | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| SMALLMOUTH BASS | | 14 | 5 | 4 | 7 | 2 | 0 | 6 |
| LARGEMOUTH BASS | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| YELLOW PERCH | | 0 | 2 | 0 | 0 | 0 | 1 | 1 |
| WALLEYE | | 14 | 35 | 0 | 5 | 5 | 2 | 9 |
| AMERICAN EEL | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FLATHEAD CATFISH | | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| LONGNOSE GAR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | | 37,418 | 33,605 | 26,049 | 21,526 | 8,206 | 13,571 | 31,038 |

**Table 4**

**Continued.**

| *Date:* | *5/4* | *5/5* | *5/6* | *5/7* | *5/8* | *5/9* | *5/10* | *5/11* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* |
| *End Fishing Time:* | *18:00* | *19:00* | *18:00* | *19:00* | *19:00* | *19:00* | *19:00* | *18:00* |
| *Hours of Operation:* | *12.0* | *11.0* | *12.0* | *11.0* | *13.0* | *11.0* | *13.0* | *10.0* |
| *Number of Lifts:* | *24* | *22* | *24* | *22* | *26* | *21* | *26* | *16* |
| *Water Temperature (°F):* | *60.0* | *63.2* | *63.5* | *64.4* | *64.4* | *65.3* | *65.7* | *65.3* |
| AMERICAN SHAD | 817 | 1,303 | 553 | 136 | 358 | 295 | 146 | 31 |
| BLUEBACK HERRING | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| ALEWIFE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | 25,331 | 26,128 | 42,813 | 56,265 | 38,345 | 35,030 | 44,157 | 14,071 |
| STRIPED BASS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| SEA LAMPREY | 0 | 0 | 2 | 4 | 2 | 2 | 3 | 1 |
| RAINBOW TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| BROWN TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 3 | 61 | 22 | 10 | 25 | 3 | 8 | 1 |
| QUILLBACK | 7 | 14 | 42 | 7 | 147 | 155 | 55 | 4 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | 2 | 8 | 4 | 5 | 22 | 20 | 6 | 0 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 4 | 5 | 38 | 76 | 0 | 19 | 5 | 0 |
| CHANNEL CATFISH | 19 | 128 | 195 | 151 | 97 | 240 | 844 | 110 |
| WHITE PERCH | 0 | 2 | 0 | 0 | 2 | 3 | 0 | 0 |
| HYBRID STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| BLUEGILL | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 |
| SMALLMOUTH BASS | 2 | 6 | 15 | 20 | 7 | 23 | 4 | 3 |
| LARGEMOUTH BASS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| YELLOW PERCH | 0 | 0 | 0 | 1 | 0 | 1 | 6 | 0 |
| WALLEYE | 6 | 9 | 38 | 27 | 66 | 60 | 42 | 12 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | 26,192 | 27,665 | 43,724 | 56,704 | 39,073 | 35,851 | 45,296 | 14,235 |

**Table 4**

**Continued.**

| *Date:* | *5/12* | *5/13* | *5/14* | *5/15* | *5/16* | *5/17* | *5/18* | *5/19* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* |
| *End Fishing Time:* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* |
| *Hours of Operation:* | *13.0* | *11.0* | *13.0* | *11.0* | *13.0* | *11.0* | *13.0* | *11.0* |
| *Number of Lifts:* | *26* | *22* | *25* | *21* | *26* | *22* | *26* | *22* |
| *Water Temperature (°F):* | *64.4* | *65.3* | *65.7* | *65* | *65.7* | *65.9* | *66.8* | *66.4* |
| AMERICAN SHAD | 95 | 141 | 994 | 161 | 119 | 7 | 9 | 5 |
| BLUEBACK HERRING | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| ALEWIFE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | 26,795 | 29,562 | 21,580 | 11,789 | 17,772 | 1,660 | 13,249 | 9,209 |
| STRIPED BASS | 2 | 1 | 20 | 0 | 2 | 5 | 2 | 5 |
| SEA LAMPREY | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| RAINBOW TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 3 | 1 | 0 | 2 | 2 | 11 | 2 | 0 |
| QUILLBACK | 7 | 2 | 3 | 47 | 22 | 5 | 7 | 0 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | 7 | 5 | 2 | 9 | 9 | 107 | 12 | 9 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CHANNEL CATFISH | 353 | 44 | 79 | 115 | 211 | 908 | 1,384 | 947 |
| WHITE PERCH | 1 | 0 | 0 | 2 | 3 | 0 | 0 | 1 |
| HYBRID STRIPED BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | 0 | 1 | 0 | 0 | 2 | 2 | 1 | 0 |
| SMALLMOUTH BASS | 3 | 3 | 4 | 2 | 3 | 0 | 2 | 0 |
| LARGEMOUTH BASS | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| YELLOW PERCH | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| WALLEYE | 19 | 3 | 21 | 8 | 30 | 12 | 4 | 1 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | 27,285 | 29,764 | 22,705 | 12,139 | 18,176 | 2,720 | 14,673 | 10,178 |

**Table 4**

**Continued.**

| *Date:* | *5/20* | *5/21* | *5/22* | *5/23* | *5/24* | *5/25* | *5/26* | *5/27* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* | *6:00* | *8:00* |
| *End Fishing Time:* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* | *19:00* |
| *Hours of Operation:* | *13.0* | *11.0* | *13.0* | *11.0* | *13.0* | *11.0* | *13.0* | *11.0* |
| *Number of Lifts:* | *26* | *22* | *26* | *22* | *26* | *22* | *26* | *22* |
| *Water Temperature (°F):* | *67.1* | *68.7* | *68.0* | *69.3* | *71.6* | *72.5* | *72.5* | *73.8* |
| AMERICAN SHAD | 314 | 417 | 454 | 769 | 503 | 380 | 384 | 327 |
| BLUEBACK HERRING | 1 | 1 | 0 | 0 | 0 | 0 | 13 | 6 |
| ALEWIFE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | 13,198 | 13,783 | 13,906 | 9,023 | 9,413 | 7,274 | 13,239 | 5,894 |
| STRIPED BASS | 2 | 1 | 0 | 2 | 9 | 4 | 5 | 3 |
| SEA LAMPREY | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| RAINBOW TROUT | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 3 |
| BROWN TROUT | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 2 | 3 | 2 | 10 | 19 | 7 | 0 | 9 |
| QUILLBACK | 3 | 189 | 9 | 49 | 68 | 26 | 34 | 54 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SHORTHEAD REDHORSE | 0 | 3 | 3 | 3 | 4 | 4 | 4 | 1 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| CHANNEL CATFISH | 206 | 132 | 53 | 80 | 228 | 417 | 187 | 214 |
| WHITE PERCH | 1 | 0 | 7 | 2 | 0 | 1 | 0 | 0 |
| HYBRID STRIPED BASS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | 2 | 3 | 1 | 2 | 0 | 0 | 1 | 3 |
| SMALLMOUTH BASS | 0 | 8 | 6 | 6 | 2 | 3 | 4 | 1 |
| LARGEMOUTH BASS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| YELLOW PERCH | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| WALLEYE | 10 | 7 | 9 | 13 | 29 | 18 | 23 | 10 |
| AMERICAN EEL | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 1,025 | 0 | 0 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Total* | 13,740 | 15,577 | 14,454 | 9,963 | 10,276 | 8,134 | 13,898 | 6,529 |

**Table 4**

**Continued.**

| *Date:* | *5/28* | *5/29* | *5/30* | *5/31* | *6/1* | *6/2* | *6/3* | *6/4* |
|---|---|---|---|---|---|---|---|---|
| *Start Fishing Time:* | *6:00* | *8:00* | *8:00* | *8:00* | *8:00* | *8:00* | *8:00* | *8:30* |
| *End Fishing Time:* | *19:00* | *19:00* | *19:00* | *18:00* | *17:30* | *15:30* | *15:30* | *15:30* |
| *Hours of Operation:* | *13.0* | *11.0* | *11.0* | *10.0* | *9.5* | *7.5* | *7.5* | *7.0* |
| *Number of Lifts:* | *25* | *22* | *22* | *20* | *19* | *15* | *15* | *13* |
| *Water Temperature (°F):* | *76.1* | *77.9* | *78.6* | *79.4* | *78.1* | *77.6* | *74.7* | *72.5* |
| AMERICAN SHAD | 100 | 32 | 47 | 22 | 11 | 20 | 2 | 2 |
| BLUEBACK HERRING | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| ALEWIFE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GIZZARD SHAD | 5,869 | 5,823 | 5,950 | 1,162 | 1,227 | 487 | 2,765 | 1,489 |
| STRIPED BASS | 2 | 6 | 8 | 11 | 18 | 10 | 3 | 1 |
| SEA LAMPREY | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| RAINBOW TROUT | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN TROUT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MUSKELLUNGE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TIGER MUSKIE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CARP | 18 | 11 | 16 | 11 | 4 | 4 | 0 | 0 |
| QUILLBACK | 132 | 33 | 20 | 5 | 10 | 1 | 5 | 1 |
| WHITE SUCKER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S. REDHORSE | 2 | 4 | 6 | 0 | 0 | 1 | 1 | 0 |
| YELLOW BULLHEAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWN BULLHEAD | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| CHANNEL CATFISH | 311 | 518 | 903 | 344 | 573 | 373 | 637 | 167 |
| WHITE PERCH | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| HYBRID STRIPED BASS | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| ROCK BASS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| GREEN SUNFISH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUMKINSEED | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLUEGILL | 0 | 2 | 2 | 0 | 3 | 0 | 4 | 0 |
| SMALLMOUTH BASS | 10 | 7 | 3 | 1 | 6 | 0 | 0 | 0 |
| LARGEMOUTH BASS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| YELLOW PERCH | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WALLEYE | 18 | 10 | 31 | 6 | 6 | 6 | 5 | 0 |
| AMERICAN EEL | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| SPLAKE (Brook x Lake Trout) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GOLDEN SHINER | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| COMELY SHINER | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| SPOTTAIL SHINER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATLANTIC NEEDLEFISH | 4 | 2 | 1 | 0 | 0 | 1 | 0 | 0 |
| FLATHEAD CATFISH | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| LONGNOSE GAR | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| *Total* | 6,475 | 6,450 | 6,993 | 1,565 | 1,859 | 904 | 3,424 | 1,660 |

**Table 4**

**Continued.**

| | | |
|---|---|---|
| *Date:* | *6/5* | ***Season*** |
| *Start Fishing Time:* | *8:00* | ***Total*** |
| *End Fishing Time:* | *15:30* | |
| *Hours of Operation:* | *7.5* | ***633.7*** |
| *Number of Lifts:* | *15* | ***1230.0*** |
| *Water Temperature (°F):* | *71.3* | |
| AMERICAN SHAD | 5 | **22,143** |
| BLUEBACK HERRING | 0 | **25** |
| ALEWIFE | 0 | **27** |
| GIZZARD SHAD | 1,710 | **1,070,672** |
| STRIPED BASS | 3 | **129** |
| SEA LAMPREY | 0 | **85** |
| RAINBOW TROUT | 0 | **14** |
| BROWN TROUT | 0 | **6** |
| MUSKELLUNGE | 0 | **3** |
| TIGER MUSKIE | 0 | **1** |
| CARP | 0 | **331** |
| QUILLBACK | 1 | **1,523** |
| WHITE SUCKER | 0 | **1** |
| SHORTHEAD REDHORSE | 0 | **334** |
| YELLOW BULLHEAD | 0 | **1** |
| BROWN BULLHEAD | 1 | **203** |
| CHANNEL CATFISH | 67 | **12,224** |
| WHITE PERCH | 0 | **39** |
| HYBRID STRIPED BASS | 0 | **3** |
| ROCK BASS | 0 | **5** |
| GREEN SUNFISH | 0 | **1** |
| PUMKINSEED | 1 | **3** |
| BLUEGILL | 1 | **39** |
| SMALLMOUTH BASS | 0 | **263** |
| LARGEMOUTH BASS | 0 | **13** |
| YELLOW PERCH | 0 | **21** |
| WALLEYE | 0 | **722** |
| AMERICAN EEL | 0 | **4** |
| SPLAKE (Brook x Lake Trout) | 0 | **6** |
| GOLDEN SHINER | 0 | **1** |
| COMELY SHINER | 9 | **1,051** |
| SPOTTAIL SHINER | 0 | **1** |
| ATLANTIC NEEDLEFISH | 0 | **13** |
| FLATHEAD CATFISH | 0 | **3** |
| LONGNOSE GAR | 0 | **1** |
| *Total* | 1,798 | **1,109,911** |

**Table 5.**

**Table 5. Summary of American shad catch, Maryland DNR recaptures, daily average river flow, water temperature, turbidity (secchi), unit operation, entrance gates utilized, attraction flow, and project water elevations during operation of the Conowingo Dam East Fish Passage Facility in 2012.**

| Date | American Shad Catch | MD DNR Recaptures* | Holtwood River Flow (cfs) | Water Temp. (°F) | Secchi (in) | Maximum Units in Operation | Entrance Gates Utilized | Attraction Flow (cfs) | Tailrace Elevation (ft) | Forebay Elevation (ft) | Crest Gates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *4/2* | 642 | | 26,400 | 54.4 | 24 | 8 | A/C | 310 | 18.5-23.0 | 107.2 | |
| *4/3* | 80 | | 26,700 | 54.0 | 25 | 11 | A/C | 310 | 18.5-23.5 | 107.3 | |
| *4/4* | 571 | | 27,600 | 54.6 | 25 | 11 | A/C | 310 | 18.5-23.5 | 106.5 | |
| *4/5* | 232 | | 25,600 | 55.5 | 30 | 7 | A/C | 310 | 18.5-22.5 | 106.7 | |
| *4/6* | 152 | | 26,200 | 56.3 | 28 | 9 | A/C | 310 | 18.8-20.5 | 106.7 | |
| *4/7* | 298 | | 22,900 | 56.6 | 28 | 10 | A/C | 310 | 18.5-23.0 | 107.9 | |
| *4/8* | 313 | | 23,200 | 56.8 | 28 | 5 | A/C | 310 | 18.5-21.0 | 107.2 | |
| *4/9* | 176 | | 21,000 | 56.8 | 20 | 9 | A/C | 310 | 19.0-20.5 | 106.7 | |
| *4/10* | 107 | | 19,100 | 56.5 | 24 | 5 | A/C | 310 | 18.5-21.0 | 107.0 | |
| *4/11** | 14 | | 19,000 | 55.6 | 24 | 5 | | 310 | | 108.2 | |
| *4/12* | 159 | | 18,400 | 55.1 | 24 | 5 | A/C | 310 | 18.5-19.0 | 107.8 | |
| *4/13* | 435 | | 16,100 | 54.9 | 25 | 7 | A/C | 310 | 18.4-22.7 | 107.2 | |
| *4/14* | 668 | | 17,100 | 54.9 | 26 | 4 | A | 310 | 18.1-19.9 | 108.2 | |
| *4/15* | 479 | *1-orange* | 16,000 | 55.4 | 28 | 5 | A/C | 310 | 18.4-19.0 | 107.6 | |
| *4/16* | 344 | | 16,100 | 56.5 | 30 | 5 | A | 310 | 18.0-20.0 | 107.4 | |
| *4/17* | 571 | | 15,500 | 59.3 | 34 | 3 | A | 310 | 18.3-19.0 | 107.3 | |
| *4/18* | 1444 | | 14,900 | 60.1 | 30 | 2 | A | 310 | 19.7 | 107.1 | |
| *4/19* | 608 | | 14,300 | 62.3 | 30 | 5 | A/C | 310 | 18.6 | 108.2 | |
| *4/20* | 487 | *1-orange* | 16,900 | 63.1 | 30 | 2 | A | 310 | 19.0 | 107.9 | |
| *4/21* | 378 | *2-orange* | 13,700 | 64.6 | 30 | 2 | A | 310 | 18.7-19.0 | 108.0 | |
| *4/22* | 113 | | 14,800 | 64.4 | 30 | 2 | A | 310 | 18.5 | 106.5 | |
| *4/23*** | | | | 62.5 | | | | | | | |
| *4/24* | 1710 | *1-orange* | 18,000 | 61.6 | 30 | 6 | A/C | 310 | 18.6-21.0 | 106.9 | |
| *4/25* | 239 | *1-orange* | 23,400 | 61.2 | 35 | 5 | C | 310 | 18.5-20.5 | 106.8 | |
| *4/26*** | | | | 59.0 | | | | | | | |
| *4/27* | 1670 | *2-orange* | 43,500 | 56.1 | 35 | 10 | A/C | 310 | 19.0-23.4 | 106.7 | |
| *4/28* | 227 | | 41,200 | 55.9 | 30-18 | 9 | A/C | 310 | 18.5-23.5 | 106.7 | |
| *4/29* | 154 | *1-orange* | 39,200 | 55.8 | 34 | 11 | A/C | 310 | 18.5-22.5 | 107.7 | |
| *4/30* | 215 | | 37,300 | | 30 | 11 | A/C | 310 | 19.5-23.5 | 108.0 | |
| *5/1* | 89 | | 33,600 | 56.5 | 30 | 11 | A/C | 310 | 19.0-23.2 | 107.4 | |
| *5/2* | 521 | *1-orange* | 31,400 | 58.0 | 26 | 10 | A/C | 310 | 19.0-23.2 | 107.1 | |
| *5/3* | 88 | | 30,700 | 60.9 | 30 | 10 | C | 310 | 21.0-22.8 | 106.8 | |
| *5/4* | 817 | *1-orange* | 29,400 | 63.3 | 30 | 10 | A/C | 310 | 18.5-23.0 | 106.8 | |
| *5/5* | 1303 | *2-orange* | 41,300 | 65.8 | 30 | 7 | A/C | 310 | 19.9-22.6 | 107.3 | |
| *5/6* | 553 | | 46,400 | 67.6 | 30 | 11 | A/C | 310 | 18.5-23.5 | 108.2 | |
| *5/7* | 136 | *1-orange* | 50,200 | 65.5 | 30 | 11 | C | 310 | 22.8-23.5 | 106.3 | |
| *5/8* | 358 | *2-orange* | 46,300 | 64.3 | 30 | 11 | A/C | 310 | 22.5-23.5 | 106.5 | |

**Table 5.**

**Continued.**

| Date | American Shad Catch | MD DNR Recaptures* | Holtwood River Flow (cfs) | Water Temp. (°F) | Secchi (in) | Maximum Units in Operation | Entrance Gates Utilized | Attraction Flow (cfs) | Tailrace Elevation (ft) | Forebay Elevation (ft) | Crest Gates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *5/9* | 295 | | 45,600 | 64.3 | 30 | 10 | C | 310 | 22.5-23.3 | 106.2 | |
| *5/10* | 146 | | 56,700 | 63.6 | 26 | 11 | C | 310 | 23.5 | 107.1 | |
| *5/11* | 31 | | 65,200 | 62.9 | 22 | 11 | C | 310 | 23.8 | 106.8 | |
| *5/12* | 95 | | 64,500 | 63.5 | 17 | 11 | C | 310 | 22.0-23.5 | 106.2 | |
| *5/13* | 141 | | 56,800 | 64.8 | 22 | 11 | C | 310 | 23.0 | 106.8 | |
| *5/14* | 994 | *3-orange* | 49,100 | 65.4 | 23 | 11 | C | 310 | 21.5-23.5 | 107.5 | |
| *5/15* | 161 | | 51,500 | 65.7 | 29-23 | 11 | C | 310 | 23.5 | 107.2 | |
| *5/16* | 119 | | 89,000 | 66.1 | 25 | 11 | C | 310 | 23.6 | 106.5 | |
| *5/17* | 7 | | 107,300 | 65.5 | 23 | 11 | C | 310 | 24.3 | 107.8 | |
| *5/18* | 9 | | 90,200 | 66.0 | 22 | 11 | C | 310 | 23.5 | 107.6 | |
| *5/19* | 5 | | 70,800 | 67.0 | 20 | 11 | C | 310 | 24.1 | 107.5 | |
| *5/20* | 314 | *1-pink* | 57,100 | 68.5 | 20 | 11 | C | 310 | 22.0 | 106.8 | |
| *5/21* | 417 | | 47,500 | 69.1 | 25 | 11 | C | 310 | 23.0 | 108.2 | |
| *5/22* | 454 | *1-orange* | 41,700 | 69.2 | 28 | 11 | A/C | 310 | 21.2 | 106.5 | |
| *5/23* | 769 | *3-orange; 1-pink* | 39,800 | 69.9 | 28 | 11 | A/C | 310 | 21.2 | 108.4 | |
| *5/24* | 503 | | 40,400 | 71.4 | 29 | 11 | A/C | 310 | 23.0 | 107.7 | |
| *5/25* | 380 | | 39,100 | 72.7 | 29 | 11 | A/C | 310 | 21.0 | 107.3 | |
| *5/26* | 384 | | 34,800 | 74.4 | 26 | 8 | A/C | 310 | 21.5 | 107.5 | |
| *5/27* | 327 | *1-orange* | 31,800 | 76.4 | 28 | 10 | A/C | 310 | 21.0 | 107.6 | |
| *5/28* | 100 | | 39,400 | 78.2 | 35 | 11 | A/C | 310 | 20.9 | 108.7 | |
| *5/29* | 32 | | 46,900 | 79.0 | 30 | 11 | C | 310 | 23.3 | 108.2 | |
| *5/30* | 47 | | 44,300 | 78.3 | 28 | 11 | C | 310 | 22.7 | 106.7 | |
| *5/31* | 22 | | 46,900 | 78.3 | 29 | 11 | C | 310 | 22.0 | 107.1 | |
| *6/1* | 11 | | 46,500 | 77.0 | 20 | 11 | A/C | 310 | 20.7 | 107.5 | |
| *6/2* | 20 | | 53,600 | 74.4 | 20-14 | 11 | C | 310 | 22.3 | 108.8 | |
| *6/3* | 2 | | 64,400 | 71.4 | 10-14 | 11 | C | 310 | 22.7 | 107.9 | |
| *6/4* | 2 | | 56,300 | 69.8 | 12 | 9 | C | 310 | 22.5 | 105.8 | |
| *6/5* | 5 | | 50,700 | 68.4 | 12-15 | 8 | C | 310 | 22.5 | 106.8 | |

*Viewing only, No operation

**No operation or viewing

**Table 6**

**Table 6. Hourly summary of American shad passage at the Conowingo Dam East Fish Passage Facility in 2012.**

| ***Date:*** | *4/2* | *4/3* | *4/4* | *4/5* | *4/6* | *4/7* | *4/8* | *4/9* | *4/10* | *4/11* | *4/12* | *4/13* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | *11:00* | *9:00* | *8:30* | *8:30* | *8:20* | *8:20* | *10:00* | *8:30* | *8:20* | *9:30* | *8:30* | *8:30* |
| ***Observation Time-End:*** | *18:45* | *18:48* | *18:45* | *18:45* | *18:45* | *18:45* | *18:48* | *18:45* | *18:15* | *14:30* | *18:45* | *16:45* |
| **Military Time (hrs)** | | | | | | | | | | | | |
| 0600 to 0659 | | | | | | | | | | | | |
| 0700 to 0759 | | | | | | | | | | | | |
| 0800 to 0859 | | | 1 | 4 | 1 | 0 | | 10 | 3 | | 2 | 1 |
| 0900 to 0959 | | 12 | 2 | 6 | 3 | 0 | | 6 | 2 | 7 | 2 | 7 |
| 1000 to 1059 | | 10 | 0 | 3 | 0 | 2 | 3 | 0 | 1 | | 1 | 2 |
| 1100 to 1159 | 0 | 8 | 1 | 0 | 3 | 3 | 3 | 11 | 1 | 3 | 3 | 42 |
| 1200 to 1259 | 2 | 24 | 49 | 8 | 72 | 12 | 5 | 11 | 4 | 3 | 3 | 137 |
| 1300 to 1359 | 98 | 1 | 186 | 49 | 30 | 31 | 55 | 22 | 0 | 1 | 11 | 112 |
| 1400 to 1459 | 143 | 6 | 174 | 58 | 15 | 114 | 41 | 20 | 11 | | 29 | 59 |
| 1500 to 1559 | 162 | 8 | 94 | 46 | 5 | 100 | 48 | 36 | 16 | | 43 | 40 |
| 1600 to 1659 | 131 | 3 | 51 | 31 | 9 | 23 | 62 | 39 | 35 | | 46 | 18 |
| 1700 to 1759 | 68 | 6 | 11 | 21 | 7 | 9 | 64 | 15 | 31 | | 12 | 12 |
| 1800 to 1859 | 38 | 2 | 2 | 6 | 7 | 4 | 32 | 6 | 3 | | 7 | 5 |
| 1900 to 1959 | | | | | | | | | | | | |
| ***Total*** | 642 | 80 | 571 | 232 | 152 | 298 | 313 | 176 | 107 | 14 | 159 | 435 |

| ***Date:*** | *4/14* | *4/15* | *4/16* | *4/17* | *4/18* | *4/19* | *4/20* | *4/21* | *4/22* | *4/23* | *4/24* | *4/25* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | *8:15* | *8:15* | *8:30* | *8:30* | *11:30* | *8:25* | *8:20* | *8:20* | *8:15* | | *6:30* | *8:15* |
| ***Observation Time-End:*** | *19:25* | *17:00* | *16:00* | *16:30* | *19:45* | *19:30* | *19:00* | *18:50* | *11:55* | | *19:35* | *12:00* |
| **Military Time (hrs)** | | | | | | | | | | | | |
| 0600 to 0659 | | | | | | | | | | | 1 | |
| 0700 to 0759 | 1 | 34 | 1 | 18 | | | | | | | 3 | |
| 0800 to 0859 | 0 | 10 | 15 | 19 | | 13 | 22 | 19 | 74 | | 4 | 4 |
| 0900 to 0959 | 3 | 16 | 3 | 2 | | 55 | 13 | 22 | 27 | | 5 | 209 |
| 1000 to 1059 | 3 | 16 | 2 | 3 | | 28 | 13 | 5 | 9 | | 10 | 11 |
| 1100 to 1159 | 1 | 51 | 8 | 0 | | 9 | 12 | 5 | 3 | | 117 | 15 |
| 1200 to 1259 | 5 | 107 | 17 | 3 | | 9 | 4 | 5 | | | 135 | |
| 1300 to 1359 | 6 | 96 | 182 | 75 | 23 | 15 | 5 | 7 | | | 57 | |
| 1400 to 1459 | 48 | 130 | 116 | 171 | 240 | 64 | 11 | 12 | | | 169 | |
| 1500 to 1559 | 145 | 19 | | 280 | 387 | 150 | 46 | 51 | | | 368 | |
| 1600 to 1659 | 208 | | | | 292 | 125 | 81 | 71 | | | 417 | |
| 1700 to 1759 | 190 | | | | 233 | 80 | 170 | 71 | | | 208 | |
| 1800 to 1859 | 58 | | | | 181 | 32 | 110 | 110 | | | 110 | |
| 1900 to 1959 | | | | | 88 | 28 | | | | | 106 | |
| ***Total*** | 668 | 479 | 344 | 571 | 1,444 | 608 | 487 | 378 | 113 | 0 | 1,710 | 239 |

**Table 6 (Continued)**

| ***Date:*** | *4/26* | *4/27* | *4/28* | *4/29* | *4/30* | *5/1* | *5/2* | *5/3* | *5/4* | *5/5* | *5/6* | *5/7* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | | *8:30* | *6:10* | *8:15* | *8:30* | *8:15* | *8:00* | *8:15* | *6:00* | *8:00* | *6:00* | *8:00* |
| ***Observation Time-End:*** | | *18:45* | *18:30* | *17:15* | *19:00* | *18:26* | *19:30* | *18:15* | *18:15* | *19:30* | *18:15* | *19:25* |
| **Military Time (hrs)** | | | | | | | | | | | | |
| 0600 to 0659 | | | 21 | | | | | | 1 | | 5 | |
| 0700 to 0759 | | | 13 | | | | | | 29 | | 61 | |
| 0800 to 0859 | | 3 | 12 | 13 | | 11 | 11 | 19 | 66 | 58 | 77 | 18 |
| 0900 to 0959 | | 5 | 5 | 30 | 6 | 27 | 7 | 27 | 15 | 28 | 86 | 14 |
| 1000 to 1059 | | 5 | 1 | 11 | 10 | 4 | 5 | 4 | 27 | 5 | 45 | 3 |
| 1100 to 1159 | | 8 | 5 | 3 | 5 | 1 | 1 | 3 | 8 | 2 | 66 | 1 |
| 1200 to 1259 | | 18 | 2 | 2 | 10 | 2 | 0 | 2 | 26 | 7 | 33 | 13 |
| 1300 to 1359 | | 121 | 3 | 1 | 2 | 3 | 1 | 3 | 40 | 22 | 38 | 21 |
| 1400 to 1459 | | 250 | 11 | 9 | 6 | 2 | 14 | 2 | 125 | 190 | 39 | 4 |
| 1500 to 1559 | | 369 | 20 | 41 | 3 | 6 | 34 | 10 | 196 | 231 | 24 | 5 |
| 1600 to 1659 | | 633 | 47 | 30 | 3 | 9 | 126 | 9 | 202 | 233 | 20 | 21 |
| 1700 to 1759 | | 214 | 71 | 14 | 81 | 13 | 129 | 9 | 57 | 237 | 44 | 18 |
| 1800 to 1859 | | 44 | 16 | | 89 | 11 | 139 | 0 | 25 | 217 | 15 | 13 |
| 1900 to 1959 | | | | | | | 54 | | | 73 | | 5 |
| ***Total*** | 0 | 1,670 | 227 | 154 | 215 | 89 | 521 | 88 | 817 | 1,303 | 553 | 136 |

| ***Date:*** | *5/8* | *5/9* | *5/10* | *5/11* | *5/12* | *5/13* | *5/14* | *5/15* | *5/16* | *5/17* | *5/18* | *5/19* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | *6:00* | *8:00* | *6:00* | *8:00* | *6:25* | *8:00* | *6:15* | *8:15* | *6:10* | *8:10* | *6:15* | *8:15* |
| ***Observation Time-End:*** | *19:20* | *19:15* | *19:20* | *18:30* | *19:25* | *19:15* | *19:25* | *19:15* | *19:20* | *19:15* | *19:15* | *19:15* |
| **Military Time (hrs)** | | | | | | | | | | | | |
| 0600 to 0659 | 2 | | 13 | | | | 11 | | 12 | | 0 | |
| 0700 to 0759 | 9 | | 16 | | 1 | | 13 | | 4 | | 1 | |
| 0800 to 0859 | 2 | 29 | 9 | 2 | 1 | 3 | 161 | 2 | 7 | 3 | 1 | 0 |
| 0900 to 0959 | 10 | 61 | 8 | 2 | 3 | 8 | 279 | 16 | 14 | | 0 | 2 |
| 1000 to 1059 | 12 | 29 | 7 | 3 | 7 | 8 | 108 | 35 | 6 | | 0 | 2 |
| 1100 to 1159 | 12 | 37 | 2 | 6 | 2 | 4 | 115 | 38 | 15 | | 1 | 0 |
| 1200 to 1259 | 19 | 41 | 4 | 3 | 6 | 5 | 66 | 18 | 13 | 2 | 0 | 0 |
| 1300 to 1359 | 33 | 34 | 11 | 0 | 8 | 15 | 56 | 9 | 14 | 1 | 2 | 0 |
| 1400 to 1459 | 46 | 22 | 19 | 7 | 14 | 27 | 44 | 10 | 5 | | 0 | 0 |
| 1500 to 1559 | 68 | 9 | 8 | 6 | 2 | 18 | 30 | 7 | 2 | | 1 | 1 |
| 1600 to 1659 | 49 | 3 | 17 | 1 | 1 | 27 | 41 | 14 | 3 | 1 | 1 | 0 |
| 1700 to 1759 | 46 | 1 | 16 | 1 | 3 | 16 | 17 | 3 | 9 | | 2 | 0 |
| 1800 to 1859 | 29 | 23 | 14 | 0 | 22 | 8 | 28 | 8 | 13 | | 0 | 0 |
| 1900 to 1959 | 21 | 6 | 2 | | 25 | 2 | 25 | 1 | 2 | | 0 | 0 |
| ***Total*** | 358 | 295 | 146 | 31 | 95 | 141 | 994 | 161 | 119 | 7 | 9 | 5 |

**Table 6 (Continued)**

| ***Date:*** | *5/20* | *5/21* | *5/22* | *5/23* | *5/24* | *5/25* | *5/26* | *5/27* | *5/28* | *5/29* | *5/30* | *5/31* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | *6:00* | *8:00* | *6:15* | *8:15* | *6:00* | *8:15* | *6:20* | *8:00* | *6:00* | *8:15* | *8:00* | *8:00* |
| ***Observation Time-End:*** | *19:15* | *19:25* | *19:15* | *19:30* | *19:15* | *19:20* | *19:20* | *19:15* | *19:15* | *19:20* | *19:15* | *18:10* |
| **Military Time (hrs)** | | | | | | | | | | | | |
| 0600 to 0659 | 0 | | 68 | | 13 | | 8 | | 1 | | | |
| 0700 to 0759 | 7 | | 122 | | 13 | | 63 | | 18 | | | |
| 0800 to 0859 | 2 | 23 | 99 | 93 | 38 | 41 | 73 | 24 | 30 | 2 | 3 | 2 |
| 0900 to 0959 | 8 | 22 | 34 | 187 | 60 | 120 | 44 | 131 | 11 | 3 | 0 | 10 |
| 1000 to 1059 | 7 | 58 | 11 | 86 | 104 | 91 | 52 | 64 | 7 | 8 | 3 | 3 |
| 1100 to 1159 | 5 | 52 | 26 | 84 | 75 | 41 | 40 | 27 | 9 | 8 | 10 | 0 |
| 1200 to 1259 | 6 | 39 | 12 | 29 | 73 | 21 | 26 | 21 | 2 | 1 | 10 | 2 |
| 1300 to 1359 | 13 | 21 | 22 | 32 | 37 | 26 | 14 | 25 | 4 | 3 | 1 | 2 |
| 1400 to 1459 | 31 | 16 | 22 | 34 | 21 | 15 | 9 | 7 | 9 | 1 | 2 | 1 |
| 1500 to 1559 | 45 | 31 | 16 | 32 | 20 | 4 | 12 | 5 | 5 | 0 | 0 | 1 |
| 1600 to 1659 | 65 | 57 | 7 | 73 | 7 | 3 | 10 | 2 | 4 | 0 | 1 | 0 |
| 1700 to 1759 | 75 | 31 | 6 | 49 | 14 | 5 | 9 | 11 | 0 | 0 | 5 | 1 |
| 1800 to 1859 | 37 | 52 | 8 | 43 | 18 | 6 | 20 | 9 | | 4 | 9 | 0 |
| 1900 to 1959 | 13 | 15 | 1 | 27 | 10 | 7 | 4 | 1 | | 2 | 3 | |
| ***Total*** | 314 | 417 | 454 | 769 | 503 | 380 | 384 | 327 | 100 | 32 | 47 | 22 |

| ***Date:*** | *6/1* | *6/2* | *6/3* | *6/4* | *6/5* | *Season* |
|---|---|---|---|---|---|---|
| ***Observation Time-Start:*** | *8:30* | *8:00* | *8:00* | *8:30* | *8:00* | *Total* |
| ***Observation Time-End:*** | *18:00* | *16:00* | *16:00* | *16:00* | *16:00* | |
| **Military Time (hrs)** | | | | | | |
| 0600 to 0659 | | | | | | **156** |
| 0700 to 0759 | | | | | | **427** |
| 0800 to 0859 | 0 | 0 | 0 | 0 | 0 | **1,140** |
| 0900 to 0959 | 3 | 2 | 0 | 0 | 1 | **1,691** |
| 1000 to 1059 | 1 | 5 | 2 | 0 | 0 | **961** |
| 1100 to 1159 | 1 | 6 | 0 | 1 | 0 | **1,019** |
| 1200 to 1259 | 1 | 3 | 0 | 1 | 0 | **1,154** |
| 1300 to 1359 | 1 | 2 | 0 | 0 | 1 | **1,704** |
| 1400 to 1459 | 1 | 1 | 0 | 0 | 2 | **2,649** |
| 1500 to 1559 | 0 | 1 | 0 | 0 | 1 | **3,308** |
| 1600 to 1659 | 1 | | | | | **3,363** |
| 1700 to 1759 | 2 | | | | | **2,417** |
| 1800 to 1859 | | | | | | **1,633** |
| 1900 to 1959 | | | | | | **521** |
| ***Total*** | 11 | 20 | 2 | 2 | 5 | **22,143** |

**Table 7**

**Table 7. Summary of American shad passage counts and percent passage values at Susquehanna River dams, 1997-2012.**

| | Conowingo | Holtwood | | Safe Harbor | | York Haven | |
|---|---|---|---|---|---|---|---|
| | East | Number | % of C.E.L. | Number | % of Holt. | Number | % of S.H. |
| 1997 | 90,971 | 28,063 | 30.8% | 20,828 | 74.2% | - | - |
| 1998 | 39,904 | 8,235 | 20.6% | 6,054 | 73.5% | - | - |
| 1999 | 69,712 | 34,702 | 49.8% | 34,150 | 98.4% | - | - |
| 2000 | 153,546 | 29,421 | 19.2% | 21,079 | 71.6% | 4,687 | 22.2% |
| 2001 | 193,574 | 109,976 | 56.8% | 89,816 | 81.7% | 16,200 | 18.0% |
| 2002 | 108,001 | 17,522 | 16.2% | 11,705 | 66.8% | 1,555 | 13.3% |
| 2003 | 125,135 | 25,254 | 20.2% | 16,646 | 65.9% | 2,536 | 15.2% |
| 2004 | 109,360 | 3,428 | 3.1% | 2,109 | 61.5% | 219 | 10.4% |
| 2005 | 68,926 | 34,189 | 49.6% | 25,425 | 74.4% | 1,772 | 7.0% |
| 2006 | 56,899 | 35,968 | 63.2% | 24,929 | 69.3% | 1,913 | 7.7% |
| 2007 | 25,464 | 10,338 | 40.6% | 7,215 | 69.8% | 192 | 2.7% |
| 2008 | 19,914 | 2,795 | 14.0% | 1,252 | 44.8% | 21 | 1.7% |
| 2009 | 29,272 | 10,896 | 37.2% | 7,994 | 73.4% | 402 | 5.0% |
| 2010 | 37,757 | 16,472 | 43.6% | 12,706 | 77.1% | 907 | 7.1% |
| 2011 | 20,571 | 21 | 0.1% | 8 | 38.1% | 0 | 0.0% |
| **2012** | **22,143** | **4,238** | **19.1%** | **3,089** | **72.9%** | **224** | **7.3%** |

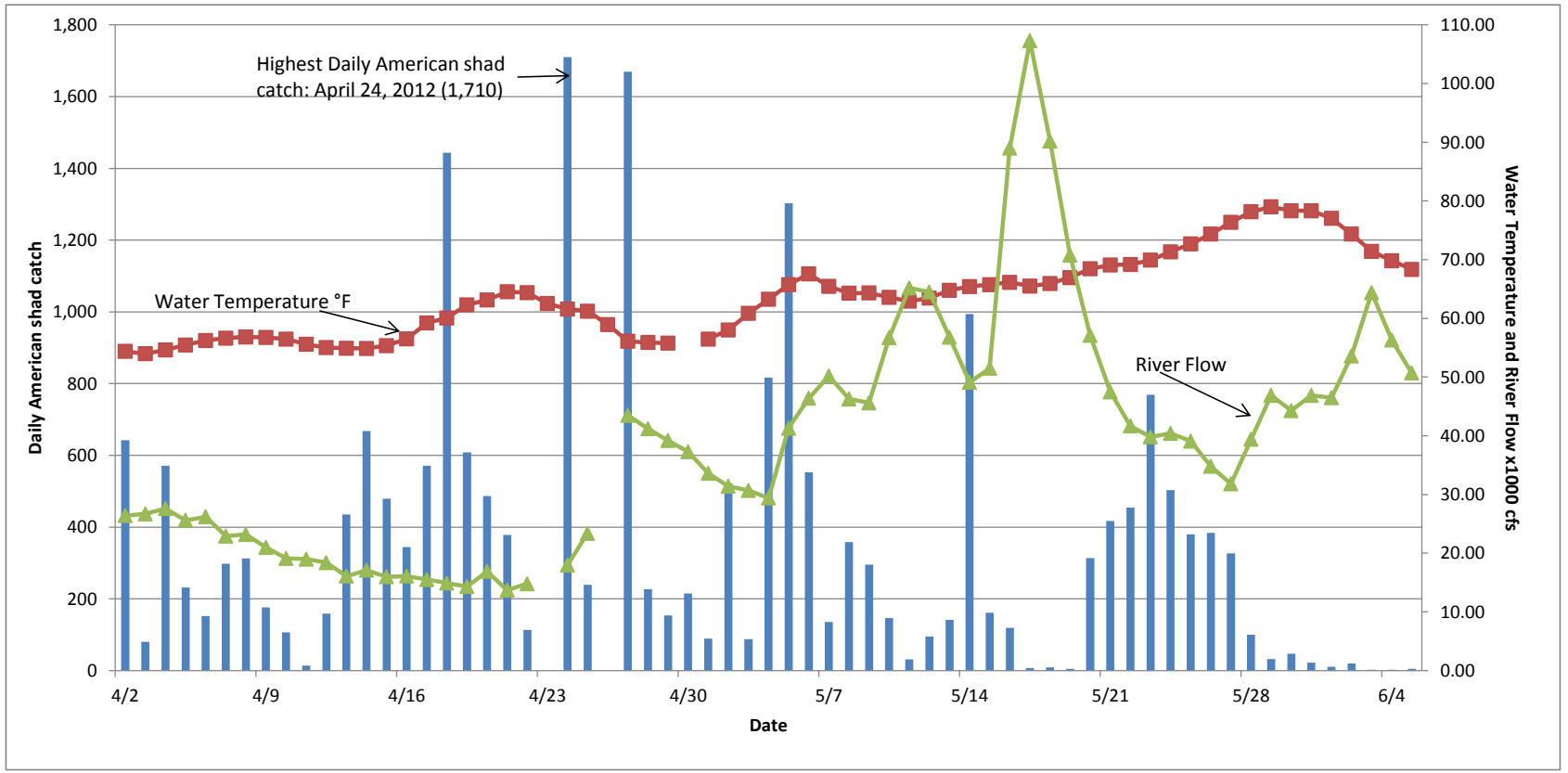


**Figure 1**

**A plot of river flow (x 1000 cfs) and water temperature (°F) as measured at Holtwood Dam, in relationship to the daily American shad catch at the Conowingo East Fish Lift, spring 2012.**

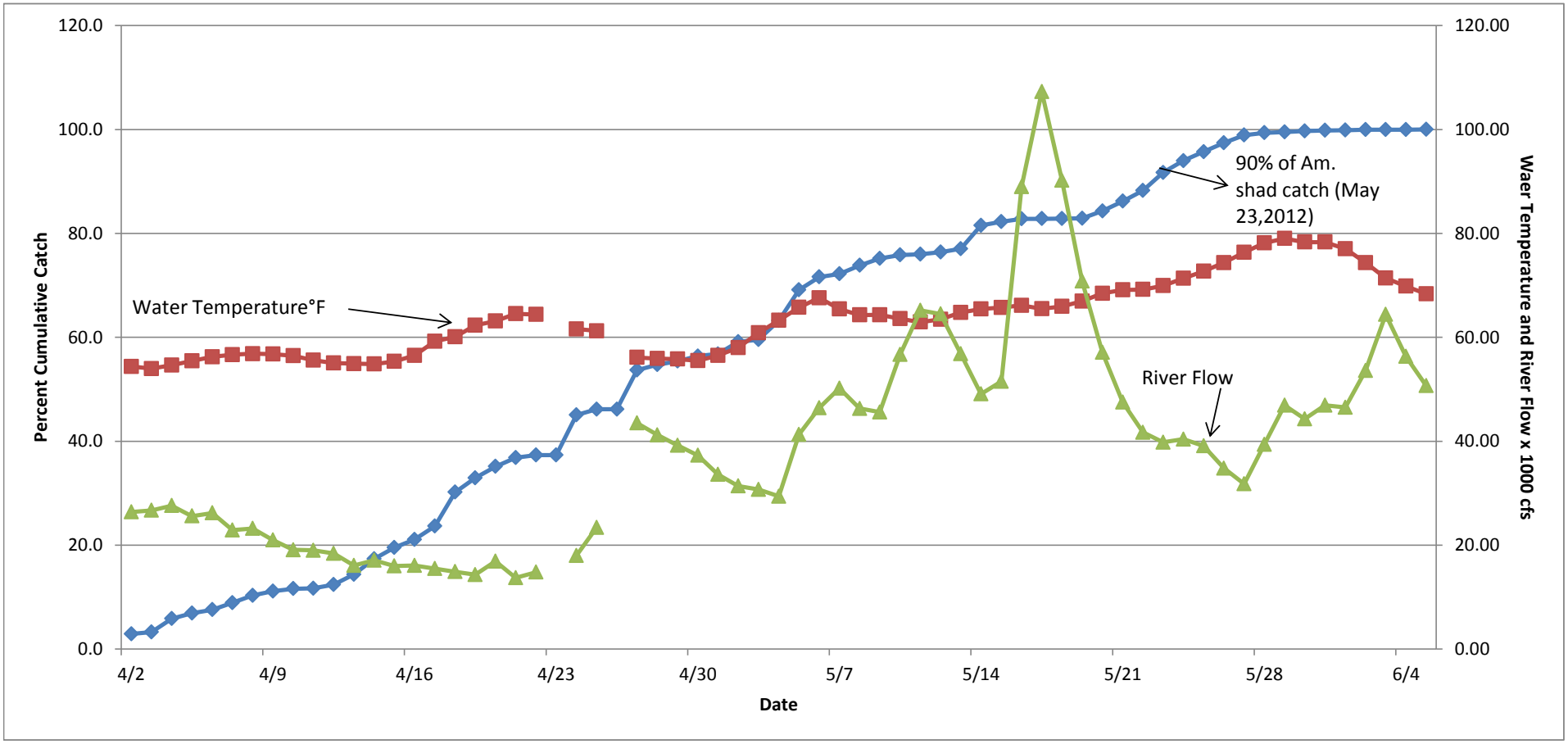


**Figure 2**

**A plot of river flow (x 1000 cfs) and water temperature (°F) as measured at Holtwood Dam, in relationship to the percent cumulative American shad catch at the Conowingo East Fish Lift, spring 2012.**

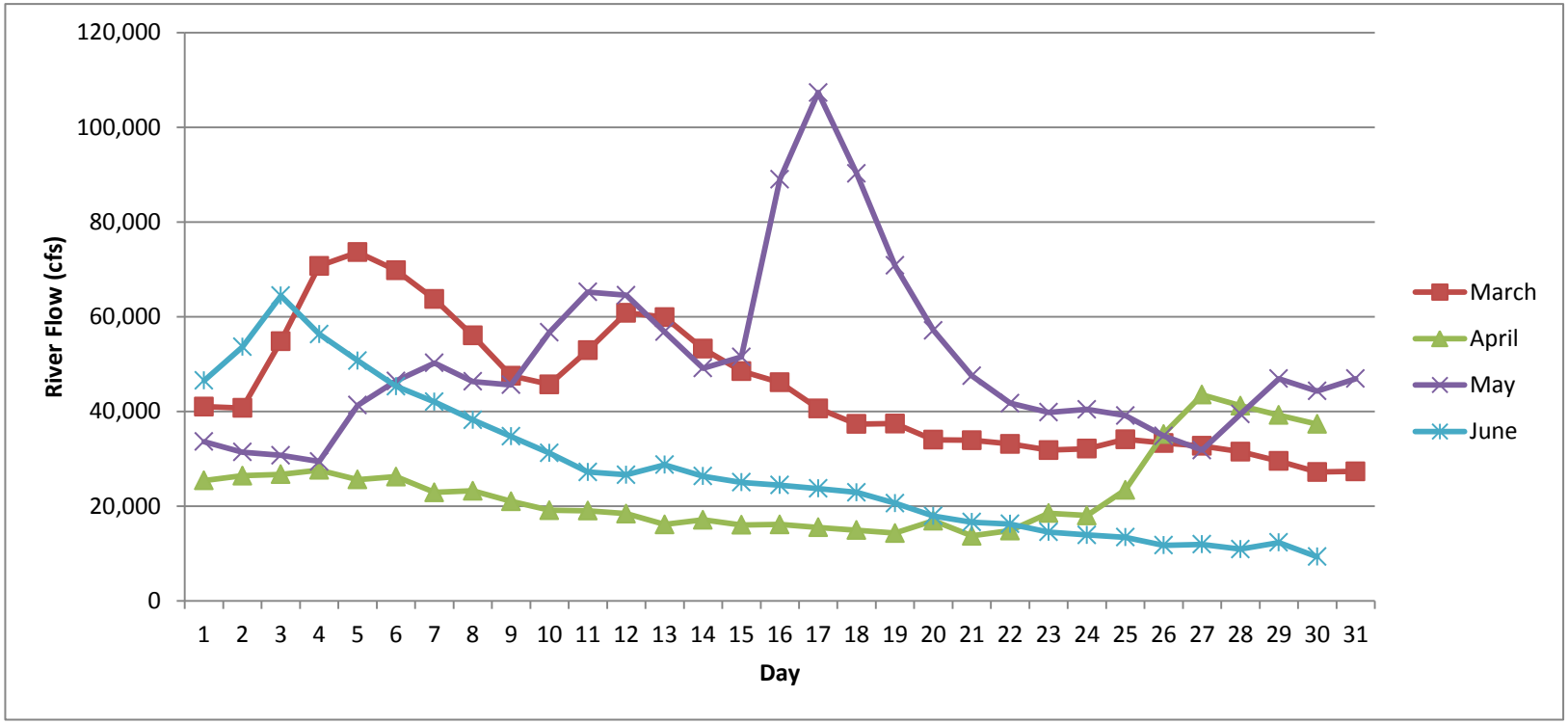


**Figure 3**
**Plot of River Flow (as measured at Holtwood Dam) March through June 2012.**