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Muddy Run Pumped Storage Project American Eel Collection Facility in Octoraro Creek, 2024

FERC Project No. 2355

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Executive Summary

Constellation Energy Generation, LLC (Constellation) received a license from the Federal Energy Regulatory Commission (FERC) on December 22, 2015, for the Muddy Run Pumped Storage Project (Muddy Run Project; FERC Project No. 2355). An American Eel Passage Plan (Eel Plan) was developed by Constellation and included as a condition of the Pennsylvania Department of Environmental Protection (PA DEP) 401 Water Quality Certification (WQC; PA DEP File No. EA 36-033 dated December 10, 2014) for the Muddy Run Project that is a condition of the FERC license for the Muddy Run Project.

Pursuant to the FERC License and the PA DEP 401 WQC, Constellation began operation of a temporary eel trapping facility at Octoraro Creek in 2015. The temporary eel trapping facility at Octoraro Creek operated for three seasons: 2015, 2016, and 2017. An annual report was developed and filed with FERC and resource agencies after each year of operation. On March 1, 2018, FERC issued a letter indicating that the temporary eel trapping facility met the requirements of the PA DEP 401 WQC and United States Department of the Interior (DOI) fishway prescription for the Muddy Run Project. Subsequently, this eel facility location has been considered permanent since 2018. Constellation completed upgrades, including a larger submersible pump, water line, manifold, collection tank, and attraction flow lines, to the permanent Octoraro Creek Eel Facility (OCEF or facility) in support of eel passage prior to the 2019 season. The remaining work left to be completed addresses aesthetics, safety (stairs), and erosion, which has been ongoing since 2018.

In early 2020, Chester Water Authority (CWA), which owns the property where the OCEF is located, notified Constellation of the existence of a buried, abandoned tailrace structure below the existing OCEF. The upgrades to the eel collection structure and the erosion control concerned CWA, because the design drawing showed the footers to be placed on top of or through the underground buried structure. An underground survey needed to be completed prior to installing this structure. The survey was postponed until mid-May 2020 due to the COVID-19 pandemic. The 2020 season was also delayed due to the COVID-19 pandemic. Due to the results of the 2020 underground survey, which confirmed a void under the current location of the OCEF, it was constructed at the top of the hill with agreement from the EPAG and contained one longer ramp of Enkamat substrate in 2020. The OCEF in 2021 contained two longer ramps (12.3 meters compared to 7 meters), one with Enkamat substrate and one with Milieu substrate, both of which were used from 2015 through 2019.

The Conowingo Hydroelectric Project (Conowingo; FERC Project No. 405) license was issued by FERC on March 19, 2021, which is now vacated. Article 419 of this license required Constellation to prepare an American Eel Passage and Restoration Plan, which was developed in consultation with the U.S. Fish and Wildlife Service (USFWS), Maryland Department of Environment (MDE), and other members of the EPAG and was filed with FERC on September 16, 2021. The American Eel Passage and Restoration Plan discusses eel passage at Conowingo and on the east side of the Susquehanna River, which includes the OCEF.

A shoreline stabilization project for the permanent OCEF was completed in August 2022. This work included regrading the eroded shoreline to a suitable slope and placing articulating concrete blocks (ACBs) throughout an approximately 2,000-square-foot area. In addition, upgrades were made to the collection platform to move it upslope to a flat, easily accessible area and to provide a larger

working platform and a larger eel collection tank. In addition, Constellation is planning to enhance/replace the existing working platform with a wooden structure in the future. In 2024, the OCEF was set up similar to the 2023 facility. The difference between the 2023 and the 2024 set up was the last two rows of ACBs and the large riprap holding them in place were missing, due to an erosion event, causing the entrance of the ramp not to be flush with the shoreline. On May 24, a jetty like extension was created below the entrance of the ramp to create a smooth transition by using existing substrate from the immediate area and held in place with four pieces of 3/4" rebar.

The lower 20 feet of the Octoraro Creek eel ramp was removed on August 7, 2024, in anticipation of the heavy forecasted rainfall with the approaching Tropical Storm Debby. The ramp was reinstalled and glued back together on August 13, 2024, and placed back into service on August 15, 2024.

Each year, American Eels *Anguilla rostrata* collected at the OCEF are transported to and held at the Conowingo West Eel Collection Facility (CWECF) and subsequently transported upriver and released at designated points in the Susquehanna River watershed.

This report provides details on the following objectives for the 2024 OCEF operational period:

- Install seasonal components of the OCEF immediately downstream of the CWA Pine Grove Low-Head Dam;
- Documentation of any modifications made to the OCEF during the season to improve functionality and eel attraction capability;
- Operate, maintain, and monitor the OCEF daily from May 1 through September 15, 2024;
- Collection of eel catch and length, water quality data, creek flow data, moon phase data, and rainfall during the entire operational period;
- Transport eels collected by the OCEF to the CWECF;
- Conduct weekly quality control checks and cleaning of the OCEF to maintain proper attraction water flow.

Seasonal components of the OCEF included juvenile eel ramps (14.8 meters), a one-horsepower submersible pump and water line, manifold, a collection tank (1,061-liters), and 25 mm attraction flow lines. The seasonal components were installed and placed in service on May 1, 2024. The OCEF operated a total of 130 days from May 1 until August 7, and August 15 until September 15, 2024.

A total of 84,895 juvenile eels were collected at the OCEF. The greatest number of juvenile eels was collected on June 8, 2024, with 16,779 eels or 19.8% of the total seasonal catch. Two collection peaks occurred during the periods of June 6-10 and August 3-7, which accounted for 82,224 of the 84,895 (96.9%) juvenile eels collected at the OCEF. The two major collection peaks in 2024 are associated to the decreasing limb of the Octoraro Creek flows, during these receding creek flows the turbidity of the creek is also the greatest. Daily juvenile eel collections of less than 10 individuals were recorded on 98 of the 130 collection days (75.4%). Eel collections greater than 1,000 individuals occurred on 10 of the 130 collection days (7.7%). Volumetric estimation was used on ten days to quantify the number of eels collected during the 2024 season at the OCEF. The ramp entrance was underwater on seven of the 130 operational days (5.4%) during the 2024 season: three times in June, once in July, and three times in August. These seven days accounted for 31,768 eels (37.4%) of the 84,895 eels collected.

Length, weight, and injuries (i.e., condition factor) were recorded from biweekly subsamples on 260 juvenile eels. Length of juvenile eels ranged from 92-175 millimeters (mm) with an average length of 125.2 mm. The average weight of juvenile eels was 2.4 grams (g) and ranged from 0.7-7.8 g. Six of the 260 (2.3%) eels showed any form of external injury such as hemorrhaging or marks on body.

A total of 84,891 of the 84,895 eels were transported within 24 hours of capture either to the CWECF where they were held before transport or directly to the mainstem Susquehanna River. Only 4 of the 84,895 (< 0.01%) juvenile American Eel collected at OCEF were removed from the collection tank dead, and no eels died during transport from OCEF during the 2024 season.

Cleaning and calibration of the OCEF was performed weekly. Cleaning of the screened barrel that housed the submersible pump, collection tank, screened drains, and spray bars occurred daily after all eels were removed for transport. The pump, manifold, and attraction flow lines were also cleaned as needed during the season. CWA operated their small hydroelectric facility on 23 (17.7%) of the 130 collection days.

The red-light nighttime survey of the ramp entrance planned for the peak of the eel migration during 2024 season when the eel collection was moderate and the ramp was out of water did not occur. The peak migration period is defined as July and August. August 3-7 had an increase in eel numbers collected, but the redlight nighttime survey was called off due to safety concerns from forecasted localized thunderstorms in the area overnight on August 5 and August 6. These were the only two nights during this peak migration season that the eel ramp entrance was out of water.

List of Abbreviations

Agencies/Groups

Constellation	Constellation Energy Generation, LLC
CWA	Chester Water Authority
CWECF	Conowingo West Eel Collection Facility
DOI	United States Department of Interior
EPAG	Eel Passage Advisory Group
FERC	Federal Energy Regulatory Commission
MDE	Maryland Department of Environment
PA DEP	Pennsylvania Department of Environmental Protection
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Units of Measure

C	Celsius
cfs	cubic feet per second
DO	dissolved oxygen
gpm	gallons per minute
in	inches
km	kilometer
L	liter
mg/L	milligrams per liter
mm	millimeter

Miscellaneous

OCEF	Octoraro Creek Eel Facility
WQC	Water Quality Certification
YSI	YSI Incorporated

1 Introduction

Constellation Energy Generation, LLC (Constellation), received a license from the Federal Energy Regulatory Commission (FERC) on December 22, 2015 for the Muddy Run Pumped Storage Project (Muddy Run Project; FERC Project No. 2355). An American Eel Passage Plan (Eel Plan) was developed by Constellation and included as a condition of the Pennsylvania Department of Environmental Protection (PA DEP) 401 Water Quality Certification (WQC; PA DEP File No. EA 36-033; dated 10 December 2014) for the Muddy Run Project and is a condition of the FERC license for the Muddy Run Project.

The Eel Plan required Constellation to investigate the feasibility of installing and operating a juvenile eel trapping facility on Octoraro Creek. The evaluation was conducted at a location identified on Octoraro Creek immediately downstream of the Chester Water Authority (CWA) Pine Grove Low-Head Dam. This site was approved by the PA DEP and other members of the Eel Passage Advisory Group (EPAG)[1].

The Conowingo Hydroelectric Project (Conowingo; FERC Project No. 405) license was issued by FERC on March 19, 2021, which is now vacated. Article 419 of this license required Constellation to prepare an American Eel Passage and Restoration Plan, which was developed in consultation with the United States Fish and Wildlife Service (USFWS), Maryland Department of Environment (MDE), and other members of EPAG and was filed with FERC on September 16, 2021. The American Eel Passage and Restoration Plan discusses eel passage at Conowingo and on the east side of the Susquehanna River, which includes the Octoraro Creek Eel Facility (OCEF).

American Eel *Anguilla rostrata* collected at the OCEF were transported directly to and held at the Conowingo West Eel Collection Facility (CWECF) and subsequently transported and released at designated points in the Susquehanna River watershed.

The report provides details relative to the following objectives for the 2024 field investigation:

- Installation of seasonal components to the OCEF on Octoraro Creek immediately downstream of CWA Pine Grove Low-Head Dam;
- Documentation of any modifications made to the OCEF during the season to improve functionality and eel attraction capability;
- Operation, maintenance, and monitoring of the OCEF daily from May 1 through September 15, 2024;
- Collection of eel catch and length , water quality data, creek flow data, moon phase data, and rainfall during the entire operational period;
- Transportation of eels collected by the OCEF to the CWECF;
- Completion of weekly quality control checks and cleaning of the OCEF to maintain proper attraction water flow.

[1] EPAG members include the Pennsylvania Department of Environmental Protection, United States Fish and Wildlife Service, Pennsylvania Fish and Boat Commission, Maryland Department of Natural Resources, Susquehanna River Basin Commission, and Exelon. Maryland Department of Environment was added to the EPAG group on March 19, 2021.

Seasonal components of the OCEF included juvenile eel ramps (14.8 meters), a one-horsepower submersible pump and water line, manifold, a collection tank (1,061-liters), and 25 mm attraction flow lines. The seasonal components were installed and placed in service on May 1, 2024.

2 Background

Areas of lower Octoraro Creek from the confluence with the Susquehanna river to the area near CWA's Pine Grove Low-Head Dam were surveyed over a 13-week period from June 16 through September 10, 2014, using Fyke nets, red-light headlamps, and fine mesh dip nets (Figure 2.0-1 and Normandeau Associates and Gomez and Sullivan 2014). Based on the information gathered during the 2014 survey, eels were consistently found in the north corner of the spillway adjacent to the dam, whereas eels did not seem to be as abundant at the downstream sites during the same period. The report recommended that a site near the dam be considered for future juvenile eel trapping (Normandeau Associates and Gomez and Sullivan 2014). Constellation and EPAG discussed the possibility of utilizing this north corner of the spillway site for the temporary eel collection facility in 2015. However, due to concerns by the CWA relating to existing structures at the site, an alternative site along the south shore of the Pine Grove Low-Head Dam was selected and approved by the CWA and EPAG. The alternative site was located immediately downstream of the Octoraro Art Association building adjacent to the dam.

The temporary eel trapping facility was across the creek from CWA's small hydroelectric site on Octoraro Creek and operated for three seasons: 2015, 2016, and 2017. An annual report was developed and filed with FERC and resource agencies after each year of operation. On March 1, 2018, FERC issued a letter indicating that the temporary eel trapping facility met the requirements of the PA DEP 401 WQC and U.S. Department of the Interior (DOI) fishway prescription for the Muddy Run Project[2]. The OCEF location has been considered permanent since 2018.

Prior to the 2019 eel season, Constellation completed upgrades to the OCEF related to eel passage, including a larger submersible pump and water line, manifold, collection tank, and attraction flow lines. Work related to facility aesthetics and safety (e.g., stairs) and erosion remains to be completed. This remaining work requires a PA DEP Chapter 105 Wetland and Waterway Obstruction and Encroachment Permit and, therefore, a signed agreement from CWA (the landowner) was necessary so that Constellation could apply for this permit. Constellation received the CWA-signed agreement on December 2, 2019, and applied for the Chapter 105 permit on December 27, 2019. On January 16, 2020, the Chapter 105 Permit application package was deemed complete by PA DEP, and the permitting public comment period closed on March 2, 2020. Constellation received a permit on May 8, 2020. Meanwhile, in March 2020, CWA reviewed the OCEF project plans again and had concerns with the proposed upgraded eel structure plans along the left bank of Octoraro Creek due to an abandoned underground buried tailrace that runs below the proposed gazebo platform. The existing OCEF was revised, and improvement plans were reconsidered for safety and constructability. Constellation had performed studies to identify the exact location of this structure and to determine if it created a void. In early May 2020, the underground survey was scheduled and completed, and the results of the survey were distributed to EPAG prior to a conference call on June 2, 2020. During this conference call, alternative options for the eel facility were discussed, and a decision was made and agreed to by all parties to construct a longer ramp with the collection tank and scaffolding placed at the top of the hill near the driveway. With the scaffolding at the top of the

[2] On March 1, 2018, FERC issued a letter that stated, "Review of your filing indicates that it fulfils the pertinent WQC and fishway prescription requirements. Pursuant to the PADEP's WQC, because you have determined the Octoraro facility to be successful…" This approval was based on the OCEF being deemed successful and determining it as a permanent installation (Accession number: 20180301-3083; FERC, 2018)

hill and the existing water line exiting at the mid hillside level near the old scaffolding, Constellation agreed to relocate the water line and have it exit at the top of the hill near the new scaffolding. This approach was used to decrease the head loss and increase the total attraction flow of the OCEF, and this work was completed on August 13, 2021.

Constellation conducted a topographic land survey on October 18, 2021, and developed a plan for the OCEF based on this survey. The original shoreline protection design was changed from riprap to articulating concrete block (ACB) to reduce the depth of excavation and lessen the amount of weight placed over the buried tailrace. The shoreline stabilization project for the permanent OCEF was completed in August 2022 after the termination of an in-water work restriction due to the presence of threatened Chesapeake Logperch *Percina bimaculata* habitat at the site. This work included regrading the eroded shoreline to a suitable slope and placing ACBs throughout an approximately 2,000-square-foot area. In addition, upgrades were made to the collection platform to move it upslope to a flat, easily accessible area to provide a larger working platform. The site was seeded with a PA Piedmont Province shoreline-appropriate native grass mix. The shoreline stabilization was completed in late August 2022, and the OCEF began operations on September 5 and ceased on November 20, 2022; when the Octoraro Creek water temperature at CWA decreased below 10.0 °C for three consecutive days.

The OCEF continuously operated from May 1 until September 15, 2023. The OCEF in 2023 contained two longer ramps, one with Enkamat substrate and one with Milieu substrate, which were the same substrates used from 2015-2022, except for 2020 when only a single Enkamat substrate ramp was used.

In 2024, the OCEF was set up similar to the 2023 facility. The difference between the 2023 and the 2024 season set up was the last two rows of ACBs and the large riprap to hold them in place were missing, due to an erosion event, in 2024 causing the entrance of the ramp not to be flush with the shoreline. On May 24, a jetty like extension was created below the entrance of the ramp to create a smooth transition by using existing substrate from the immediate area and held in place with four pieces of 3/4” rebar.

3 Methods

3.1 Design, Construction, and Installation of Facility

The size of the scaffolding platform was increased in 2022 to an eight foot by ten-foot platform to support the larger collection tank and oxygen supply system (Figure 3.1-1). A 1,061-liter collection tank replaced the former 310.4-liter tank. This larger tank was installed to minimize holding mortality of eels during periods of high capture rate. A stainless-steel frame was installed in 2023 to support the collection tank. The manifold and submersible pump remained the same as the previous years (Normandeau Associates Inc. 2020, 2021, 2022, and 2023). The rainfall gauge was reinstalled each year on the corner of the scaffolding to record daily rainfall events during each collection day.

The longer juvenile eel ramps were constructed and installed with the entrance location near the locations of ramp installations from all previous years. The ramps consisted of two approximately 14.8 meter long by 305 millimeter (mm) wide cable trays positioned at a 28° angle, plus a continuous length of tray that was bent and shaped at a 90° angle over a 25 mm bend radius at the top of the ramp to convey juvenile eels into the collection tank. The entrances to the ramps were out of water when creek flows taken at the United States Geological Survey (USGS) Gage 01578475 on Octoraro Creek at Richardsmere, MD, located approximately 21 kilometers (km) downstream of CWA's Pine Grove Low-Head Dam were below 182 cubic feet per second (cfs) in 2022 and 2023, and the hydro at CWA was not operating (Figure 3.1-2). During set up of the facility in 2024, it was noted the last two rows of ACBs and the large riprap holding them in place were missing causing the entrance of the ramp not to be flush with the shoreline, creating an undesirable transition (Figure 3.1-3). On May 24, a jetty like extension was created below the entrance of the ramp to create a smooth transition by using existing substrate from the immediate area and held in place with four pieces of 3/4" rebar (Figure 3.1-4). A smooth transition from the ramp entrances and the jetty was created by ensuring that the material of the ramps was flush to shoreline substrate (gaps were minimized). The entrances were near the shoreline riprap of the tailwater. A continuous piece of Enkamat extended beyond the ramp entrance and continued under the riprap below the ramp entrance, but nothing was placed under the area below the Milieu substrate entrance to prevent excluding eels. In 2024, the entrances to the ramps were underwater when creek flows taken at the United States Geological Survey (USGS) Gage 01578475 on Octoraro Creek at Richardsmere, MD, were at 191 cfs, and the hydro at CWA was operating (Figure 3.1-5). The ramps were supported by seven T-shaped metal braces evenly spread across the length of the ramps, which were driven through the ACBs and into the ground beneath the ramps (Figure 3.1-6). On both sides of these braces, a hole was drilled into the flat bar and a strap was used to fasten the ramps to the braces. The ramps were directly and entirely covered with aluminum from the upper 90 degree bend down to approximately the median discharge elevation of Octoraro Creek to protect juvenile eels from predation and keep the ramps dark while ascending the ramps. A hinged cover was added to the ramps over the spray bar to decrease light inside the ramp at the top of the ramp, as eels are known to be photophobic.

A 51 mm diameter water line was attached to a 51 mm diameter manifold with seven 25 mm ball valves that supplied water to the spray bars and additional attraction flow lines.

The collection tank was 914 mm wide and 1,829 mm long. The depth of the water in the collection tank was approximately 762 mm, with a volume of approximately 1,061 liters (L). Like in prior years

of operation, the collection tank was filled by allowing some of the spray bar flow to enter the collection tank, but a 25 mm collection tank fill line was added in 2022 to supply additional freshwater to the larger collection tank. The collection tank contained two drains comprised of a 76 mm PVC pipe with holes drilled through it which were wrapped in one mm mesh to prevent juvenile eel escapement. The collection tank drain lines were directed to the highest points of the ramps that were possible via gravity feed, which provided eel scent from the eels in the collection tank to the ramps to maximize eel attraction. The collection tank was custom fitted with a lid that was held down by clamps to prevent escapement and predation.

The oxygen supply system provided additional oxygen to the collection tank to minimize holding mortality. An oxygen regulator was attached to an oxygen bottle with a manifold that terminated at a micropore diffuser in the collection tank.

3.2 Data Collection

Daily recorded sample data included date, time of sample, weather, eel counts, water temperature, dissolved oxygen (DO), and rainfall. The data was verified, tabulated, and entered into an electronic format each week as part of a quality control and quality assurance protocol. Environmental conditions such as creek discharge and lunar fraction were also recorded, verified, and entered in an electronic format. Additional data was recorded on the daily field sheet like operation of the CWA hydro unit and if the ramp entrance was underwater.

Eel length and weight measurements, along with condition factors were recorded biweekly from a subsample of a maximum of 25 individuals (when available). Eels were measured and weighed after being anesthetized.

Water temperature and DO were measured in the collection tank and in the head pond near the pump during each sampling event with a YSI water quality meter that was calibrated prior to each sampling event. An Onset HOBO dissolved oxygen and water temperature logger was added to the collection tank and continuously recorded data every thirty minutes throughout the duration of the 2024 operational period.

3.3 Juvenile Eel Transport

All juvenile eels captured in the OCEF were either transported to the CWECF where they were held before subsequent transport and release upriver at designated locations in the Susquehanna River watershed or were transported and released directly to the designated locations daily. The determination for these two transportation options was dependent upon current water temperatures; eels were only transported and held at the CWECF during periods when water temperatures were less than 26° Celsius (C). This protocol was developed to minimize holding mortality.

When less than 150 eels were collected during a daily sampling event, the eels were transported in aerated 19 L buckets with lids that contained a maximum amount of water that would maintain escapement prevention, with less than or equal to 50 eels in each bucket. When daily collections of juvenile eels were greater than 150 but less than 2,500 individuals, a small, enclosed transport tank (250 L) was used. This transport tank was filled to a maximum level that would preclude escapement and was equipped with supplemental oxygen. When daily collections of juvenile eels were greater than 2,500 individuals, a large transport truck and tank (2,500 L) was used. This tank was filled

completely to prevent sloshing and was equipped with supplemental oxygen to maintain DO levels in the tank.

4 Results

The OCEF commenced operation on May 1 and operated continuously until August 7. The facility was restarted on August 15 and continued until operations ceased on September 15, 2024. The OCEF was monitored daily during the 130-day season to ensure that it was attracting eels. A total of 84,895 juvenile eels were collected during the 2024 season (Table 4.0-1). Daily monitoring was conducted as a condition of the OCEF's permanent status.

4.1 Juvenile Eel Collection

A total of 84,895 juvenile American Eels were captured at the OCEF during the 2024 season (Table 4.0-1). The highest single-day collection of 16,779 juvenile eels occurred on June 8, which accounted for 19.8% of the total 2024 collection season (Table 4.0-1 and Figure 4.1-1). Volumetric estimations of collected eels, which are indicative of high collection rates, were required on ten days (7.7%, Table 4.1-1). Eel collections greater than 1,000 individuals occurred on ten of the 130 collection days (7.7%), with eel collections greater than 5,000 individuals on three consecutive days in June (2.3%) and four consecutive days in August (3.1%, (Table 4.0-1). Daily juvenile eel collections of less than 10 individuals were recorded on 98 of the 130 collection days (75.4%). The collection tank contained no eels on 37 of the 130 collection days (28.5%).

4.2 Juvenile Eel Biological Data

Biological data (length, weight, and condition factor) were recorded from biweekly subsamples. A total of 260 juvenile eels were collected from these biweekly subsamples (0.3% of total eels collected), during 28 of the 130 sample days (Table 4.2-1).

The average length of juvenile eels was 125.2 mm with a median size of 124.0 mm (Table 4.2-1). The length of juvenile eels ranged from 92-175 mm. During the 2024 season, no eels measured greater than 175 mm (Table 4.2-2). Over 93% (243 individuals) of the 260 measured eels ranged between 100-149 mm.

The average weight of juvenile eels was 2.4 grams (g), with a median weight of 2.2 g (Table 4.2-1). The weight of juvenile eels ranged from 0.7-7.8 g (Table 4.2-1). During the 2024 season, no eels weighed more than 10.0 g (Table 4.2-3). Nearly 89% (231 individuals) of the 260 juvenile eels weighed between 1.0-3.4 g.

Eels from each biweekly subsample were examined for external injuries. Individual condition factors, date, and detailed biological data for these are shown on Table 4.2-4. External injuries were noted on 2.3% (6 of 260 individuals) of the examined eels. A hemorrhage on the operculum and the caudal fin was noted on an eel on July 1 and July 18, 2024, respectively. (Figure 4.2-1). A mark on the right side and a laceration above the vent was observed on June 17 and July 1, 2024, respectively (Figure 4.2-1). Color variations including redness underside near gill and ventral discoloration were noted on May 9 and July 1, 2024, respectively.

4.3 Juvenile Eel Collection by Week

Many of the juvenile eels were collected during Week 6 (June 2-June 8) when the OCEF collected 40.6% (34,480 individuals) of the season total (Table 4.3-1 and Figure 4.3-1). Eel collections during Week 15 comprised the second greatest weekly total of 33.9% (28,809 eels) of the season total.

Week 7 was the only other week when greater than 10% of the season total was collected (20.7% or 17,609 individuals). Weeks 1-4, 11-13, 16, 18-21 each collected less than 0.1% (combined total of 104 eels) of the season total (Table 4.3-1 and Figure 4.3-1). Weeks 10 and 14 each collected more than 1,000 eels. Weekly catch data are also provided in Appendix A.

4.4 Peak Periods of Eel Collections

During the 2024 season, the OCEF had one large and one smaller collection peak period. The large peak period (June 6-10) yielded 51,460 of the 84,895 juvenile eels collected, or 60.6% of the total season catch (Table 4.0-1 and Figure 4.1-1). The smaller peak occurred during the period of August 3-7 yielding 30,764 of the 84,895 juvenile eels collected, or 36.2% of the total season catch. The two peak periods accounted for 82,224 of the 84,895 (96.9%) juvenile eels collected at the OCEF.

4.5 Juvenile Eel Catch in Relation to Environmental Factors

Appendix B contains averaged weekly environmental data from the 2015-2024 operational seasons coupled with the weekly proportions of eel collections at the OCEF and the weekly sum of eels collected at the CWECF, which are discussed further in this section.

Creek Flow

Creek flow and juvenile eel catch were strongly correlated during the 2024 season. Daily average creek flow was taken from the USGS Gage 01578475 on Octoraro Creek at Richardsmere, MD, (Table 4.5-1). The highest daily average creek flow value when the OCEF was in operation occurred on June 6 (975 cfs, Table 4.5-1). Major peaks in creek flow during the 2024 in June 5-7 and August 3-7 corresponded to increased eel collections at the OCEF over these days following these elevated flows (Figure 4.5-1). The two major collection peaks in 2024 are associated to the decreasing limb of the Octoraro Creek flows, during these receding creek flows the turbidity of the creek is also the greatest. A much smaller event in early July showed a slight increase in eel collection.

During Week 15, the highest weekly average creek flow coincided with the second highest weekly catch, although the facility did not operate for three of the seven days (Table 4.0-1 and 4.5-1 and Figure 4.5-1). Week 6 produced the highest weekly catch of collection at the OCEF and the second highest weekly average creek flows (Figure 4.5-1 and Appendix B). The tenth highest weekly average creek flow during Week 7 could have been a factor for the high catches during Week 6. Typical of most eel ladders, freshets in Octoraro Creek generally corresponded to greater numbers of eels collected during the 2024 operational period, but higher catch numbers during periods without an increase of flow may be a function of other environmental or behavioral variables.

Lunar Fraction

Juvenile eel catch did appear to be correlated to lunar fraction during the 2024 season. The largest peak in eel capture (45,361 eels collected from June 7-9) occurred during the end of Week 6 and the beginning of Week 7, just after the new moon in June (Table 4.5-2, Figure 4.5-2 and Appendix B, Time and Date Website, 2024). Full moon is equal to 1.0 lunar fraction. The second largest peak in eel capture (28,809 eel collected from August 4-7) occurred during the Week 15, just after the new moon in August (Table 4.5-2, Figure 4.5-2 and Appendix B, Time and Date Website, 2024).

Based on average weekly lunar fraction, Weeks 2 and 19 were the first and second darkest weeks with a total of 12 eels (0.01%) of the 84,895 eels collected during these two weeks combined

(Appendix B). Weeks 4, 21, and 8 were the first, second, and third brightest weeks, with a total of 253 (0.30%) of the 84,895 eels collected during these three weeks (Appendix B). Weeks 6 and 15 were ranked the third and the fifth darkest week of the 2024 season, respectively, but combined accounted for 63,289 eels (74.5%) of the 84,895 eels collected (Appendix B) Typically, the lower illuminance during lower lunar fraction periods (new moon) has been associated with increases in eel catch at eel traps (Welsh *et al*. 2015 and Schmidt *et al*. 2009).

Water Temperature

Water temperature and eel catch did appear to be correlated this season. Water temperatures ranged from 14.2° Celsius (C) soon after the season began on May 11 (Week 2) to 29.2° C on July 10, 2024 (Week 11, Table 4.5-3 and Figure 4.5-3). The highest average weekly water temperature (27.3° C) occurred during Week 15, which was also the second largest eel collection week of the season (Appendix B). The OCEF had sustained daily water temperatures above 20.0° C from May 25, 2024, until the facility was shut down on September 15, 2024.

Dissolved Oxygen

Eel collection numbers and DO did not appear to be related this season. DO was recorded as milligrams/Liter (mg/L). These data indicated that the DO readings were typically lower in the source water in the head pond above the dam than those observed in the collection tank for most of the season (Table 4.5-4 and Figure 4.5-4). The oxygen supply system was added to the collection tank in the 2022 season was used again in 2024 and operated daily. Daily DO readings are presented in Table 4.5-4 and displayed in Figure 4.5-5. DO levels in the head pond were lower than the collection tank when the oxygen supply system was operated properly (Figure 4.5-4 and Appendix B). Dissolved oxygen measurements were usually taken in the early morning when the lowest natural DO level was likely to be observed.

Rainfall

Juvenile eel collection and rainfall did appear to be correlated during the 2024 season. Rainfall was recorded in inches (in) by a rain gauge affixed to the scaffolding platform. The largest rainfall event occurred on June 6, 2024 of 3.6 inches was just prior to the two largest eel collection days of the 2024 season which accounted for 33,110 eels (39.0%) of the 84,895 eel collected (Tables 4.0-1, 4.5-5, and Figure 4.5-6). The second largest rainfall event occurred on August 3, 2024 just prior to the second largest peak of eel collected (Tables 4.0-1, 4.5-5, and Figure 4.5-6). Another rainfall event of over two inches occurred on August 7, but the eel collection facility was removed that afternoon due to the forecasted high rainfall prediction during Tropical Storm Debby. Recorded rainfall amounts over 1.0 inch were observed on six days during the 2024 season: three times in June, once in July, and twice in August. During 76.9% of the season (100 of the 130 days), the rain gauge recorded values of 0.0 inches.

4.6 Juvenile Eel Transport and Mortality

Table 4.6-1 has detailed information of transport and mortality data.

Transport

A total of 84,891 eels (99.99%) of the 84,895 eels collected at the OCEF were transported within 24 hours of capture to the CWECF where they were held before transport (Table 4.6-1). Transport time

from the OCEF to the CWECF was approximately 30 minutes. No juvenile eel mortality occurred when transferring eels from the transport vehicle into the CWECF.

Mortality

Mortality at the OCEF was very low during the 2024 season. Four eels perished at the OCEF, with three of these eels removed on June 12 (Table 4.0-1 and Table 4.6-1). All juvenile eels captured at the OCEF were observed to be free of fungus.

4.7 Quality Control Activities

Cleaning and calibration activities were conducted weekly during the season. Scrubbing of the barrel housing the pump, along with the spray bars, was performed prior to performing any calibrations. The attraction flow lines, pump, barrel, and the manifold were cleaned as needed during the season.

Calibration of the ramp flow was executed each week after cleaning, using a 15-liter graduated bucket. Multiple locations of each ramp were checked for calibration purposes: the spray bar, the collection tank fill line, the scent line (collection tank drain), and the additional attraction flows at the entrance of the ramp. Detailed calibration records are listed in Table 4.7-1.

The amount of algal growth within the spray bars and collection tank fill were not an issue this season for they are cleaned daily. The flow through the hoses, screened barrel, and pump became a problem with meeting the suggested fishway design attraction flow for an eel facility as the season progressed. To increase the flow of attraction water to the ramps, the pump, the barrel, manifold, and all the attraction flow lines were scrubbed or cleaned with a drain snake as needed during the 2024 season when attraction flows were below expected volumes (Table 4.7-1). The same submersible pump was used all season.

Actual eel counts were compared to volumetric eel estimates to determine accuracy of the volumetric estimates. A quality control comparison of the volumetric estimate occurred once during the 2024 season: August 3. The detailed estimates for juvenile eels per 200 mL, displacement, total estimated, and actual counts are in Table 4.7-2. With only a small difference observed between estimates and actual counts (2.1%), no further changes to this method are warranted.

4.8 Other Species Caught

Four other aquatic species were caught in addition to American Eel and released to the tailrace of the field stone dam between the ramp entrance and the covered bridge. One hundred twenty-two crayfish (Cambaridae family) were found in the collection tank on 41 occasions during the season. Fourteen common Musk Turtle *Sternotherus odoratus* were captured in the collection tank on 12 occasions during the 2024 season, while a snapping turtle *Chelydra serpentina* was captured on June 9, 2024. One northern water snake *Nerodia sipedon* was removed from the collection tank on May 8, 2024, while another one was observed at the apex of the ramp near the collection tank on September 15, 2024.

5 Discussion

The CWECF has one Enkamat ramp compared to the OCEF which contains one Enkamat and one Milieu ramp. Both ramps operated simultaneously from May 1 to August 7 and August 15 to September 15. The CWECF continued to operate after the OCEF season was complete. During the dates listed above, the CWECF captured 350,931 eels compared to the OCEF which captured 84,895 juvenile eels during the 2024 season. When both ramps were operating simultaneously, the OCEF captured approximately 24.2% of the number of eels collected by the CWECF. During this time, the size range of the juvenile eels caught at the CWECF was 62-173 mm with an average length of 118.9 mm (Normandeau Associates, Inc. 2024 (draft). The average size and range of the juvenile eels caught in the ramp at the OCEF were of a slightly larger size range of 92-175 mm and an average length of 125.2 mm. Overall, the CWECF collected much smaller eels and a greater size range then the OCEF in 2024.

The collection tank was cleaned, hoses were inspected, and spray bars were examined and cleaned daily to ensure the facility was operating correctly. A routine (weekly) and as needed clean-out of the hoses and manifolds was performed to maintain consistent attraction flow. Minor decreases of attraction flow may be due to the build-up of biological growth in the system. The OCEF was not shaded during the 2024 season.

Water temperature and DO readings were taken daily in the head pond at the pump level and in the collection tank. These data indicated that the dissolved oxygen in the water above the dam was less than the dissolved oxygen observed in the collection tank for most of the season, likely due to the additional oxygen supply system used in 2024 (Table 4.5-4 and Figure 4.5-4). The oxygen supply system was used when the ramp commenced and continued until the end of the season.

The average seasonal creek flow value per the USGS gage station during the 2024 season was compared to the previous years of operation (2015-2023). The average creek flow value during the operational period of May 1 through September 15, 2015-2023 was 203.6 cfs compared to the average creek flow value of 135.8 cfs in 2024 (Normandeau Associates and Gomez and Sullivan 2015, 2016, and 2018a and Normandeau Associates 2018, 2019, 2020, 2021, 2022, and 2023). During the 2024 season at OCEF, the daily average creek flow did not exceed 1,000 cfs. The daily average creek flow was below 100 cfs for sixty-eight days compared to 24, 65, 46, 4, 13, 18, 2, 5, and 69 days in 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, and 2023, respectively. CWA operated its hydropower facility on 23 of the 130 days (17.7%) this year, but no relationship was observed between eel catch and hydropower operation (Table 4.0-1).

The entrance of the ramp was in close proximity to that of previous operational years but was above the tailwater elevation at creek flow less than 182 cfs, which was unlike the years prior to the shoreline stabilization project. In 2023, the transition of the ramp entrance and the substrate became submerged when the creek flow was approximately 182 cfs, according to the USGS Gage 01578475 on Octoraro Creek at Richardsmere, MD (Figures 3.1-2 and 5.0-1). During set up of the facility in 2024, it was noted the last two rows of ACBs and the large riprap were missing causing the entrance of the ramp not to be flush with the shoreline, creating an undesirable transition (Figure 3.1-3). Multiple options were discussed on how to create a smooth transition, including building a jetty-like structure and fabricating a curved ramp extension. Building a temporary jetty was the quick fix but couldn't be completed until a waiver for in-water work was received from Pennsylvania

Fish and Boat Commission. On May 23, 2024, the Pennsylvania Fish and Boat Commission approved the request to waive the Chesapeake Logperch seasonal restriction to perform emergency repairs consisting of hand movement of rock to restore functionality of the Octoraro eel ramp. On May 24, a jetty-like extension was created below the entrance of the ramp to create a smooth transition by using existing substrate from the immediate area along with four pieces of 3/4" rebar (Figure 3.1-4). A smooth transition from the ramp entrances and the jetty was created by ensuring that the material of the ramps was flush to shoreline substrate (gaps were minimized). The entrances were near the shoreline riprap of the tailwater. A continuous piece of Enkamat extended beyond the ramp entrance and continued under the riprap below the ramp entrance, but nothing was placed under the area below the Milieu substrate entrance to prevent excluding eels. The daily average creek flow was observed to be greater than or equal to 191 cfs on 28 of the 130 operational days (21.5%), and the average creek flow for the 2024 operational eel season was 131.4 cfs (Tables 4.5-1 and 5.0-1 and Figure 3.1-5). The ramp entrance was underwater on seven of the 130 operational days (5.4%) during the 2024 season: three times in June, once in July, and three times in August (Table 5.0-2). These seven days accounted for 31,768 eels (37.4%) of the 84,895 eels collected.

Since 2015, typically when the creek flow has increased, the catch of juvenile eels has also increased within a few days of the flow increase. This was evident during the higher creek flows in June and August. Figure 5.0-2 shows a comparison of 2015 through 2024 weekly catch and average creek flow data.

The number of eels collected (84,895 individuals) in 2024 was the highest annual total since the commencement of this facility (Table 5.0-1). The prior season (2023) was the first full season after the completion of the shoreline stabilization project was completed, and during this season a total of 62,113 were collected. The shortest season length occurred in 2022 and operated on a shifted schedule (September until mid-November) but did collect a fair number of eels (7,159 individuals) operating outside the normal eel migration season. The highest average seasonal collection of eels per day prior to this season was 364.8 eels/day in 2021 when 45,230 eels were collected over a 124-day season, but the OCEF collected an average of 450.1 eels/day in 2023 for the entire 138-day season, and an average of 653 eels/day in 2024. The OCEF collected more than the daily average (653 eels per day) on 11 of the 130 days (8.5% of the season, Tables 4.0-1 and 5.0-1). The average size of eels (125.2 mm) captured in 2024 was slightly larger than the previous three years (2021 – 2023) when the average size of eels was 123.5, 123.9, and 122.8 mm, respectively (Table 5.0-1). From 2015 to 2018, juvenile eels were measured during every sample day (up to 25 eels if available), but only biweekly subsamples of lengths were collected in 2019-2024. The OCEF has caught juvenile eels less than or equal to 100 mm every year. The magnitude of the size range of eels collected and measured in 2024 was slightly smaller compared to all other years when both substrate ramps were used to collect eels.

The collection tank is 914 mm wide with a length of 1,829 mm. The depth of the water in the collection tank is approximately 762 mm with a volume of approximately 1,061 Liters. The capacity of American Eels in this new, larger collection tank is 10,061 eels under the USFWS guidelines. The capacity of the collection was exceeded four times in 2024, with no mortality on these high collection days (Table 4.0-1). The improvements to the OCEF in 2022 helped minimize potential mortality events. The addition of a small oxygen bottle, regulator, and micro pore diffuser helped increase the oxygen levels in the collection tank. Oxygen levels were kept close to 100% saturation and not held at extreme levels. An oxygen bottle system was added to the OCEF which did not

change its footprint. Oxygen was controlled and maintained manually and was increased daily when an increase in creek flows was forecasted or when higher eel collections were being recorded. Typically, at most eel ladders, increases of eel captures occur when river flows increase or shortly after these events.

Due to the installation of the larger collection tank, the footprint of the scaffolding needed to be increased to a platform of eight feet by ten feet. An additional length of the ramp was needed to reach the new location of the scaffolding and ensure the angle of the ramp did not change. These changes to the OCEF were agreed upon by EPAG and FERC was updated on these changes.

Multiple monitoring checks were performed during the evening after the large collection occurred on June 8 when the facility collected 16,331 eels. The eel numbers in the collection tank that evening was not high enough to anticipate that the holding capacity of the collection tank would be exceeded.

On August 7, 2024, the OCEF attraction flow was stopped and the lower 20 feet of the eel ramp was removed because of the forecasted heavy rainfall total that was expected with Tropical Storm Debby. Tropical Storm Debby tracked a bit further west than anticipated and missed the Octoraro Creek watershed. The ramp was reinstalled and glued together on Tuesday, August 13, 2024. The attraction water was restarted on the morning of August 15, 2024. No loss of power events occurred during the 2024 season.

The red-light nighttime survey of the ramp entrance planned for the peak of the eel migration during 2024 season when the eel collection was moderate and the ramp was out of water did not occur. The peak migration period is defined as July and August. August 3-7 had an increase in eel numbers collected, but the redlight nighttime survey was called off due to safety concerns from forecasted localized thunderstorms in the area overnight on August 5 and August 6. These were the only two nights during this peak migration season that the eel ramp entrance was out of water.

6 References

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7 Tables and Figures

Table 4.0-1: Number of Juvenile Eels Caught Daily, Octoraro Creek Eel Facility, 2024

Date	Number of Eels	Date	Number of Eels	Date	Number of Eels	Date	Number of Eels
5/1/2024*	-	6/5/2024	3	7/10/2024	0	8/14/2024	DNO
5/2/2024*	1	6/6/2024*	*1348*	7/11/2024	2	8/15/2024	DNO
5/3/2024*	0	6/7/2024	***16331***	7/12/2024	7	8/16/2024	0
5/4/2024*	0	6/8/2024	***16779***	7/13/2024	4	8/17/2024	1
5/5/2024*	0	6/9/2024	***12251***	7/14/2024	1	8/18/2024	3
5/6/2024	0	6/10/2024	*4751*	7/15/2024	1	8/19/2024	2
5/7/2024	0	6/11/2024	85	7/16/2024	0	8/20/2024	0
5/8/2024*	1	6/12/2024	445	7/17/2024	1	8/21/2024	2
5/9/2024*	1	6/13/2024	9	7/18/2024	7	8/22/2024	7
5/10/2024*	0	6/14/2024	63	7/19/2024	3	8/23/2024	32
5/11/2024*	0	6/15/2024	5	7/20/2024	0	8/24/2024	2
5/12/2024*	0	6/16/2024	136	7/21/2024	1	8/25/2024	0
5/13/2024*	0	6/17/2024	39	7/22/2024	1	8/26/2024	0
5/14/2024*	0	6/18/2024	20	7/23/2024	1	8/27/2024	0
5/15/2024*	0	6/19/2024	14	7/24/2024	2	8/28/2024	2
5/16/2024*	0	6/20/2024	11	7/25/2024	4	8/29/2024	1
5/17/2024*	0	6/21/2024	13	7/26/2024	6	8/30/2024	7
5/18/2024*	0	6/22/2024	16	7/27/2024	4	8/31/2024	11
5/19/2024*	0	6/23/2024	9	7/28/2024	5	9/1/2024	6
5/20/2024	0	6/24/2024	5	7/29/2024	5	9/2/2024	1
5/21/2024	0	6/25/2024	19	7/30/2024	3	9/3/2024	1
5/22/2024	2	6/26/2024	5	7/31/2024	2	9/4/2024	1
5/23/2024	1	6/27/2024	3	8/1/2024	1	9/5/2024	0
5/24/2024	0	6/28/2024	6	8/2/2024	1	9/6/2024	1
5/25/2024	1	6/29/2024	7	8/3/2024	*1955*	9/7/2024	0
5/26/2024	0	6/30/2024*	3	8/4/2024	*6200*	9/8/2024	1
5/27/2024	25	7/1/2024*	781	8/5/2024	***10809***	9/9/2024	0
5/28/2024	4	7/2/2024*	576	8/6/2024	*6650*	9/10/2024	0
5/29/2024*	6	7/3/2024	104	8/7/2024*	*5150*	9/11/2024	0
5/30/2024	20	7/4/2024	6	8/8/2024	DNO	9/12/2024	0
5/31/2024	17	7/5/2024	13	8/9/2024	DNO	9/13/2024	0
6/1/2024	8	7/6/2024	7	8/10/2024	DNO	9/14/2024	0
6/2/2024	4	7/7/2024	0	8/11/2024	DNO	9/15/2024	0
6/3/2024	12	7/8/2024	9	8/12/2024	DNO		
6/4/2024	3	7/9/2024	10	8/13/2024	DNO	Total	84,895

*Days the hydroelectric facility was operating (23 days)
Volumetric estimates are in italics (10)
Bolded numbers are peak days.
The peak periods are shown in boxes.
QC check is underlined.

Table 4.1-1: Known Eel Numbers in the 200 Milliliter Subsample during Days of Volumetric Estimates, Octoraro Creek Eel Facility, 2024

Date	Number of Eels in 200 mL
6/6/2024	63
6/7/2024	71
6/8/2024	94
6/9/2024	88
6/10/2024	68
8/3/2024	85
8/4/2024	80
8/5/2024	64
8/6/2024	100
8/7/2024	79

Table 4.2-1: Number of Juvenile Eels Captured with Length and Weight Measurements, Octoraro Creek Eel Facility, 2024

	Total
Number eels collected	84,895
Number measured	260
Data Collection Days	28
Length Range (mm)	92-175
Average length (mm)	125.2
Median length (mm)	124.0
Weight range (g)	0.7-7.8
Average weight (g)	2.4
Median weight (g)	2.2

Table 4.2-2: Juvenile Eel Length Frequency, Octoraro Creek Eel Facility, 2024

TL (mm)	Number
90-94	2
95-99	3
100-104	4
105-109	16
110-114	30
115-119	44
120-124	37
125-129	33
130-134	30
135-139	25
140-144	17
145-149	7
150-154	4
155-159	4
160-164	0
165-169	1
170-174	1
175-179	2
Total	**260**

Table 4.2-3: Juvenile Eel Weight Frequency, Octoraro Creek Eel Facility, 2024

Weight (g)	Number
0.5-0.9	3
1.0-1.4	30
1.5-1.9	71
2.0-2.4	59
2.5-2.9	43
3.0-3.4	28
3.5-3.9	13
4.0-4.4	5
4.5-4.9	2
5.0-5.4	1
5.5-5.9	1
6.0-6.4	1
6.5-6.9	1
7.0-7.4	0
7.5-7.9	2
Total	**260**

Table 4.2-4: Observed Injuries of Juvenile American Eels, Octoraro Creek Eel Facility, 2024

Date	Length (mm)	Weight (grams)	Condition Factor
5/9/2024	129	2.3	Redness underside near gills
6/17/2024	127	2.4	Mark on right side
7/1/2024	124	2.4	Hemm left operculum
	122	2.2	Ventral discoloration
	127	2.2	Laceration above vent
7/18/2024	132	2.2	Hemm on caudal fin

6 of 260 eels (2.3%) that were processed had an injury.

Table 4.3-1: Juvenile Eel Collection by Week and Ranks, Octoraro Creek Eel Facility, 2024

	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
Total	1	2	0	4	80	34,480	17,609	249	54	1,490
Rank	T-17	16	T-20	15	7	1	3	6	8	5
Percent Catch (%)	< 0.1	< 0.1	< 0.1	< 0.1	0.1	40.6	20.7	0.3	0.1	1.8

	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21
Total	32	13	19	1,972	28,809	1	48	21	10	1	0
Rank	10	13	12	4	2	T-17	9	11	14	T-17	T-20
Percent Catch (%)	< 0.1	< 0.1	< 0.1	2.3	33.9	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1

Top 3 ranked weeks are shown in boxes.

Wk 1: May 1 - May 4
Wk 2: May 5 - May 11
Wk 3: May 12 - May 18
Wk 4: May 19 - May 25
Wk 5: May 26 - June 1
Wk 6: June 2 - June 8
Wk 7: June 10 - June 15
Wk 8: June 16 - June 22
Wk 9: June 23 - June 29
Wk 10: June 30 - July 6

Wk 11: July 7 - July 13
Wk 12: July 14 – July 20
Wk 13: July 21 – July 27
Wk 14: July 28 - August 3
Wk 15: August 4 – August 10
Wk 16: August 11 – August 17
Wk 17: August 18 – August 24
Wk 18: August 25 – August 31
Wk 19: September 1 – September 7
Wk 20: September 8 – September 14
Wk 21: September 15

Table 4.5-1: USGS 01578475 - Octoraro Creek at Richardsmere, MD Gage Flows Daily Average Creek Flows (cfs), 2024

Day	May	June	July	August	September
1	257	127	202	75.5	52.1
2	237	120	140	95.2	60.6
3	221	120	110	280	61.2
4	214	116	95.9	403	62.1
5	237	224	95.3	212	60.3
6	235	975	93.3	142	59.7
7	237	248	97.4	475	54.4
8	252	150	82.7	301	56.5
9	226	130	77.4	263	52.8
10	235	119	71.2	395	50.5
11	230	114	78.3	230	52.0
12	234	111	80.3	155	51.3
13	227	108	82.3	120	51.2
14	227	104	82.8	101	50.7
15	230	104	89.6	91.2	50.4
16	227	97.4	95.3	84.6	
17	242	92.7	126	96.8	
18	255	99.4	103	110	
19	203	102	93.2	116	
20	153	100	81.5	106	
21	91.1	97.4	75.8	99.5	
22	89.0	95.8	74.6	91.6	
23	89.2	94.8	103	88.0	
24	120	93.7	132	86.0	
25	128	87.8	114	84.0	
26	135	84.0	100	84.4	
27	136	89.7	84.3	70.5	
28	140	87.0	74.5	54.5	
29	134	83.8	67.4	50.7	
30	152	191	65.4	53.5	
31	141		70.5	53.9	

Shaded cells indicate when the OCEF was out of operation

Table 4.5-2: Fraction of Moon Illumination, 2024 EST *(1.0 Equals Full Moon)*

Day	May	June	July	August	September
1	0.501	0.298	0.218	0.085	0.019
2	0.384	0.195	0.131	0.036	0.002
3	0.272	0.109	0.064	0.008	0.004
4	0.170	0.047	0.021	0.020	0.025
5	0.088	0.01	0.003	0.017	0.065
6	0.031	0.002	0.009	0.052	0.120
7	0.003	0.020	0.037	0.103	0.191
8	0.006	0.062	0.085	0.169	0.274
9	0.037	0.124	0.149	0.248	0.368
10	0.092	0.200	0.225	0.337	0.470
11	0.167	0.287	0.312	0.432	0.576
12	0.255	0.380	0.405	0.533	0.682
13	0.351	0.477	0.502	0.635	0.783
14	0.450	0.574	0.600	0.734	0.872
15	0.549	0.668	0.696	0.826	0.942
16	0.645	0.757	0.786	0.904	
17	0.734	0.838	0.867	0.962	
18	0.815	0.906	0.932	0.978	
19	0.885	0.958	0.955	0.994	
20	0.941	0.974	0.977	0.996	
21	0.979	0.990	0.998	0.967	
22	0.989	0.998	0.989	0.908	
23	0.998	0.980	0.952	0.824	
24	0.994	0.936	0.887	0.722	
25	0.967	0.867	0.799	0.610	
26	0.917	0.776	0.694	0.495	
27	0.844	0.670	0.580	0.383	
28	0.752	0.555	0.462	0.279	
29	0.646	0.436	0.349	0.188	
30	0.530	0.322	0.245	0.114	
31	0.412		0.156	0.057	

Shaded cells indicate when the OCEF was out of operation

Table 4.5-3: Water Temperature (˚C) from the Collection Tank, Octoraro Creek Eel Facility, 2024

Day	May	June	July	August	September
1	19.4	20.0	25.2	26.3	23.3
2	19.5	20.3	24.8	27.0	23.4
3	19.8	20.9	24.4	28.0	22.7
4	17.7	21.7	24.2	27.2	22.3
5	16.6	22.1	25.4	27.2	22.0
6	17.6	23.1	26.5	27.8	22.5
7	17.9	22.4	27.3	26.9	22.4
8	18.6	22.1	26.8		21.3
9	19.0	22.0	26.8		21.2
10	15.9	21.7	29.2		20.5
11	14.2	21.8	26.1		20.6
12	14.4	20.8	26.6		21.0
13	14.4	21.4	26.5		21.0
14	15.1	22.1	26.8		20.8
15	15.3	22.8	27.4		21.0
16	15.4	22.3	27.5	24.6	
17	16.1	22.3	27.0	24.6	
18	15.9	23.2	27.6	24.4	
19	16.2	24.2	26.9	24.6	
20	16.3	24.4	26.7	24.0	
21	16.8	24.7	26.1	23.3	
22	17.2	25.4	26.7	23.2	
23	18.3	26.1	26.8	22.8	
24	19.5	26.0	27.9	22.5	
25	20.7	24.9	26.8	22.7	
26	21.2	25.3	26.3	23.4	
27	21.3	25.5	26.1	23.3	
28	21.3	24.9	25.7	23.1	
29	21.0	24.1	26.0	24.3	
30	20.4	25.4	26.0	23.3	
31	20.2		25.9	22.9	

Table 4.5-4: Water Quality Parameters at Associated Locations at Octoraro Creek Eel Facility, 2024

Day	Time	Collection *		Head Pond	
		Temp (°C)	DO (mg/L)	Temp (°C)	DO (mg/L)
5/1/2024	940	19.4	9.26	19.1	8.93
5/2/2024	920	19.5	7.80	19.4	7.60
5/3/2024	830	19.8	7.44	19.8	7.30
5/4/2024	750	17.7	8.10	17.8	7.74
5/5/2024	850	16.6	8.70	16.7	8.70
5/6/2024	814	17.6	9.02	17.5	8.90
5/7/2024	845	17.9	9.42	17.8	8.40
5/8/2024	750	18.6	8.40	18.4	8.15
5/9/2024	809	19.0	7.21	19.1	6.88
5/10/2024	835	15.9	7.77	15.8	7.58
5/11/2024	805	14.2	8.38	14.2	8.38
5/12/2024	820	14.4	8.03	14.4	7.96
5/13/2024	745	14.4	8.21	14.4	8.02
5/14/2024	745	15.1	8.41	15.0	8.25
5/15/2024	840	15.3	8.24	15.3	8.54
5/16/2024	800	15.4	8.00	15.4	8.50
5/17/2024	754	16.1	9.20	16.1	9.00
5/18/2024	815	15.9	7.92	15.9	7.29
5/19/2024	800	16.2	8.09	16.1	7.59
5/20/2024	835	16.3	7.84	16.2	7.42
5/21/2024	750	16.8	8.26	16.7	7.70
5/22/2024	810	17.2	8.23	17.2	8.10
5/23/2024	808	18.3	8.69	18.1	8.47
5/24/2024	756	19.5	8.15	19.4	7.95
5/25/2024	815	20.7	10.00	20.7	7.40
5/26/2024	756	21.2	9.78	21.2	7.81
5/27/2024	841	21.3	8.03	21.2	7.49
5/28/2024	753	21.3	8.13	21.3	7.87
5/29/2024	811	21.0	9.21	21.0	7.47
5/30/2024	750	20.4	9.29	21.0	7.76
5/31/2024	752	20.2	9.49	20.5	7.70
6/1/2024	830	20.0	9.39	20.0	7.91
6/2/2024	804	20.3	8.07	20.3	7.89
6/3/2024	840	20.9	8.72	20.9	8.21
6/4/2024	804	21.7	7.73	21.6	7.12
6/5/2024	800	22.1	7.57	22.1	7.35
6/6/2024	827	23.1	7.89	22.8	8.20
6/7/2024	801	22.4	2.45	22.5	7.97
6/8/2024	745	22.1	5.23	22.1	7.70
6/9/2024	1110	22.0	3.15	21.9	8.20
6/10/2024	930	21.7	5.68	21.6	8.06
6/11/2024	920	21.8	8.95	21.7	7.80
6/12/2024	750	20.8	8.44	20.9	7.44
6/13/2024	800	21.4	8.57	21.7	7.49
6/14/2024	800	22.1	9.50	22.1	8.20
6/15/2024	803	22.8	6.43	22.6	7.15

Table 4.5-4. (Continued)

Day	Time	Collection		Head Pond	
		Temp (°C)	DO (mg/L)	Temp (°C)	DO (mg/L)
6/16/2024	815	22.3	8.59	22.2	7.77
6/17/2024	845	22.3	8.98	22.2	7.88
6/18/2024	730	23.2	7.42	23.2	7.04
6/19/2024	804	24.2	8.31	24.2	7.02
6/20/2024	745	24.4	7.70	24.4	6.75
6/21/2024	740	24.7	7.25	24.7	6.95
6/22/2024	750	25.4	7.13	25.4	6.43
6/23/2024	821	26.1	6.83	26.1	6.47
6/24/2024	820	26.0	6.84	25.9	6.19
6/25/2024	915	24.9	9.46	24.4	8.46
6/26/2024	1027	25.3	9.04	25.1	7.91
6/27/2024	1040	25.5	7.76	25.4	7.06
6/28/2024	748	24.9	7.64	24.8	6.40
6/29/2024	930	24.1	8.12	24.1	7.24
6/30/2024	730	25.4	8.61	25.4	7.61
7/1/2024	747	25.2	9.42	25.7	7.82
7/2/2024	921	24.8	8.36	24.8	7.26
7/3/2024	750	24.4	8.29	24.4	6.89
7/4/2024	700	24.2	7.61	24.3	6.43
7/5/2024	729	25.4	6.68	25.3	6.18
7/6/2024	720	26.5	6.83	26.3	6.92
7/7/2024	800	27.3	7.51	27.1	6.60
7/8/2024	800	26.8	7.01	26.7	6.10
7/9/2024	800	26.8	7.38	26.8	7.36
7/10/2024	754	29.2	10.50	27.2	6.88
7/11/2024	815	26.1	6.93	26.2	5.55
7/12/2024	800	26.6	6.40	26.6	5.80
7/13/2024	800	26.5	6.59	26.4	6.36
7/14/2024	800	26.8	6.82	26.8	6.33
7/15/2024	800	27.4	7.25	27.5	7.04
7/16/2024	801	27.5	7.13	27.4	7.05
7/17/2024	740	27.0	6.98	27.1	6.60
7/18/2024	758	27.6	7.14	27.9	6.27
7/19/2024	745	26.9	5.97	26.9	6.25
7/20/2024	721	26.7	5.97	26.7	5.55
7/21/2024	745	26.1	6.97	26.1	6.51
7/22/2024	815	26.7	7.70	26.6	5.92
7/23/2024	740	26.8	8.38	25.7	7.18
7/24/2024	810	27.9	6.27	27.2	6.83
7/25/2024	800	26.8	8.30	26.8	6.99
7/26/2024	750	26.3	7.70	26.4	6.13
7/27/2024	718	26.1	7.78	26.2	6.75
7/28/2024	810	25.7	8.42	25.8	5.44
7/29/2024	807	26.0	7.51	29.5	6.83
7/30/2024	800	26.0	6.12	26.0	5.40
7/31/2024	744	25.9	7.88	25.9	6.93

Table 4.5-4. (Continued)

Day	Time	Collection		Head Pond	
		Temp (°C)	DO (mg/L)	Temp (°C)	DO (mg/L)
8/1/2024	740	26.3	6.99	26.3	6.54
8/2/2024	751	27.0	6.73	27.0	5.44
8/3/2024	1117	28.0	7.89	27.8	7.75
8/4/2024	917	27.2	3.95	27.2	7.35
8/5/2024	845	27.2	5.70	27.1	7.50
8/6/2024	1045	27.8	5.03	27.5	6.77
8/7/2024	903	26.9	6.25	27.0	8.34
8/8/2024					
8/9/2024					
8/10/2024					
8/11/2024					
8/12/2024					
8/13/2024					
8/14/2024					
8/15/2024					
8/16/2024	1300	24.6	7.93	23.4	6.74
8/17/2024	1002	24.6	8.23	24.6	6.65
8/18/2024	915	24.4	8.03	24.4	6.74
8/19/2024	1000	24.6	7.59	24.4	6.94
8/20/2024	920	24.0	7.34	24.0	6.70
8/21/2024	1025	23.3	8.00	23.3	7.10
8/22/2024	1042	23.2	6.9	23.0	8.20
8/23/2024	926	22.8	6.88	23.7	6.34
8/24/2024	915	22.5	8.19	22.5	7.40
8/25/2024	839	22.7	8.26	22.7	7.46
8/26/2024	900	23.4	8.55	23.3	7.62
8/27/2024	916	23.3	7.84	23.5	7.03
8/28/2024	936	23.1	7.36	23.8	6.07
8/29/2024	935	24.3	6.00	24.0	5.68
8/30/2024	1020	23.3	6.01	23.2	5.96
8/31/2024	902	22.9	4.9	22.9	4.25
9/1/2024	840	23.3	5.48	23.3	4.59
9/2/2024	935	23.4	5.44	23.3	4.26
9/3/2024	1000	22.7	6.22	22.5	4.86
9/4/2024	930	22.3	6.04	22.2	5.08
9/5/2024	822	22.0	6.01	22.1	4.69
9/6/2024	1000	22.5	6.45	22.5	5.32
9/7/2024	727	22.4	5.38	22.4	5.36
9/8/2024	944	21.3	6.69	21.2	5.44
9/9/2024	800	21.2	6.42	21.2	5.57
9/10/2024	1030	20.5	6.50	20.5	5.86
9/11/2024	742	20.6	6.46	20.7	5.10
9/12/2024	945	21.0	10.86	21.0	7.51
9/13/2024	824	21.0	7.11	21.0	6.28
9/14/2024	738	20.8	6.27	20.9	5.30
9/15/2024	735	21.0	6.90	21.0	5.52

Table 4.5-5: Rainfall (inches) Readings Taken at the Octoraro Creek Eel Facility, 2024

Day	May	June	July	August	September
1	0.0	0.0	0.5	0.2	0.0
2	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	**2.3**	0.0
4	0.0	0.0	0.0	0.7	0.0
5	0.5	0.0	0.0	0.0	0.0
6	0.2	**3.6**	0.0	0.2	0.0
7	0.0	0.0	0.0	**2.0**	0.0
8	0.0	0.0	0.0		0.15
9	0.0	0.0	0.0		0.0
10	0.8	0.0	0.0		0.0
11	0.3	0.0	0.3		0.0
12	0.2	0.0	0.0		0.0
13	0.0	0.0	0.2		0.0
14	0.0	0.0	0.0		0.0
15	0.2	0.1	0.0		0.0
16	0.0	0.0	0.0	0.0	
17	0.0	0.0	**1.1**	0.5	
18	0.0	0.0	0.5	0.0	
19	0.5	0.0	0.0	0.3	
20	0.0	0.0	0.0	0.1	
21	0.0	0.0	0.0	0.0	
22	0.0	0.0	0.0	0.0	
23	0.0	0.0	0.6	0.0	
24	0.0	1.5	0.0	0.0	
25	0.0	0.0	0.0	0.0	
26	0.1	0.0	0.0	0.0	
27	0.0	0.2	0.0	0.0	
28	0.2	0.0	0.0	0.0	
29	0.0	0.0	0.0	0.0	
30	0.1	**1.8**	0.0	0.0	
31	0.0		0.0	0.0	

Bolded values represent rainfall amounts greater than or equal to 1.0 inches.

Table 4.6-1: Eel Transport/Stocking Data, 2024

Location of stocking	Number of Eels	No. eels died (mortality)			Removed for analysis	Remove by SRBC	Number stocked
		Collection Tank	Holding Tank	Transport			
Octoraro Creek Collection Tanks	84,895	4 (0.00%)					
Transported to Conowingo West Eel Collection Facility				0 (0.00%)			
Conowingo Collection Tank	366,010	64 (0.02%)	**234 (0.45%)**		95	500	365,117
Total Transported from Octoraro Creek and Conowingo West Eel Collection Facility	450,008			115 (0.03%)			449,893

Numbers displayed are from May 1 – September 15, 2024

Bolded value is assumed all dead eels were from the CWECF.

Table 4.7-1: Checking Flows (Gallons per Minute) in the Octoraro Creek Eel Facility, 2024

	DATE									
	5/1	5/8	5/15	5/22	5/29*	6/5	6/12	6/19	6/26*	7/3
Enkamat Ramp										
Spray bar	7.35	7.8	7.65	7.35	7.5	6.0	7.5	5.8	6.0	7.5
Scent line	4.8	4.0	3.5	3.6	6.0	3.5	4.0	3.0	8.1	5.5
Bottom Attraction flow	23.5	21.6	25.0	21.0	21.0	22.5	17.5	18.4	23.25	20.0
Milieu Ramp										
Spray bar	6.0	7.2	6.75	6.3	7.5	5.0	6.0	5.2	5.8	8.0
Scent line	5.5	4.6	2.7	5.25	5.0	6.0	6.0	3.8	6.0	6.0
Bottom Attraction flow	24.5	22.8	26.0	22.8	21.2	20.5	20.0	20.4	24.0	21.0
Collection Tank Fill	4.65	4.6	5.1	4.7	5.1	5.0	6.0	6.8	6.0	6.0
Overall Attraction Flows	66.0	64.0	70.5	62.15	62.3	59.0	57.0	56.6	65.05	62.5

* Cleaned pump, manifold, and hoses to increase flow

	DATE								
	7/10*	7/17*	7/24	7/31*	8/7	8/21*	8/28*	9/4*	9/11*
Enkamat Ramp									
Spray bar	5.8	7.5	6.0	6.0	6.0	6.9	6.0	4.5	7.5
Scent line	5.0	6.0	5.4	5.0	4.2	7.35	5.0	4.6	6.0
Bottom Attraction flow	22.0	21.75	24.75	18.0	17.0	19.0	21.5	20.0	14.0
Milieu Ramp									
Spray bar	6.8	9.3	4.5	7.5	7.0	6.9	6.0	5.5	7.5
Scent line	6.5	7.2	4.6	5.0	5.0	6.75	5.0	5.5	7.0
Bottom Attraction flow	24.0	21.25	23.25	18.0	18.0	21.0	21.0	20.0	16.0
Collection Tank Fill	7.0	8.1	6.0	6.0	8.2	9.45	6.8	6.0	8.0
Overall Attraction Flows	65.6	67.9	64.5	55.5	56.2	63.25	61.3	56.0	53.0

* Cleaned pump, manifold, and hoses to increase flow

Table 4.7-2: Quality Control Checks on Counts, Octoraro Creel Eel Facility, 2024

Date	Number of eels in:		Displacement	Volumetric	Actual	Difference
	200 mL	1 L	of Water	Estimate	Counts	
8/3/2024	85	425	4.3	1913	1955	42
Total				1913	1955	42
						2.1%

All estimated eel counts contain extra eels that were anesthetized and counted.

Table 5.0-1: Comparison of Octoraro Creek Eel Facility, 2015-2024

Watershed area 540 km^2
Approximate Distance from Mouth of Chesapeake Bay to OCEF 341 km

	2015	2016	2017	2018	2021	2020	2021	2022 *	2023	2024 **	Average
Eels Collected	7,197	21,094	11,347	4,203	14,170	3,597	45,230	7,159	62,113	84,895	26,101
Average Size (mm)	129.4	130.9	135.4	141.6	129.9	125.8	123.5	123.9	122.8	125.2	129.2
Eel length range (mm)	95-232	99-202	99-245	100-259	93-252	91-170	90-190	100-219	95-350	92-175	
Days of Operation	89	138	138	135	138	95	124	73	138	130	119.8
Average eels per day	80.9	152.9	82.2	31.1	102.7	37.9	364.8	99.4	450.1	653	205.5
Average creek flow (cfs)	180.9	121.3	138	411	240	224	203	187	127.2	131.4	196.8
Flow range (cfs)	60-1,490	43-512	51-557	88-2,370	63-1,610	64-3,920	93-1,070	57-687	44-1,470	50-975	

*Started operation on September 5, 2022, after the bank stabilization project was completed and continued operation until November 20, 2022.
**Ramp was removed on August 7 and returned to service August 15 due to possible high flows from tropical storm Debby

Table 5.0-2: Occurrence of Ramp Entrance Underwater and Number of Eel Collected, Octoraro Creek Eel Facility, 2024

Date	Number of Eels in Collection Tank
6/6/2024	1,348
6/7/2024	16,331
6/30/2024	3
7/1/2024	781
8/3/2024	1,955
8/4/2024	6,200
8/7/2024	5,150
Total	**31,768**

Figure 2.0-1: Lower Octoraro Creek from Pine Grove Dam to the Mouth at the Susquehanna River, Octoraro Creek (Stone Masonry Dam Also Known as Pine Grove Low-Head Dam)

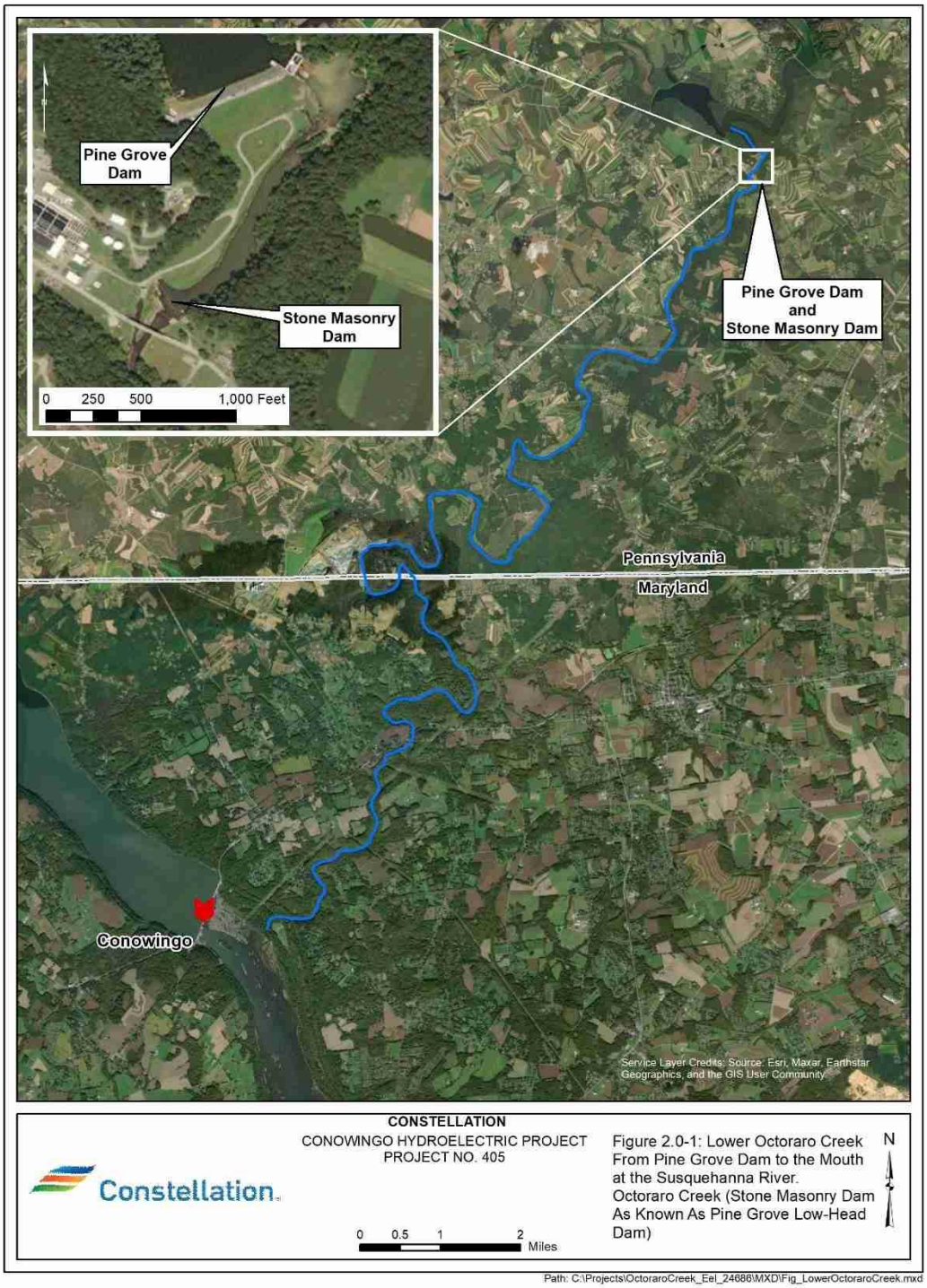


Figure 3.1-1: Overview of the Collection Tank with Support Frame and Scaffolding at top of the hill, Octoraro Creek Eel Facility, 2024

Figure 3.1-2: Ramp Entrance during 2022 and 2023 Eel Collection Seasons at 182 cfs, Octoraro Creek Eel Facility, 2024

Figure 3.1-3: Ramp Entrance at the Start of the Eel Collection Season, Octoraro Creek Eel Facility, 2024

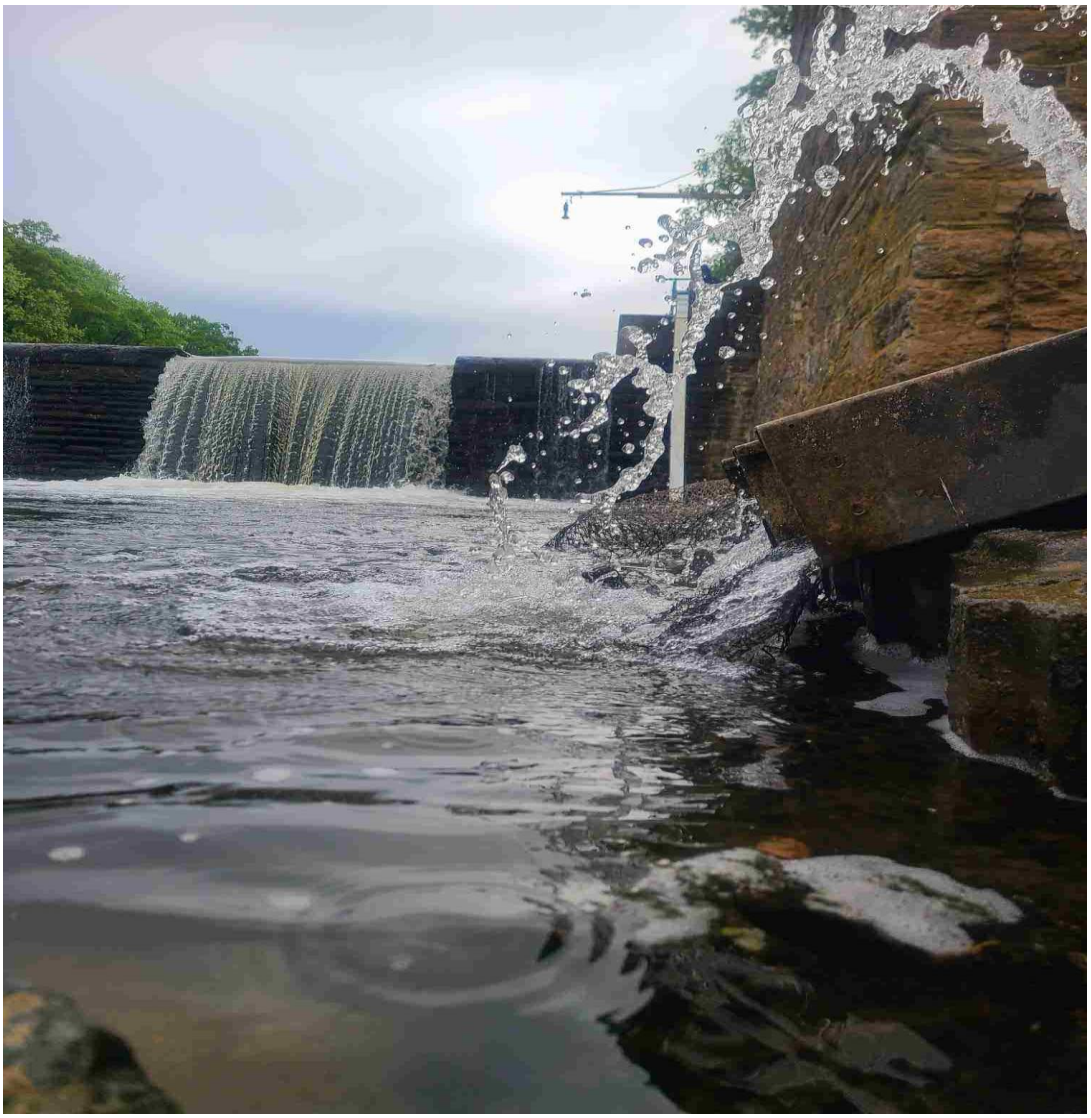


Figure 3.1-4: Ramp Entrance after completion of the Jetty to Create a Smooth Transition to the Tailwater, Octoraro Creek Eel Facility, 2024

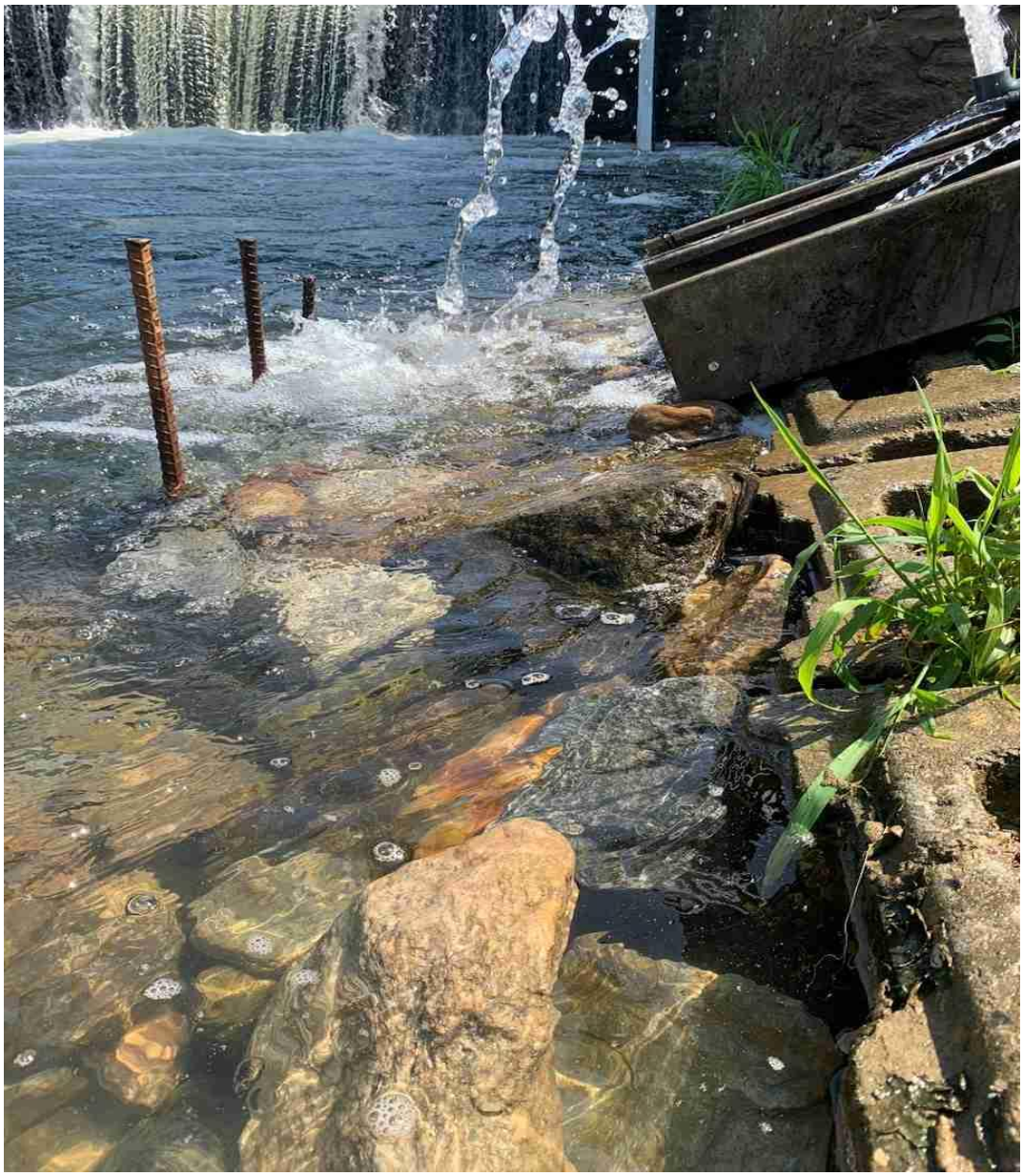


Figure 3.1-5: Ramp Entrance during 2024 Eel Collection Season at 191 cfs, Octoraro Creek Eel Facility, 2024

Figure 3.1-6: T-bar supports driven through ACBs, Octoraro Creek Eel Facility, 2024

Figure 4.1-1: Daily Eel Catch, Octoraro Creek Eel Facility, 2024

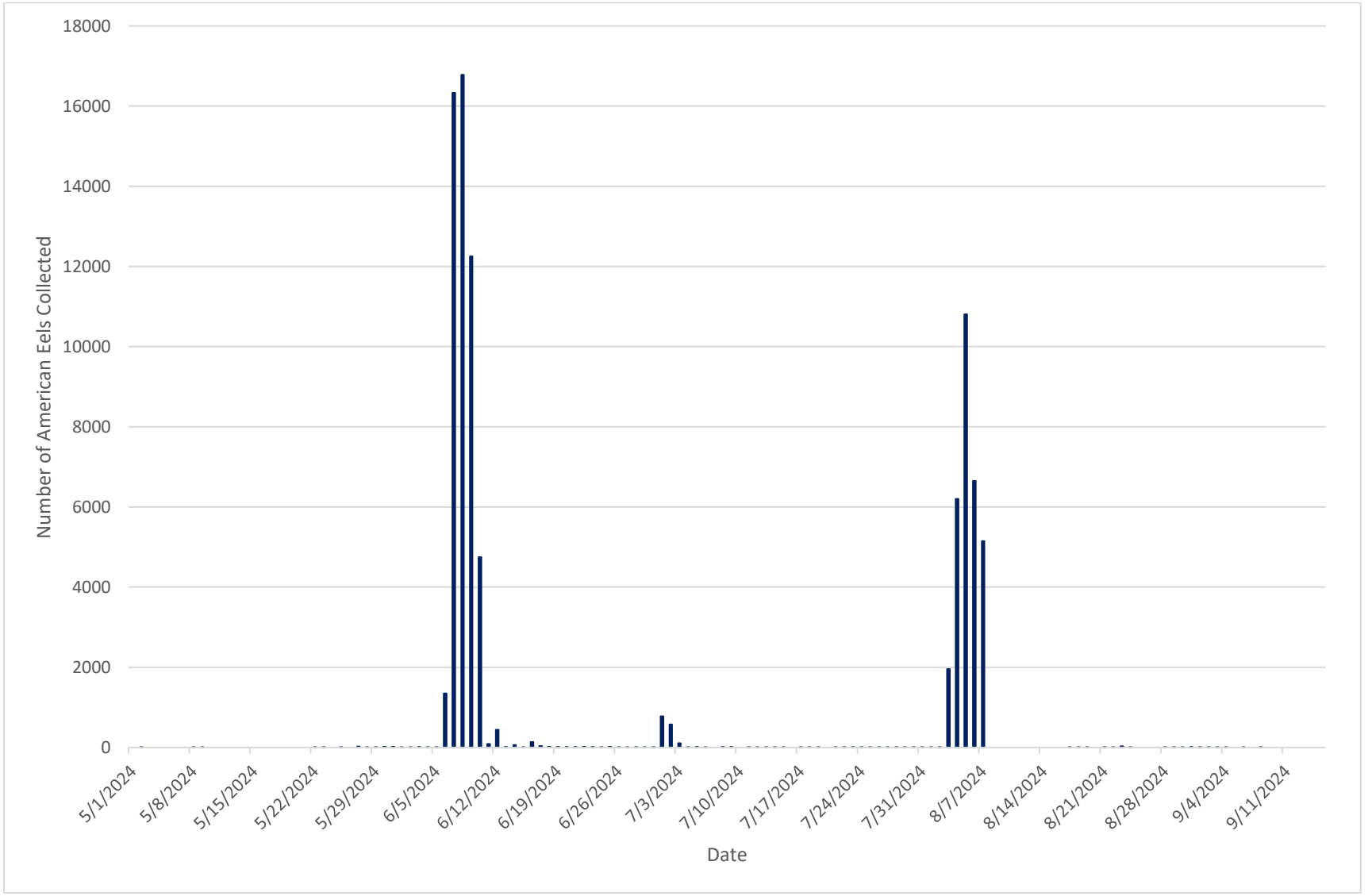


Figure 4.2-1: Image of Hemorrhage on Caudal Tail (above) and Marks on right side (below), Octoraro Creek Eel Facility, 2024

Figure 4.3-1: Percentage Eel Catch per Week, Octoraro Creek Eel Facility, 2024

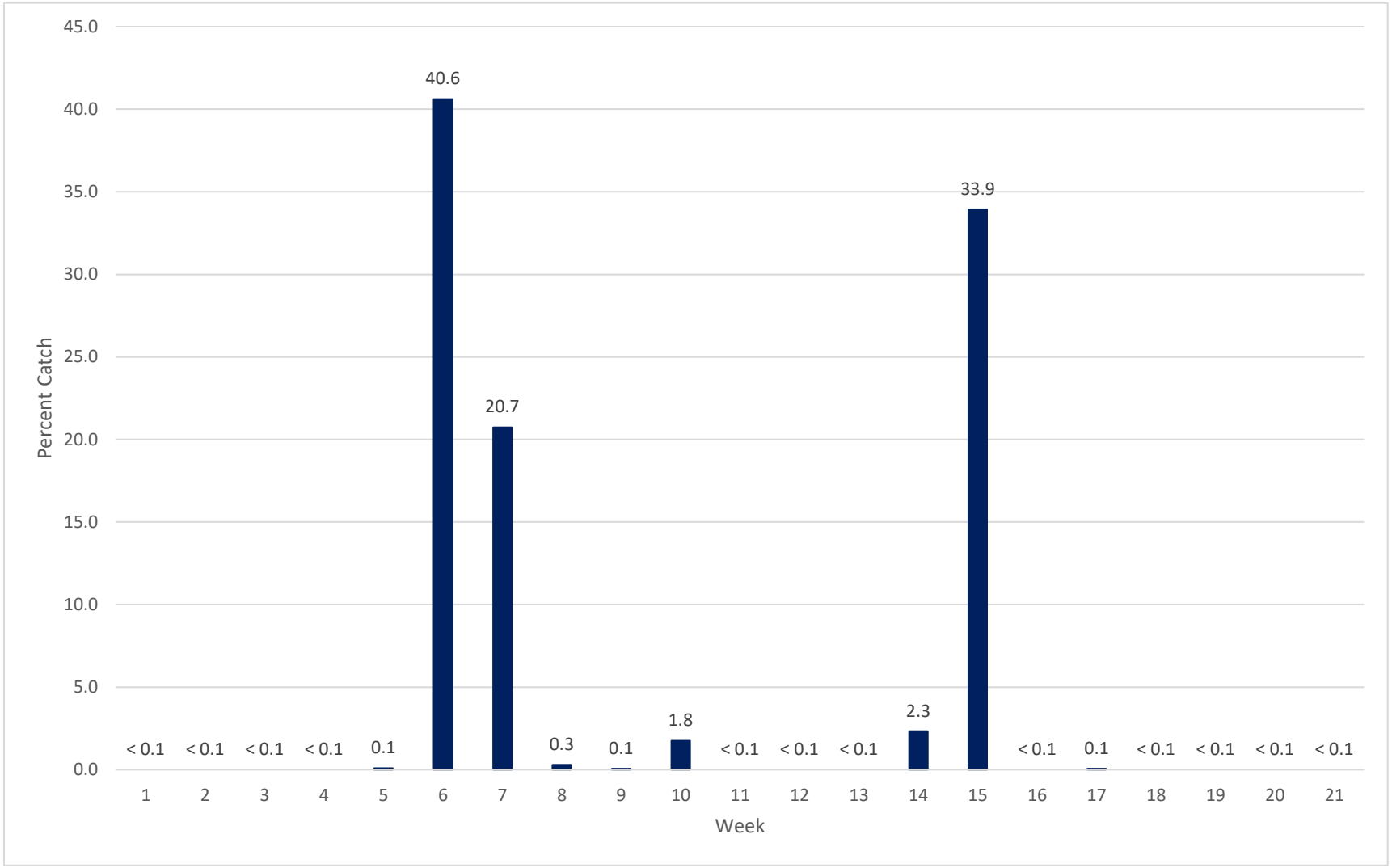


Figure 4.5-1: Daily Eel Catch and Daily Average Creek Flow (cfs, top graph) and Weekly Eel Catch and Weekly Average Creek Flow (cfs, bottom graph), Octoraro Creek Eel Facility, 2024

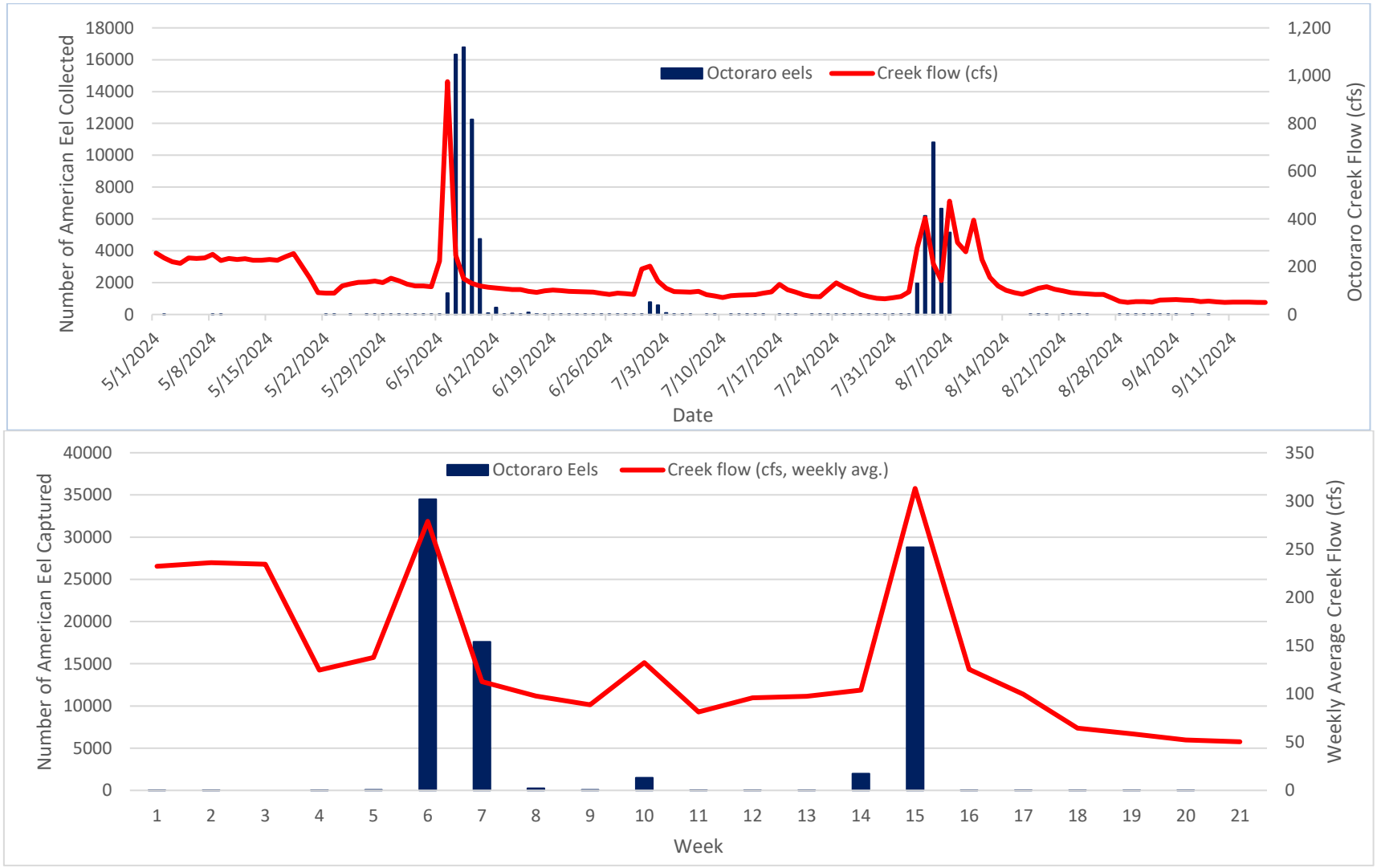


Figure 4.5-2: Eel Catch and Lunar Fraction (Daily above, Weekly Average below), Octoraro Creek Eel Facility, 2024 (1.0 Equals Full Moon)

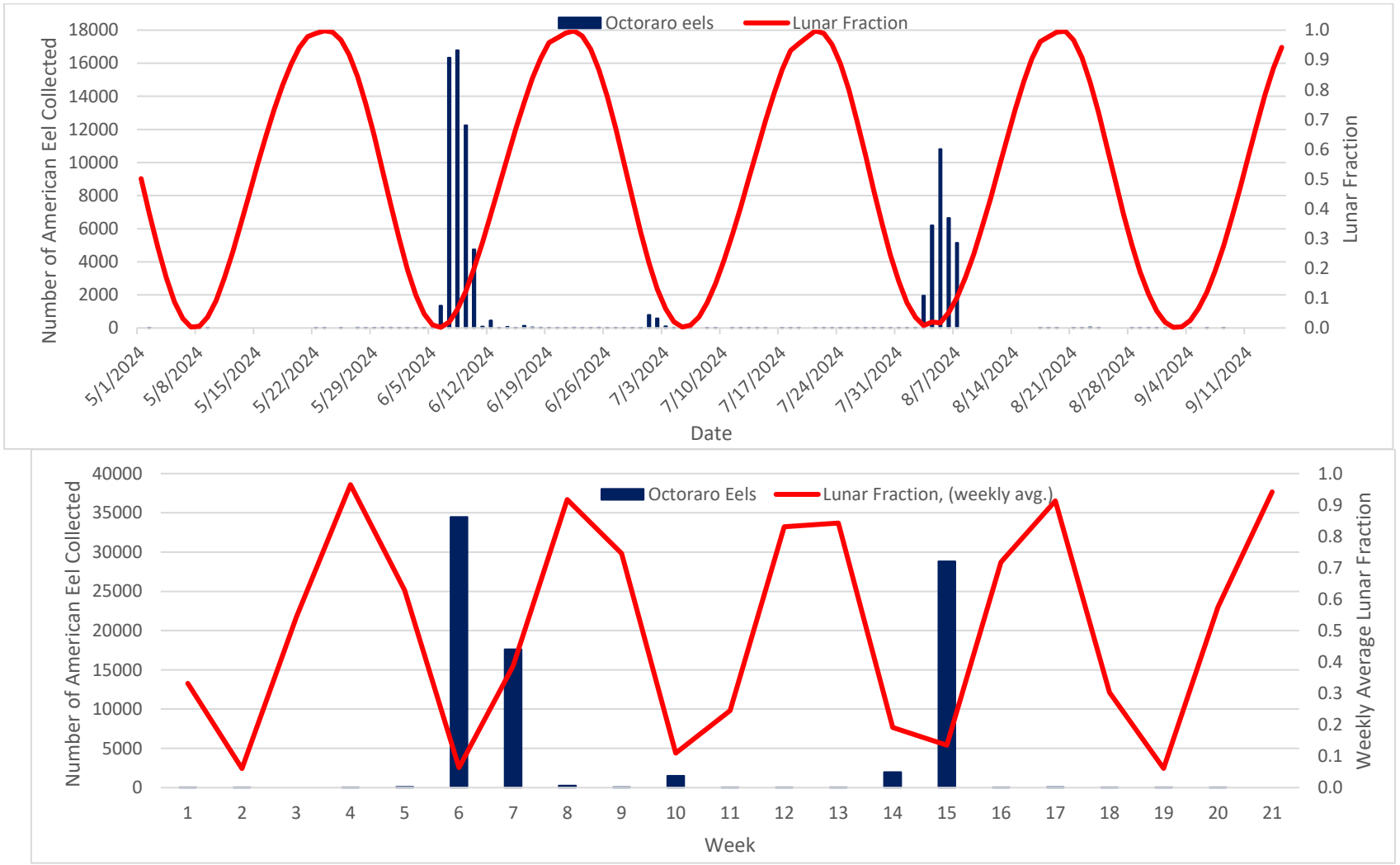
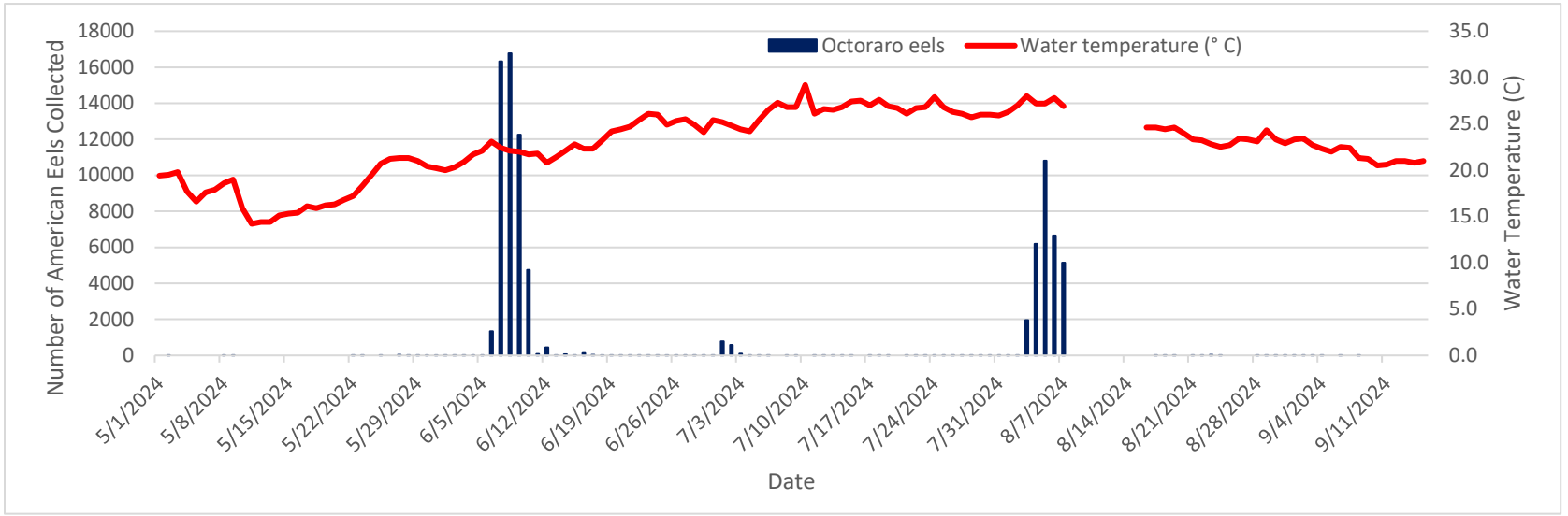


Figure 4.5-3: Eel Catch to Water Temperature (Daily above, Weekly Average below), Octoraro Creek Eel Facility, 2024



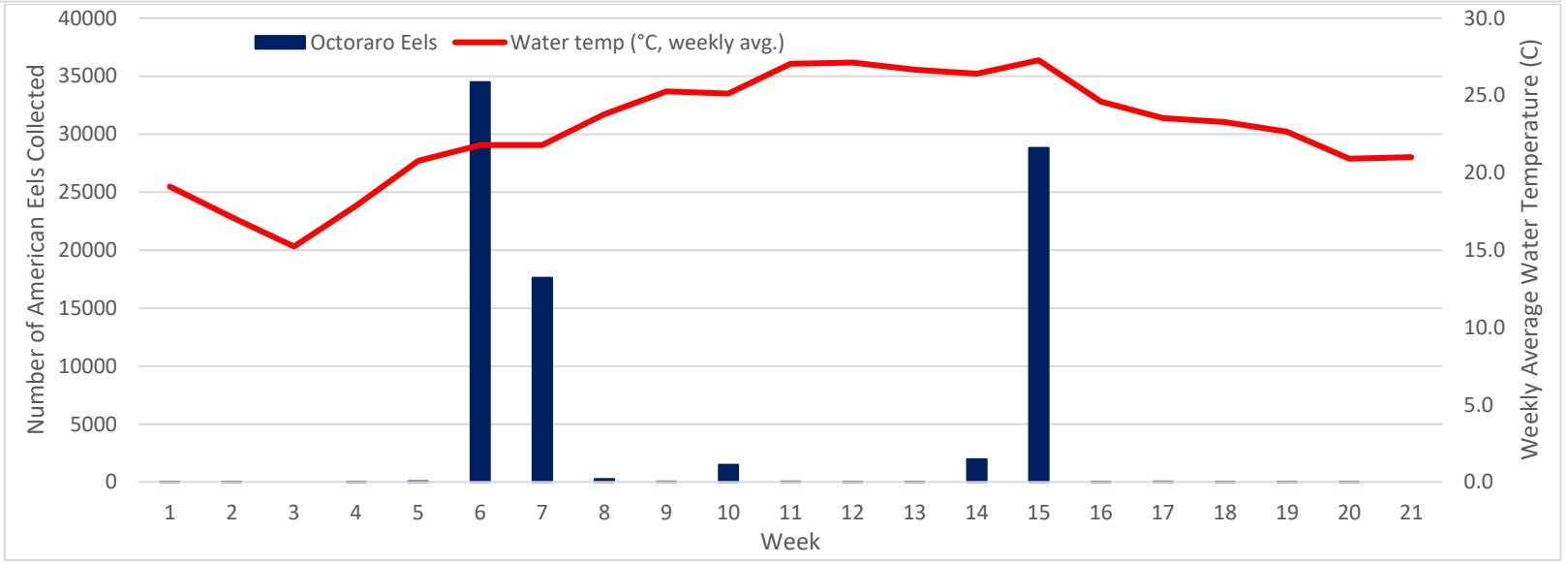


Figure 4.5-4: Comparison of Dissolved Oxygen Readings in Collection Tank and Head Pond, Octoraro Creek Eel Facility, 2024

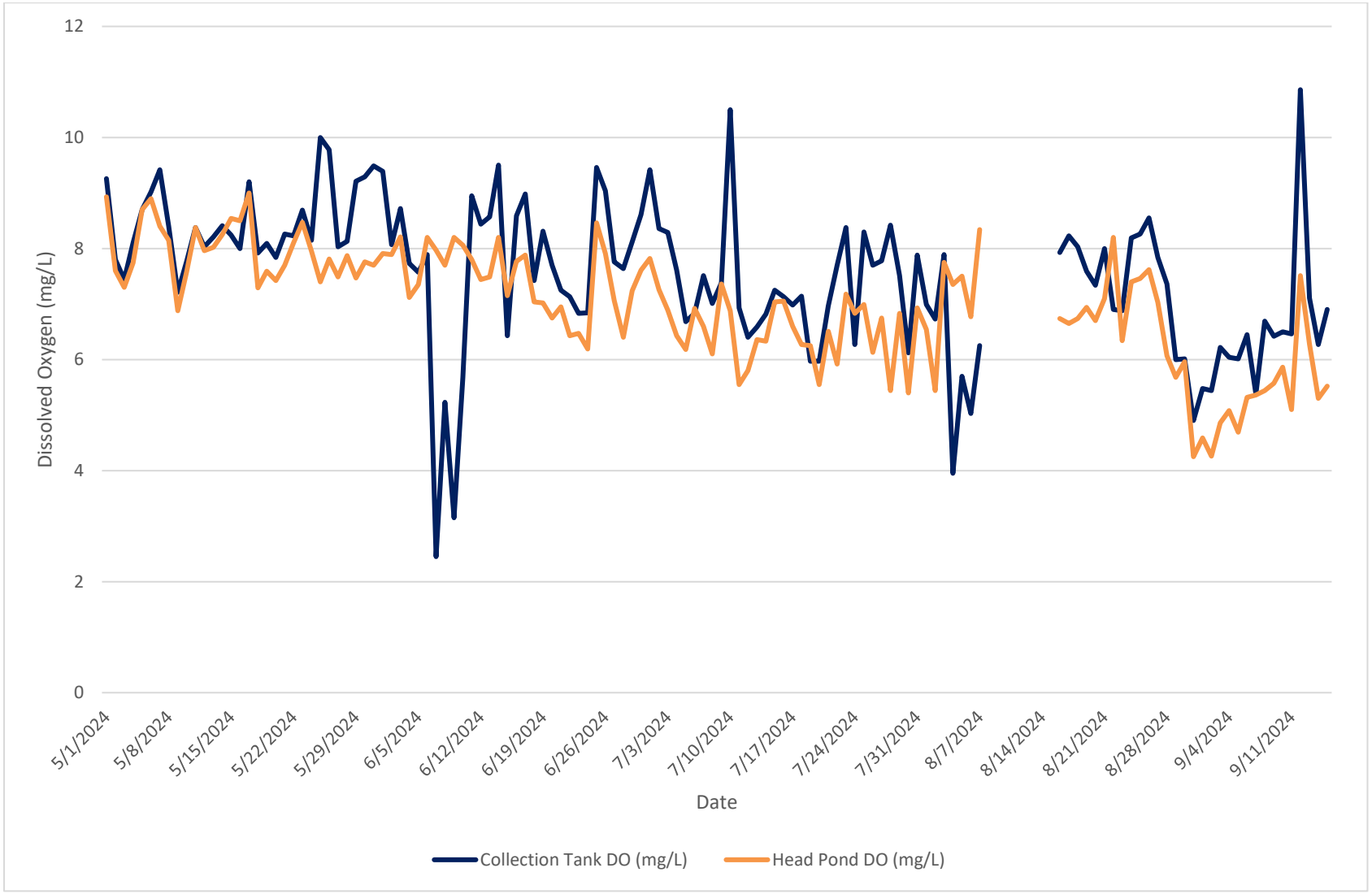


Figure 4.5-5: Eel Catch and Dissolved Oxygen (Daily above, Weekly Average below), Octoraro Creek Eel Facility, 2024

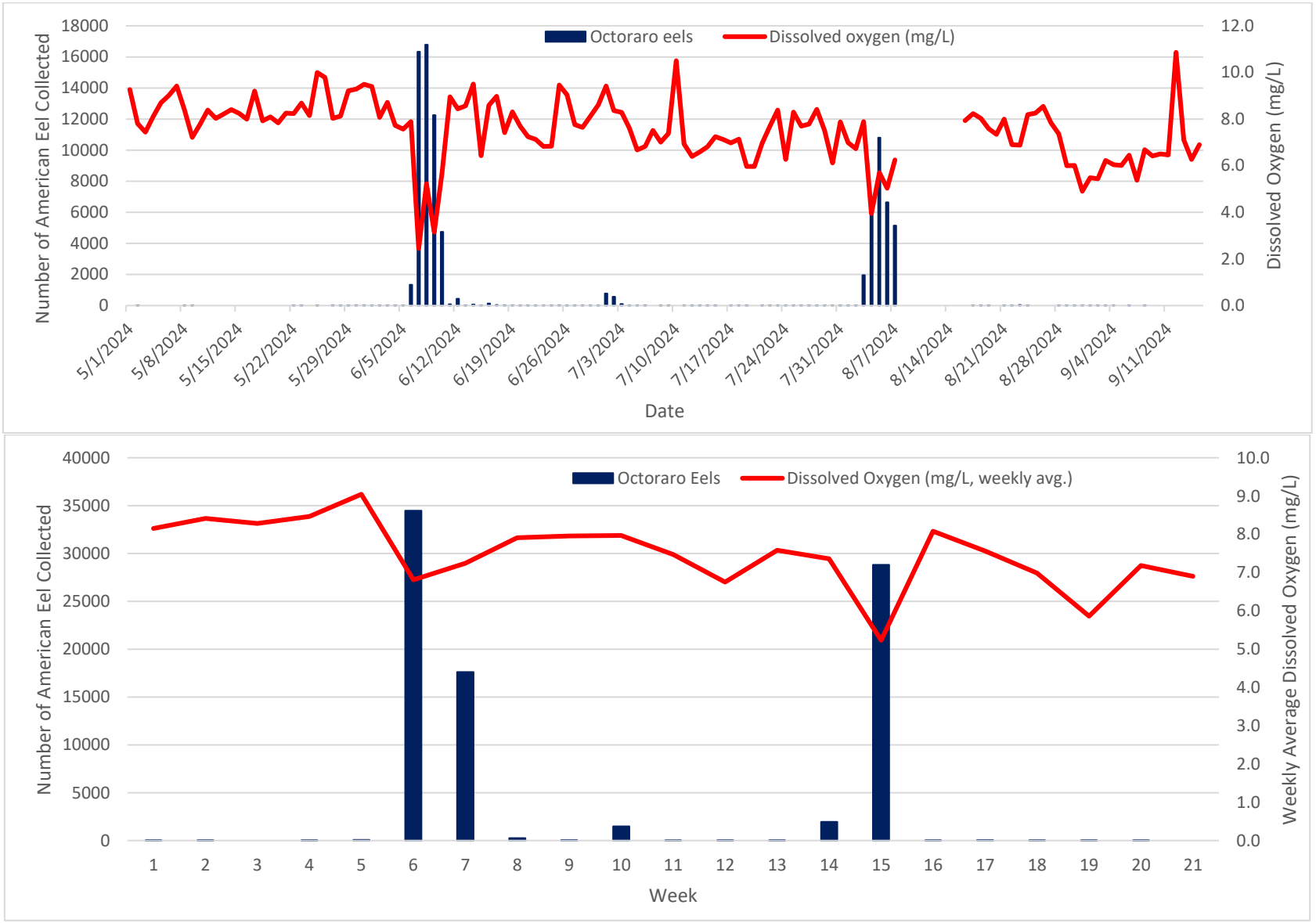


Figure 4.5-6: Eel Catch and Rainfall (Daily above, Weekly Average below), Octoraro Creek Eel Facility, 2024

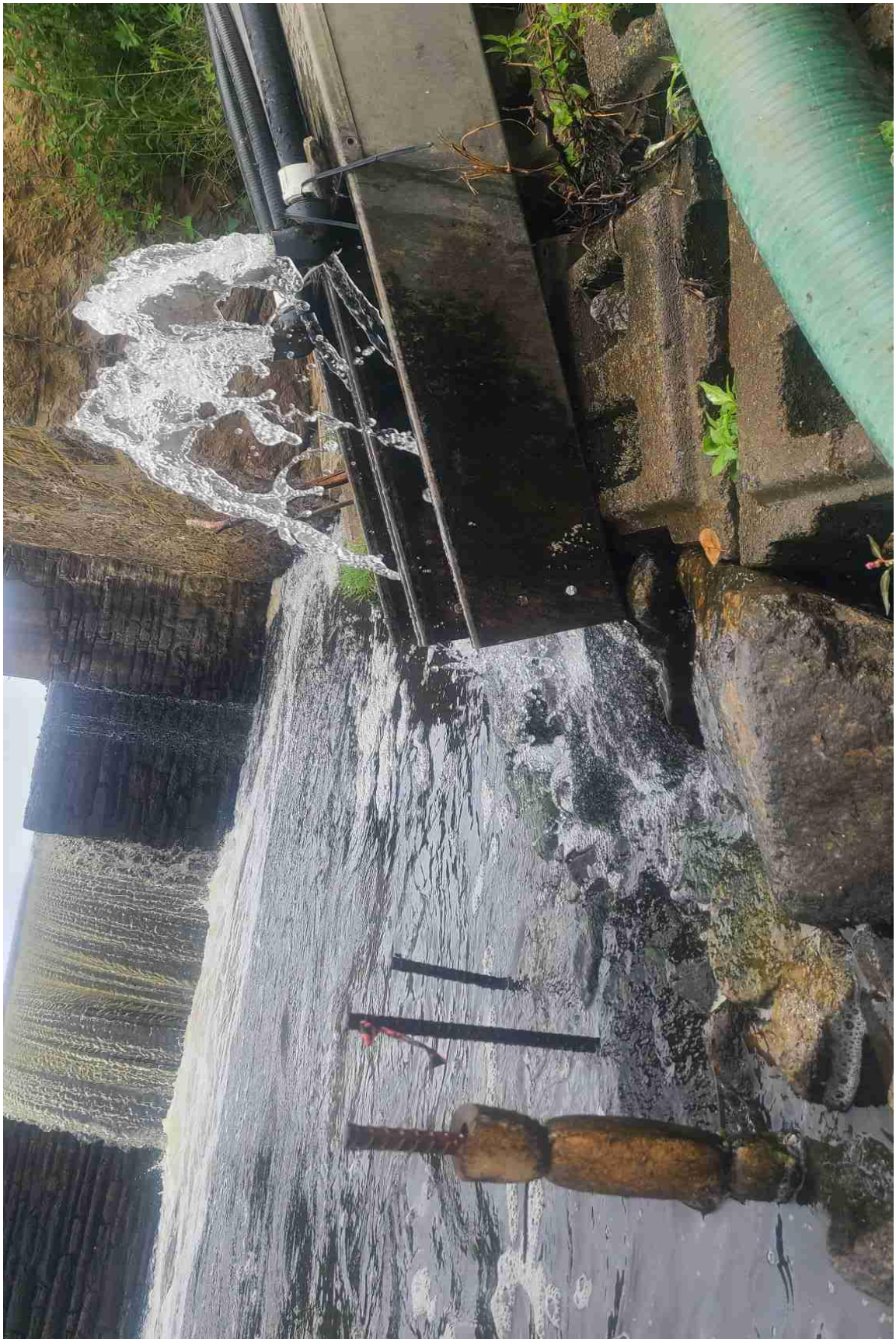
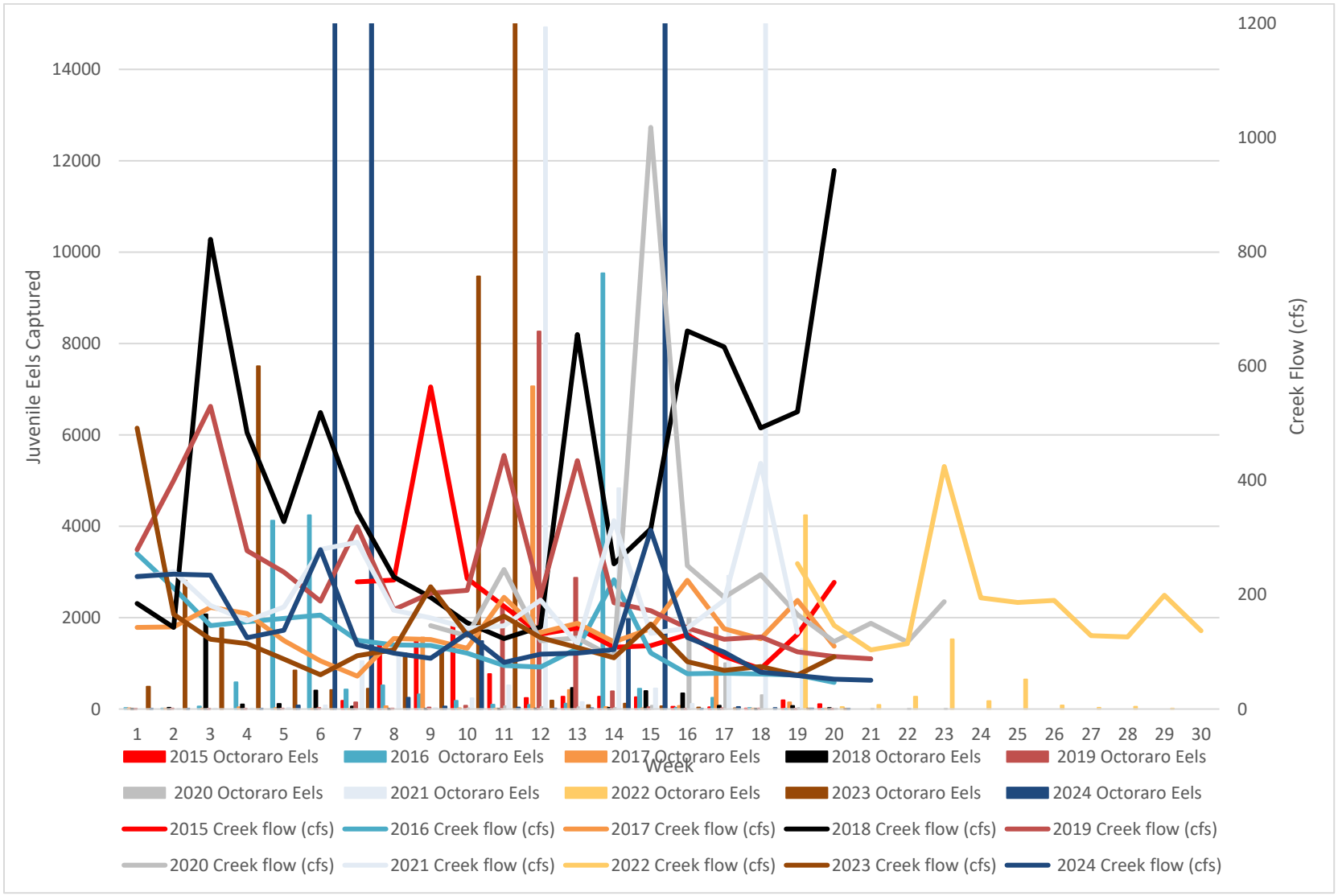


Figure 5.0-1: Ramp Entrance at ACBs (59.7 cfs), Octoraro Creek Eel Facility, 2024

Figure 5.0-2: Weekly Catch and Average Creek Flow, Octoraro Creek Eel Facility, 2015-2024



Appendix A:
Weekly Biological Data and Environmental Conditions for Octoraro Creek, 2024

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Octoraro Eels	1	2	0	4	80	34,480	17,609	249	54	1,490	32	13	19	1,972	28,809	1	48	21	10	1	0
Creek flow (cfs, weekly avg.)	232	236	235	125	138	279	113	97.8	88.7	133	81.4	95.9	97.7	104	313	126	99.6	64.5	58.6	52.1	50.4
Lunar Fraction, (weekly avg.)	0.332	0.061	0.543	0.965	0.628	0.064	0.387	0.917	0.746	0.110	0.245	0.830	0.843	0.192	0.135	0.718	0.913	0.304	0.061	0.575	0.942
Water temp (°C, weekly avg.)	19.10	17.11	15.23	17.86	20.77	21.80	21.80	23.79	25.26	25.13	27.04	27.13	26.67	26.41	27.28	24.60	23.54	23.29	22.66	20.91	21.00
Dissolved Oxygen (mg/L, weekly avg.)	8.15	8.41	8.29	8.47	9.05	6.81	7.25	7.91	7.96	7.97	7.47	6.75	7.59	7.36	5.23	8.08	7.56	6.99	5.86	7.19	6.90
Rainfall (in, weekly total)	0.0	1.8	0.4	0.5	0.4	3.6	0.1	0.0	1.7	2.3	0.5	1.6	0.6	2.5	2.9	0.5	0.4	0.0	0.0	0.2	0.0
Percent of Catch	< 0.1	< 0.1	< 0.1	< 0.1	0.1	40.6	20.7	0.3	0.1	1.8	< 0.1	< 0.1	< 0.1	2.3	33.9	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Conowingo Eels	1,334	12,965	2,473	4,663	19,314	3,161	1,659	1,730	12,541	3,399	5,377	2,519	1,072	11,459	6,991	36,312	125,604	54,025	41,467	16,855	1,090

Wk 1: May 1 - May 4
Wk 2: May 5 - May 11
Wk 3: May 12 - May 18
Wk 4: May 19 - May 25
Wk 5: May 26 - June 1
Wk 6: June 2 - June 8
Wk 7: June 10 - June 15
Wk 8: June 16 - June 22
Wk 9: June 23 - June 29
Wk 10: June 30 - July 6
Wk 11: July 7 - July 13
Wk 12: July 14 – July 20
Wk 13: July 21 – July 27
Wk 14: July 28 - August 3
Wk 15: August 4 – August 10
Wk 16: August 11 – August 17
Wk 17: August 18 – August 24
Wk 18: August 25 – August 31
Wk 19: September 1 – September 7
Wk 20: September 8 – September 14
Wk 21: September 15

Appendix B:
Weekly Data for 2015-2024

Weekly Eel Catch Data (2015-2024)

2015 Week							7	8	9	10	11	12	13	14	15	16	17	18	19	20
2015 Octoraro Eels							183	1458	1524	1819	765	240	273	271	258	50	42	13	194	107
2015 Creek flow (cfs)							222.8	225.9	564	228.6	179.7	131	141.9	108.1	111.1	130.4	91.9	70.6	130.6	221.7
2015 Lunar Fraction							0.05	0.48	0.94	0.57	0.05	0.33	0.89	0.69	0.09	0.2	0.8	0.8	0.18	0.01
2015 Water temp (°C)							25.1	23.3	22.7	24.4	24.5	25.3	25.7	25	24.3	24.3	22.8	24.9	23.3	19
Dissolved Oxygen (mg/L)							6.7	7	8.8	7.3	5.1	4.5	4.1	3.3	3.1	5.1	4.3	3.5	5.4	6.8
Percent of Catch							2.5	20.3	21.2	25.3	10.6	3.3	3.8	3.8	3.6	0.7	0.6	0.2	2.7	1.5
Conowingo Eels							2439	8200	5400	3166	4930	1794	284	190	128	327	469	267	59	
2016 Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
2016 Octoraro Eels	23	13	58	585	4124	4243	431	516	323	183	97	90	121	9540	443	28	247	25	2	2
2016 Creek flow (cfs)	271.7	211.9	145.9	153	158.7	164.7	120.4	112.3	111.4	97.6	76	73.7	106.1	226.3	98.1	61.6	62.7	61.4	59.7	46.6
2016 Lunar Fraction	0.1	0.27	0.85	0.86	0.24	0.15	0.74	0.93	0.35	0.08	0.6	0.95	0.48	0.05	0.45	0.94	0.6	0.06	0.31	0.83
2016 Water temp (°C)	14.5	14.9	15.8	19.3	23.9	22.7	22.8	24.3	24.5	25.7	26.2	27.2	27.7	25.4	26.7	26.7	24.3	24.8	24.8	23.4
Dissolved Oxygen (mg/L)	9.8	10	9.1	7.8	5.3	5.4	6.9	6.3	5.6	5.9	5.6	5	4.7	3	3.9	3.7	3.8	4.4	4	3.8
Percent of Catch	0.1	0.1	0.3	2.8	19.6	20.1	2.0	2.4	1.5	0.9	0.5	0.4	0.6	45.2	2.1	0.1	1.2	0.1	0.0	0.0
Conowingo Eels				5	95	100	113	353	252	247	1061	280	26	25	53	14	31	20	6	3
2017 Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
2017 Octoraro Eels	17	9	9	39	21	7	2	61	1565	19	13	7067	419	48	16	68	1793	12	149	12
2017 Creek flow (cfs)	142.8	144	178.1	167.4	119.9	84.3	57.6	123.3	121.6	106.3	195.4	133.7	150.3	117.7	140.7	225.4	140.7	122.9	190.3	110.2
2017 Lunar Fraction	0.56	0.96	0.66	0.09	0.37	0.92	0.78	0.16	0.24	0.84	0.88	0.26	0.14	0.72	0.94	0.38	0.07	0.58	0.96	0.56
2017 Water temp (°C)	17.4	14.2	18.8	18.2	18.9	20.2	21.6	24.4	24.9	25.7	25.6	26.9	26.2	25.2	24.1	24	23.3	20.2	20.5	20.4
Dissolved Oxygen (mg/L)	9.5	8.3	7.5	7.5	6.4	5.7	4.4	4.9	5.1	4.5	2.3	5.1	5	4	4.5	5	3	4	6.3	5.5
Percent of Catch	0.2	0.1	0.1	0.3	0.2	0.1	0.0	0.5	13.8	0.2	0.1	62.3	3.7	0.4	0.1	0.6	15.8	0.1	1.3	0.1
Conowingo Eels	4387	151	1224	5384	2196	1761	5199	23318	8090	799	1503	1432	15435	32524	13130	2654	2931	88	51	43
2018 Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
2018 Octoraro Eels	5	31	2072	101	115	407	55	3	4	0	1	11	464	29	393	343	73	5	69	22
2018 Creek flow (cfs)	185	143	822.6	484.1	327.9	519	345.1	231.3	195.7	150.9	123.3	143.9	655.6	254.3	315.7	661.9	634	492.1	520.4	943
2018 Lunar Fraction	0.89	0.4	0.06	0.6	0.96	0.55	0.06	0.47	0.95	0.69	0.1	0.34	0.91	0.8	0.18	0.22	0.82	0.89	0.29	0.12
2018 Water temp (°C)	15.3	15.9	18.4	19.4	21.4	20.5	20.8	22.6	22.5	25.6	25.5	25.3	24.6	24.9	25.9	25.2	23.2	25.3	24.6	18.2
Dissolved Oxygen (mg/L)	8.8	7.7	7.5	9.4	7.9	8.1	7.4	6.8	7	6.6	6.5	7.1	7.5	6.5	6.2	6.5	5.8	6.4	6.1	10.2
Percent of Catch	0.1	0.7	49.3	2.7	2.7	9.7	1.3	0.7	0.1	0.0	0.0	0.3	11.0	0.7	9.4	8.2	1.7	0.1	1.6	0.5
Conowingo Eels	7	6443	6879	197	398	1316	462	657	1077	6020	3175	1029	7986	20965	5262	3948	1870	165	73	20

(continued)

(Continued)

2019 Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2019 Octoraro Eels	1	9	5	3	9	20	144	12	36	73	2244	8266	2874	391	42	5	19	12	4	1	0
2019 Creek flow (cfs)	279	400	530	277	240	189	319	174	203	208	444	197	435	186	172	142	122	126	100	92	88
2019 Lunar Fraction	0.07	0.16	0.80	0.85	0.29	0.09	0.69	0.93	0.43	0.06	0.57	0.96	0.58	0.07	0.44	0.95	0.71	0.12	0.31	0.89	0.99
2019 Water temp (°C)	15.50	16.10	14.60	15.70	17.90	19.90	20.00	20.50	21.60	23.00	23.10	23.40	23.70	23.70	23.90	23.90	24.00	23.10	22.90	22.40	22.50
Dissolved Oxygen (mg/L)	9.73	9.36	10.18	10.05	9.26	8.75	8.29	8.52	7.14	6.32	6.13	5.72	6.17	6.29	5.89	5.41	5.87	4.69	5.13	4.93	4.63
Percent of Catch	0.01	0.06	0.04	0.02	0.06	0.14	1.02	0.08	0.25	0.52	15.84	58.33	20.28	2.76	0.30	0.04	0.13	0.08	0.03	0.01	0.00
Conowingo Eels	6	4616	2237	1774	9359	2097	1706	2187	2056	39685	3076	3141	5210	3213	1158	38115	3160	3135	192	40	18

2020 Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2020 Octoraro Eels									0	15	64	44	40	20	71	1992	1005	306	22	5	5	2	6
2020 Creek flow (cfs)									146	128.1	244.1	119.3	124.2	90.2	1018.5	250.9	195.5	235.4	165.4	118	150	117.4	187.9
2020 Lunar Fraction									0.35	0.76	0.88	0.32	0.07	0.65	0.94	0.47	0.05	0.52	0.96	0.62	0.08	0.39	0.93
2020 Water temp (°C)									20.7	21.4	22.7	23.8	24.8	25.5	22.5	22.8	23.6	23.5	23.4	21.7	18.6	18.6	18.8
Dissolved Oxygen (mg/L)									7.23	6.04	6.00	5.45	5.90	5.27	6.04	6.87	6.52	7.16	7.60	6.99	6.96	9.02	7.58
Rainfall (inch)									0.01	0.01	0.49	0.00	0.13	0.04	0.62	0.00	0.11	0.25	0.11	0.07	0.00	0.09	0.30
Percent of Catch									0.00	0.42	1.78	1.22	1.11	0.56	1.97	55.38	27.94	8.51	0.61	0.14	0.14	0.06	0.17
Conowingo Eels				2290	20801	36993	10842	3773	1895	4008	15127	7509	36742	17693	29622	31905	24947	6993	2570	223	608	9	101

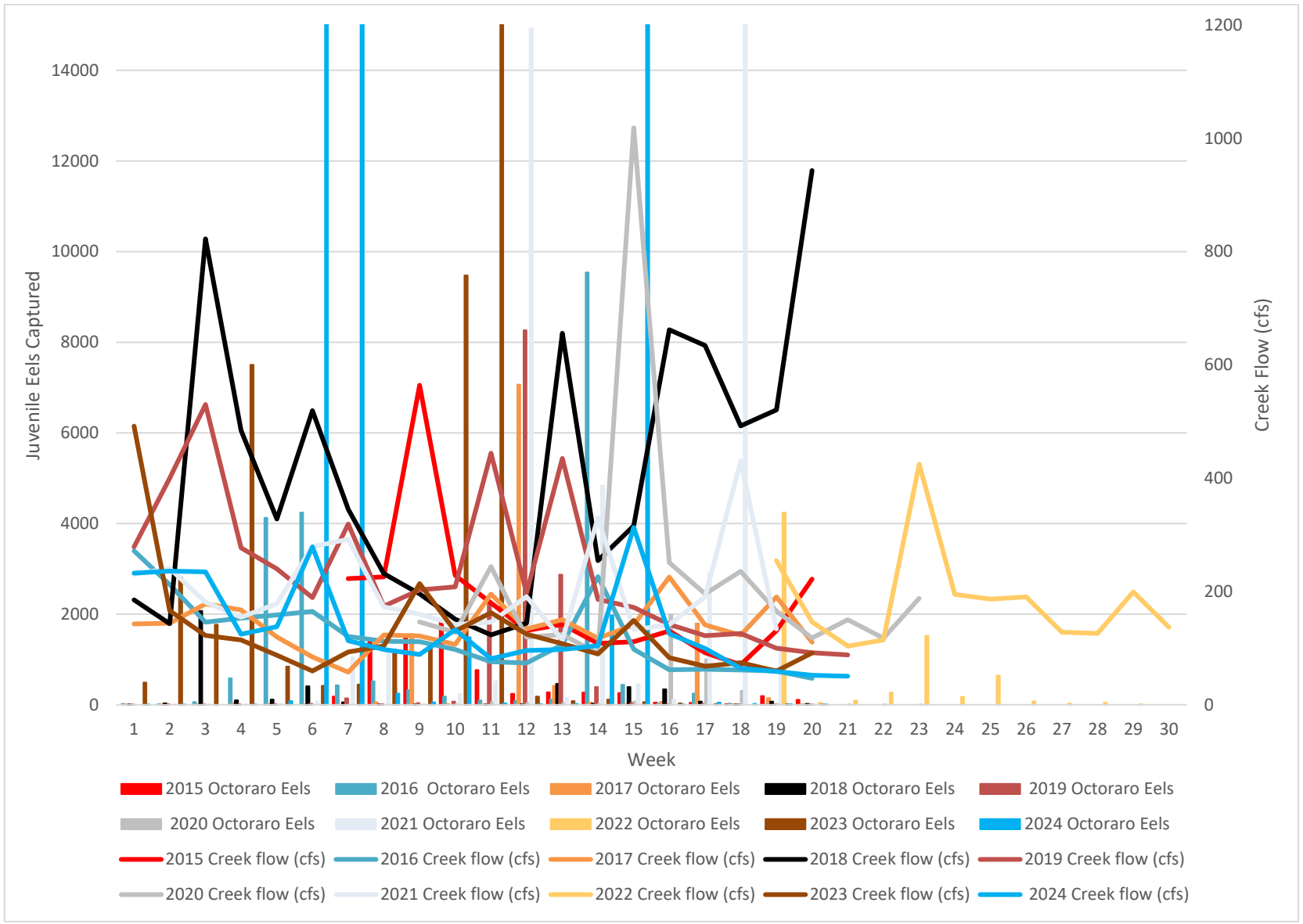
2021 Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2021 Octoraro Eels	0	5	9	13	29	77	1050	1201	21	238	519	14925	154	4836	452	112	2920	17350	1319
2021 Creek flow (cfs)	230	240.6	181.3	154.6	178.6	279.4	292.1	172.9	159.7	141.7	145.7	190.7	114.3	330.0	132.4	141.4	190.4	430.2	133.7
2021 Lunar Fraction	0.76	0.35	0.05	0.52	0.96	0.49	0.04	0.39	0.94	0.64	0.09	0.26	0.89	0.77	0.18	0.16	0.81	0.88	0.44
2021 Water temp (°C)	14.4	15.84	15.04	16.46	18.57	18.61	22.10	21.07	21.69	23.10	23.89	25.89	25.27	24.33	23.83	24.44	25.66	24.96	25.00
Dissolved Oxygen (mg/L)	9.90	9.18	9.40	9.63	8.55	7.28	7.11	7.10	6.81	6.52	6.35	4.48	6.03	5.38	6.30	6.50	6.46	4.25	6.02
Rainfall (Weekly avg.)	0.00	0.31	0.03	0.00	0.28	0.38	0.20	0.15	0.40	0.13	0.00	0.19	0.74	0.28	0.33	0.48	0.04	0.48	0.18
Percent of Catch	0.00	0.01	0.02	0.03	0.06	0.17	2.32	2.66	0.05	0.53	1.15	33.00	0.34	10.69	1.00	0.25	6.46	38.36	2.92
Conowingo Eels	5	46640	15851	17528	42848	29424	23335	18176	2711	5659	75609	63442	59128	50982	26007	12628	3747	19265	58774

2022 Week	1 - 18	19	20	21	22	23	24	25	26	27	28	29	30
2022 Octoraro Eels	0	4240	46	91	272	1526	175	646	78	26	49	10	0
2022 Creek flow (cfs)		254	146	103	115	425	195	187	190	128	126	199	137
2022 Lunar Fraction		0.87	0.80	0.20	0.14	0.79	0.90	0.34	0.07	0.67	0.96	0.51	0.14
2022 Water temp (°C)		23.75	22.30	21.97	18.84	15.64	13.74	13.29	13.13	12.80	13.51	10.53	8.10
Dissolved Oxygen (mg/L)		7.67	7.15	7.56	7.62	9.41	9.41	9.12	9.84	9.43	10.61	12.05	12.50
Rainfall (inch)		0.63	0.02	0.03	0.29	0.54	0.14	0.07	0.16	0.03	0.14	0.16	0.00
Percent of Catch		59.23	0.64	1.27	3.80	21.32	2.44	9.02	1.09	0.36	0.68	0.14	0.00
Conowingo Eels	112209	747	11478	7353	3631	1035	665	2514	73	69	23	1	0

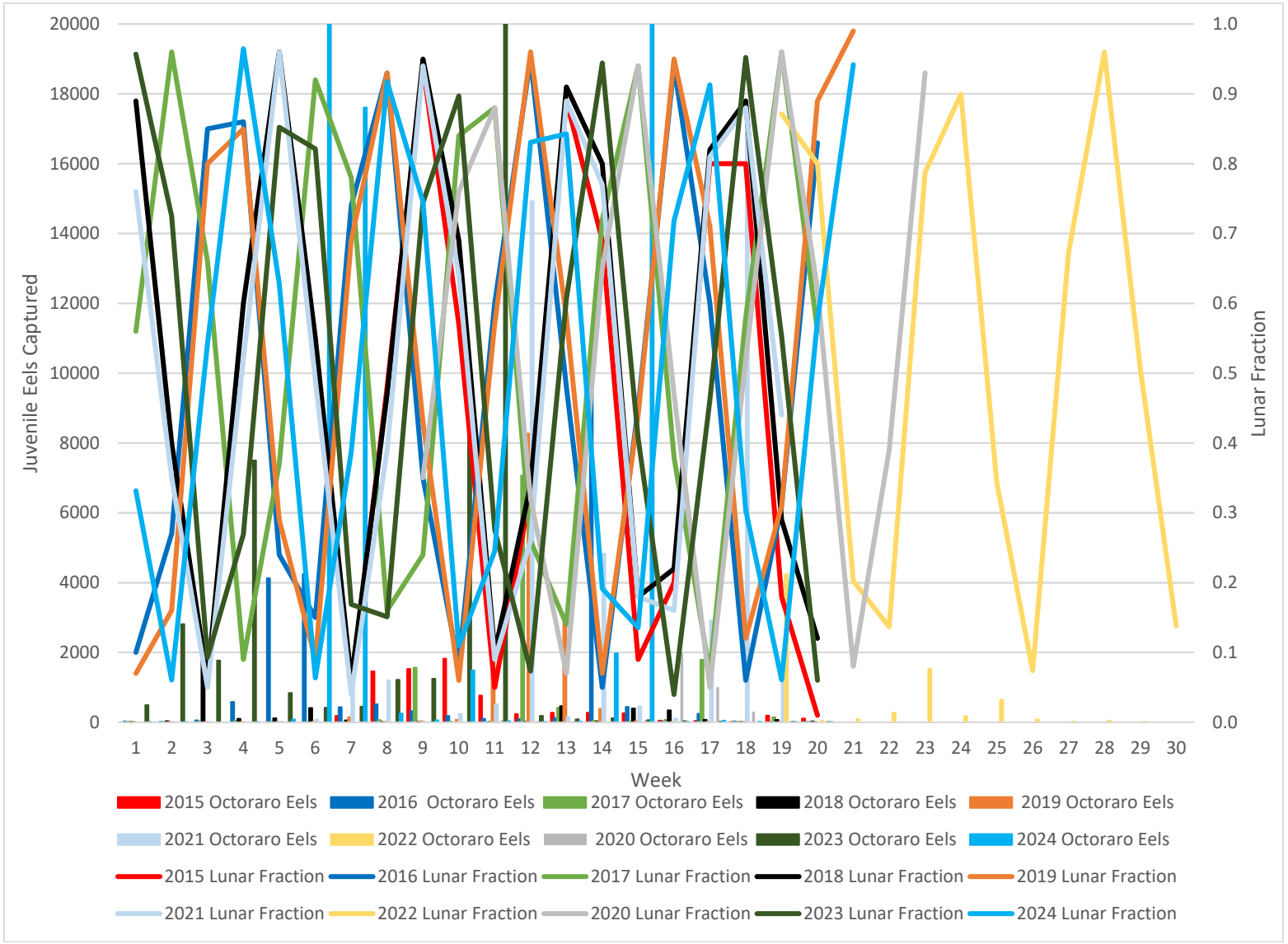
2023 Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2023 Octoraro Eels	493	2812	1767	7503	844	417	447	1216	1246	9471	35387	184	82	117	61	35	15	0	9	7
2023 Creek flow (cfs)	491.8	166.0	122.3	114.3	87.5	59.7	93.3	103.6	214.0	129.7	162.7	124.7	107.6	89.5	148.7	82.9	67.8	74.3	59.5	91.6
2023 Lunar Fraction	0.957	0.725	0.093	0.269	0.852	0.821	0.169	0.151	0.744	0.897	0.276	0.073	0.607	0.944	0.407	0.040	0.461	0.952	0.553	0.060
2023 Water temp (°C)	13.6	16.3	14.8	17.3	15.9	16.9	19.9	20.8	20.9	21.6	25.2	26.1	25.6	24.7	23.9	24.2	24.7	24.3	24.4	24.5
Dissolved Oxygen (mg/L)	9.61	9.84	9.15	8.72	8.36	7.33	7.02	7.72	6.67	7.10	7.67	8.80	7.42	6.86	6.47	5.41	5.61	5.41	4.76	5.86
Rainfall (inch)	0.1	0.0	0.1	0.1	0.0	0.2	2.3	1.4	1.3	1.6	2.4	1.3	1.0	0.1	1.9	0.5	0.0	0.2	2.0	0.80
Percent of Catch	0.79	4.53	2.84	12.08	1.36	0.67	0.72	1.96	2.01	15.25	56.97	0.30	0.13	0.19	0.10	0.06	0.02	0.00	0.01	0.01
Conowingo Eels	33	2441	24747	6310	3119	3493	879	928	4499	37844	69566	20518	5805	1110	395	142	4047	11624	2907	3611

2024 Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2024 Octoraro Eels	1	2	0	4	80	34480	17609	249	54	1490	32	13	19	1972	28809	1	48	21	10	1	0
2024 Creek flow (cfs)	232	236	235	125	138	279	113	97.8	88.7	133	81.4	95.9	97.7	104	313	126	99.6	64.5	58.6	52.1	50.4
2024 Lunar Fraction	0.332	0.061	0.543	0.965	0.628	0.064	0.387	0.917	0.746	0.110	0.245	0.830	0.843	0.192	0.135	0.718	0.913	0.304	0.061	0.575	0.942
2024 Water temp (°C)	19.10	17.11	15.23	17.86	20.77	21.80	21.80	23.79	25.26	25.13	27.04	27.13	26.67	26.41	27.28	24.60	23.54	23.29	22.66	20.91	21.00
Dissolved Oxygen (mg/L)	8.15	8.41	8.29	8.47	9.05	6.81	7.25	7.91	7.96	7.97	7.47	6.75	7.59	7.36	5.23	8.08	7.56	6.99	5.86	7.19	6.90
Rainfall (inch)	0.0	1.8	0.4	0.5	0.4	3.6	0.1	0.0	1.7	2.3	0.5	1.6	0.6	2.5	2.9	0.5	0.4	0.0	0.0	0.2	0.0
Percent of Catch	< 0.1	< 0.1	< 0.1	< 0.1	0.1	40.6	20.7	0.3	0.1	1.8	< 0.1	< 0.1	< 0.1	2.3	33.9	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Conowingo Eels	1334	12965	2473	4663	19314	3161	1659	1730	12541	3399	5377	2519	1072	11459	6991	36312	125604	54025	41467	16855	1090

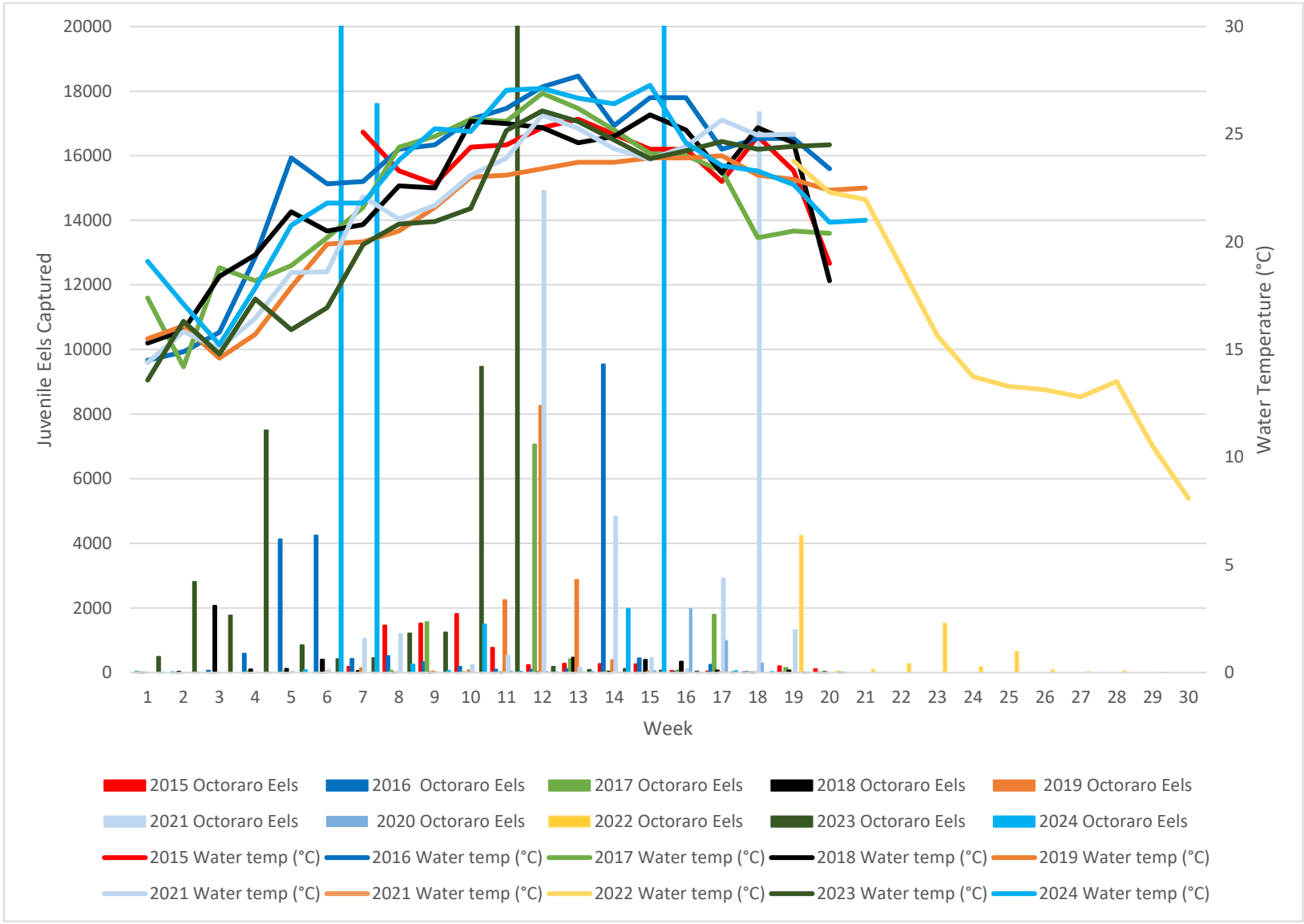
Eel Catch (Collection) to Creek Flow (2015-2024)



Eel Catch (Collection) to Lunar Fraction (2015-2024)



Eel Catch (Collection) to Water Temperature (2015-2024)



Appendix C:
Agency Comments on Draft 2024 American Eel Collection Facility in Octoraro Creek

2024 Octoraro Creek Eel Facility Report (May 1 - September 15) Comments Received by Resource Agency and Date	
Resource Agency	**Date of Receipt by Constellation**
Susquehanna River Basin Commission	December 3, 2024
Pennsylvania Department of Environmental Protection	December 2, 2024
United States Fish and Wildlife Service	January 8, 2025
Maryland Department of the Environment Maryland Department of Natural Resources	December 2, 2024
Pennsylvania Fish and Boat Commission	January 8, 2025

Responses to Resource Agency Comments for the Octoraro Creek Eel Facility Report, 2024

SRBC

- No specific comments on the report.
- We do wish to continue to work with Constellation on improving connectivity of the ramp entrance to achieve a successful and continuous connection to Octoraro Creek under a variety of flow conditions likely to be experienced at the site.
  Constellation response: A team of engineers and biologists are working on the toe-of -slope shoreline repair near the entrance of the ramp to continue successful eel passage and connectivity of attraction water from metal ramp entrance to tailwater at all flow conditions. Connectivity of attraction water and successful eel passage was evident with the record high catch of 84,895 American Eels being captured at this facility during the 2024 season. With the toe-of-slope shoreline repair, there could be some adjustments needed to ensure the ramp connectivity and this will be evaluated with as-builts and coordinated with EPAG.

- The Commission would also recommend, as we have previously, to investigate installing real-time remote water quality monitoring equipment to ensure safe collection tank conditions are being maintained.
  Constellation response: A real time water quality system (monitor and alarm system) is being investigated like the Conowingo West Eel Collection Facility (Water quality model Q46D/60), but with a use of a satellite modem instead of an internet modem. It is anticipated that a satellite system is necessary for this site due to the spotty and inconsistent cell service at the Octoraro Creek Eel Facility. Constellation will provide updates on this at the monthly EPAG meetings.

PA DEP

- PADEP will continue to monitor the collection tank dissolved oxygen levels, total ramp attraction flow, and connectivity of the ramp to Octoraro Creek.
  Constellation response: A real time water quality system (monitor and alarm system) is being investigated like the Conowingo West Eel Collection Facility (Water quality model Q46D/60), but with a use of a satellite modem instead of an internet modem. It is anticipated that a satellite system is necessary for this site due to the spotty and

inconsistent cell service at the Octoraro Creek Eel Facility. Constellation will provide updates on this at the monthly EPAG meetings.
Constellation response: A team of engineers and biologists are working on the toe-of -slope shoreline repair near the entrance of the ramp to continue successful eel passage and connectivity of attraction water from metal ramp entrance to tailwater at all flow conditions. Connectivity of attraction water and successful eel passage was evident with the record high catch of 84,895 American Eels being captured at this facility during the 2024 season. With the toe-of-slope shoreline repair, there could be some adjustments needed to ensure the ramp connectivity and this will be evaluated with as-builts and coordinated with EPAG.

USFWS

- No specific comments on the report.
- For the Time of Year restrictions for work in Octoraro Creek due to Chesapeake Logperch, please reach out to Clayton Good of Pennsylvania Fish and Boat Commission to see if there would be any flexibility for Constellation to work on the repairs to the blocks at the lower end of the eel ramp so that can be initiated sooner than the end of the 2025 eel passage season. Since the proposed repair work will be done in the dry (using a coffer dam) and the footprint for the work area is relatively small, it may be possible to move up the period of construction and have the ramp repaired earlier in 2025.
  Constellation response: Constellation is working with the PADEP regarding the construction permit requirements. Verbal approval from CWA has been received but written approval would be necessary along with approval from the resource agencies and FERC. Constellation will update the EPAG at the monthly meeting regarding the progress of the shoreline repair.

- While conducting repairs to the Octoraro Eel Ramp site in 2025, please consider options for a "quick release" section on the lower ramp to allow for faster removal and reinstallation of the lower portion of the collection facility during high water events. This may include having a rubberized seal around the connection points of the lower ramp to ensure the connection is water tight when connected and potentially shortening the ramp somewhat to allow for safe removal and reinstallation under higher water elevations. If the ramp is shortened, additional substrate will need to be added at the ramp entrance to ensure connectivity of the ramp to Octoraro Creek under a range of flow conditions.
  Constellation response: Shortening the ramp could create erosion concerns if the ramp ends at the ACBs. Shortening the ramp creates a larger area between the ramp entrance and the tailwater which could make a feeding area for birds or other animals to easy prey on migrating juvenile eels. If a shade cloth were placed over this area, it would block juvenile eels from the ramp entrance under high flow creek conditions and could impingement of fish and other aquatic species.
  The option of using a rubberized seal is being researched. Normandeau believes that an angle piece of metal attached to the ramp at this connection joint with rubber between can be used as a compression joint. The compression joint will make it watertight and easily removable and reinstalled with minor gluing. This would still allow the Milieu to fit together as designed (tongue and groove connection). Constellation will provide updates on this at the monthly EPAG meetings.

- Please install a staff gage on site so that water elevation data can be collected daily during the ramp checks.
  Constellation response: Options for obtaining water level elevation are currently being considered, such as a staff gauge or a water level logger. Constellation will provide updates on this at the monthly EPAG meetings.

- Consider installing a turbidity monitor to determine if there is an association with turbidity and eel catch.
  Constellation response: Investigation of stand-alone turbidity meters are being researched to record turbidity in the tailwater during the 2025 season along with exploring a safe place to deploy the monitor. Constellation will provide updates on this at the monthly EPAG meetings.

- Because the collection tank has experienced periods of low dissolved oxygen (<5 mg/l) in recent years, including during high collection days in 2024, a monitor should be installed in the tank with an alarm system to notify staff when DO drops to critical levels. Although there was not a significant mortality event associated with the low DO events in 2024, those low levels increase stress to fish and may have long term impacts to the eels' health and survival.
  Constellation response: A real time water quality system (monitor and alarm system) is being investigated like the Conowingo West Eel Collection Facility (Water quality model Q46D/60), but with a use of a satellite modem instead of an internet modem. It is anticipated that a satellite system is necessary for this site due to the spotty and inconsistent cell service at the Octoraro Creek Eel Facility. Constellation will provide updates on this at the monthly EPAG meetings.

MDE/MDNR

- No comments on report
- Maryland would like to take this opportunity to state that it concurs and shares the concerns raised by USFWS provided on Dec. 2, 2024 as described below relative to dissolved oxygen and ramp connectivity. Maryland also finds that efforts to keep the dissolved oxygen above 5ppm at all times, particularly during high catch events should be engaged in future years. Maryland also echoes the concerns of USFWS about ramp connectivity under all flow conditions and looks forward to discussing proposed plans to address the bank erosion by Constellation at the site and the future connectivity of the eel ramp to Octoraro Creek in 2025.
  Constellation response: A real time water quality system (monitor and alarm system) is being investigated like the Conowingo West Eel Collection Facility (Water quality model Q46D/60), but with a use of a satellite modem instead of an internet modem. It is anticipated that a satellite system is necessary for this site due to the spotty and inconsistent cell service at the Octoraro Creek Eel Facility. Constellation will provide updates on this at the monthly EPAG meetings.
  Constellation response: During the December 11, 2024, annual face to face EPAG meeting in Harrisburg, the Constellation group presented the shoreline design and a discussion occurred about the location of the greatest sloped area was well below the “normal” low water elevation of the tailrace therefore providing a connectivity of attraction flow from the metal ramp to the tailwater at all flow conditions.

A team of engineers and biologists are working on the toe-of -slope shoreline repair near the entrance of the ramp to continue successful eel passage and connectivity of attraction water from metal ramp entrance to tailwater at all flow conditions. Connectivity of attraction water and successful eel passage was evident with the record high catch of 84,895 American Eels being captured at this facility during the 2024 season. With the toe-of-slope shoreline repair, there could be some adjustments needed to ensure the ramp connectivity and this will be evaluated with as-builts and coordinated with EPAG.

PFBC

- No comments to the report
- However, we echo the concerns relayed by others regarding the low DO in the in the collection tank and ramp connectivity at the Octoraro Creek eel collection facility.
  Constellation response: A real time water quality system (monitor and alarm system) is being investigated like the Conowingo West Eel Collection Facility (Water quality model Q46D/60), but with a use of a satellite modem instead of an internet modem. It is anticipated that a satellite system is necessary for this site due to the spotty and inconsistent cell service at the Octoraro Creek Eel Facility. Constellation will provide updates on this at the monthly EPAG meetings.
  Constellation response: A team of engineers and biologists are working on the toe-of -slope shoreline repair near the entrance of the ramp to continue successful eel passage and connectivity of attraction water from metal ramp entrance to tailwater at all flow conditions. Connectivity of attraction water and successful eel passage was evident with the record high catch of 84,895 American Eels being captured at this facility during the 2024 season. With the toe-of-slope shoreline repair, there could be some adjustments needed to ensure the ramp connectivity and this will be evaluated with as-builts and coordinated with EPAG.

Mike Martinek

From:	Mike Martinek
Sent:	Thursday, December 19, 2024 12:32 PM
To:	Mike Martinek
Subject:	FW: Constellation 2024 Octoraro Creek Eel Facility draft report

From: Henning, Aaron <ahenning@srbc.gov>
Sent: Tuesday, December 3, 2024 11:54 AM
Subject: RE: Constellation 2024 Octoraro Creek Eel Facility draft report

Andrea,

The Susquehanna River Basin Commission has reviewed the 2024 Octoraro Creek Eel Facility report and offers no specific comments on the document. We do wish to continue to work with Constellation on improving connectivity of the ramp entrance to achieve a successful and continuous connection to Octoraro Creek under a variety of flow conditions likely to be experienced at the site. The Commission would also recommend, as we have previously, to investigate installing real-time remote water quality monitoring equipment to ensure safe collection tank conditions are being maintained.

Aaron

Aaron Henning
Fisheries Biologist
Susquehanna River Basin Commission
4423 North Front St.
Harrisburg, PA 17110
Office: (717) 238-0423 ext.1184
Mobile: (717) 884-5937
ahenning@srbc.gov
https://www.srbc.gov/our-work/american-eels/

Mike Martinek

From: Mike Martinek
Sent: Thursday, December 19, 2024 12:30 PM
To: Mike Martinek
Subject: FW: [External] Constellation 2024 Octoraro Creek Eel Facility draft report

From: Eberts, Ron <reberts@pa.gov>
Sent: Monday, December 2, 2024 2:36 PM
Subject: RE: [External] Constellation 2024 Octoraro Creek Eel Facility draft report

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Andrea,

PA DEP has reviewed the DRAFT 2024 Muddy Run Pump Storage Project American Eel Collection Facility in Octoraro Creek report received on November 5, 2024. We offer the following:

PADEP will continue to monitor the collection tank dissolved oxygen levels, total ramp attraction flow, and connectivity of the ramp to Octoraro Creek. PA DEP looks forward to continued discussions of these items with Constellation in future meetings and if any modifications are needed.

Thank you for the opportunity to review and comment,

Ronald C. Eberts, Jr. | Environmental Protection Compliance Specialist
Department of Environmental Protection
Southcentral Regional Office
Waterways & Wetlands Program
909 Elmerton Avenue | Harrisburg, PA 17110
Phone: 717.705.4819| Fax: 717.705.4760

THE SOUTHCENTRAL REGIONAL OFFICE AFTER HOURS REPORTING & 24 HOUR EMERGENCY RESPONSE NUMBER: 1-800-541-2050.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

1

Mike Martinek

From: Mike Martinek
Sent: Wednesday, January 8, 2025 2:36 PM
To: Mike Martinek
Subject: FW: [EXTERNAL] Constellation 2024 Octoraro Creek Eel Facility draft report

From: Eyler, Sheila <sheila_eyler@fws.gov>
Sent: Wednesday, January 8, 2025 12:50 PM
Subject: Re: [EXTERNAL] Constellation 2024 Octoraro Creek Eel Facility draft report

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Andrea,

Per discussions during the annual meeting on December 10-11 and the EPAG meeting on December 19, the resource agencies request the following items be considered and implemented for operation of the Octoraro Eel Facility in 2025.

1. For the Time of Year restrictions for work in Octoraro Creek due to Chesapeake Logperch, please reach out to Clayton Good of Pennsylvania Fish and Boat Commission to see if there would be any flexibility for Constellation to work on the repairs to the blocks at the lower end of the eel ramp so that can be initiated sooner than the end of the 2025 eel passage season. Since the proposed repair work will be done in the dry (using a coffer dam) and the footprint for the work area is relatively small, it may be possible to move up the period of construction and have the ramp repaired earlier in 2025.
2. While conducting repairs to the Octoraro Eel Ramp site in 2025, please consider options for a "quick release" section on the lower ramp to allow for faster removal and reinstallation of the lower portion of the collection facility during high water events. This may include having a rubberized seal around the connection points of the lower ramp to ensure the connection is water tight when connected and potentially shortening the ramp somewhat to allow for safe removal and reinstallation under higher water elevations. If the ramp is shortened, additional substrate will need to be added at the ramp entrance to ensure connectivity of the ramp to Octoraro Creek under a range of flow conditions.
3. Please install a staff gage on site so that water elevation data can be collected daily during the ramp checks.
4. Consider installing a turbidity monitor to determine if there is an association with turbidity and eel catch.
5. Because the collection tank has experienced periods of low dissolved oxygen (<5 mg/l) in recent years, including during high collection days in 2024, a monitor should be installed in the tank with an alarm system to notify staff when DO drops to critical levels. Although there was not a

significant mortality event associated with the low DO events in 2024, those low levels increase stress to fish and may have long term impacts to the eels' health and survival.

Please let me know if you have questions or require further clarification on any of these items.

Sheila Eyler
U.S. Fish and Wildlife Service
Mid-Atlantic Fish & Wildlife Conservation Office
717-387-2117

Mike Martinek

From: Mike Martinek
Sent: Thursday, December 19, 2024 12:31 PM
To: Mike Martinek
Subject: FW: [EXTERNAL] Constellation 2024 Octoraro Creek Eel Facility draft report

From: Heather Nelson -MDE- <hnelson@maryland.gov>
Sent: Monday, December 2, 2024 1:56 PM

Subject: Re: [EXTERNAL] Constellation 2024 Octoraro Creek Eel Facility draft report

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Good afternoon- The Maryland Department of Environment, in consultation with the Maryland Department of Natural Resources, has reviewed Constellation's 2024 Octoraro Creek Eel Collection Facility draft report and appreciates the opportunity to provide comments. Mayland does not have comments on the report.

Maryland would like to take this opportunity to state that it concurs and shares the concerns raised by USFWS provided on Dec. 2, 2024 as described below relative to dissolved oxygen and ramp connectivity. Maryland also finds that efforts to keep the dissolved oxygen above 5ppm at all times, particularly during high catch events should be engaged in future years. Maryland also echoes the concerns of USFWS about ramp connectivity under all flow conditions and looks forward to discussing proposed plans to address the bank erosion by Constellation at the site and the future connectivity of the eel ramp to Octoraro Creek in 2025.

Thank you.

Heather L. Nelson
Program Manager
Wetlands and Waterways Protection Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
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410-537-3528 (O)
443-472-9970 (C)
Website | Facebook | Twitter

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1

Mike Martinek

From: Mike Martinek
Sent: Wednesday, January 8, 2025 2:37 PM
To: Mike Martinek
Subject: FW: [External] FW: Constellation 2024 Conowingo West Eel Collection Facility draft report

From: Kuhn, Kristopher <kkuhn@pa.gov>
Sent: Wednesday, January 8, 2025 10:40 AM

Subject: FW: [External] FW: Constellation 2024 Conowingo West Eel Collection Facility draft report

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Mike,

Sorry for the delayed response. The PFBC has reviewed these reports and has no comments. However, we echo the concerns relayed by others regarding the low DO in the in the collection tank and ramp connectivity at the Octoraro Creek eel collection facility.

Thanks for the opportunity to review and comment.

Kris

Kristopher M. Kuhn | Director
Pennsylvania Fish and Boat Commission | Bureau of Fisheries
595 E. Rolling Ridge Dr. | Bellefonte, PA 16823
Office Phone: 814-359-5115 | Mobile: 814-571-4872
www.fishandboat.com