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Eels II: Biological and Engineering Studies of American Eel at Conowingo Project

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BIOLOGICAL AND ENGINEERING STUDIES OF AMERICAN EEL AT CONOWINGO PROJECT



Prepared by:
Chris Avalos



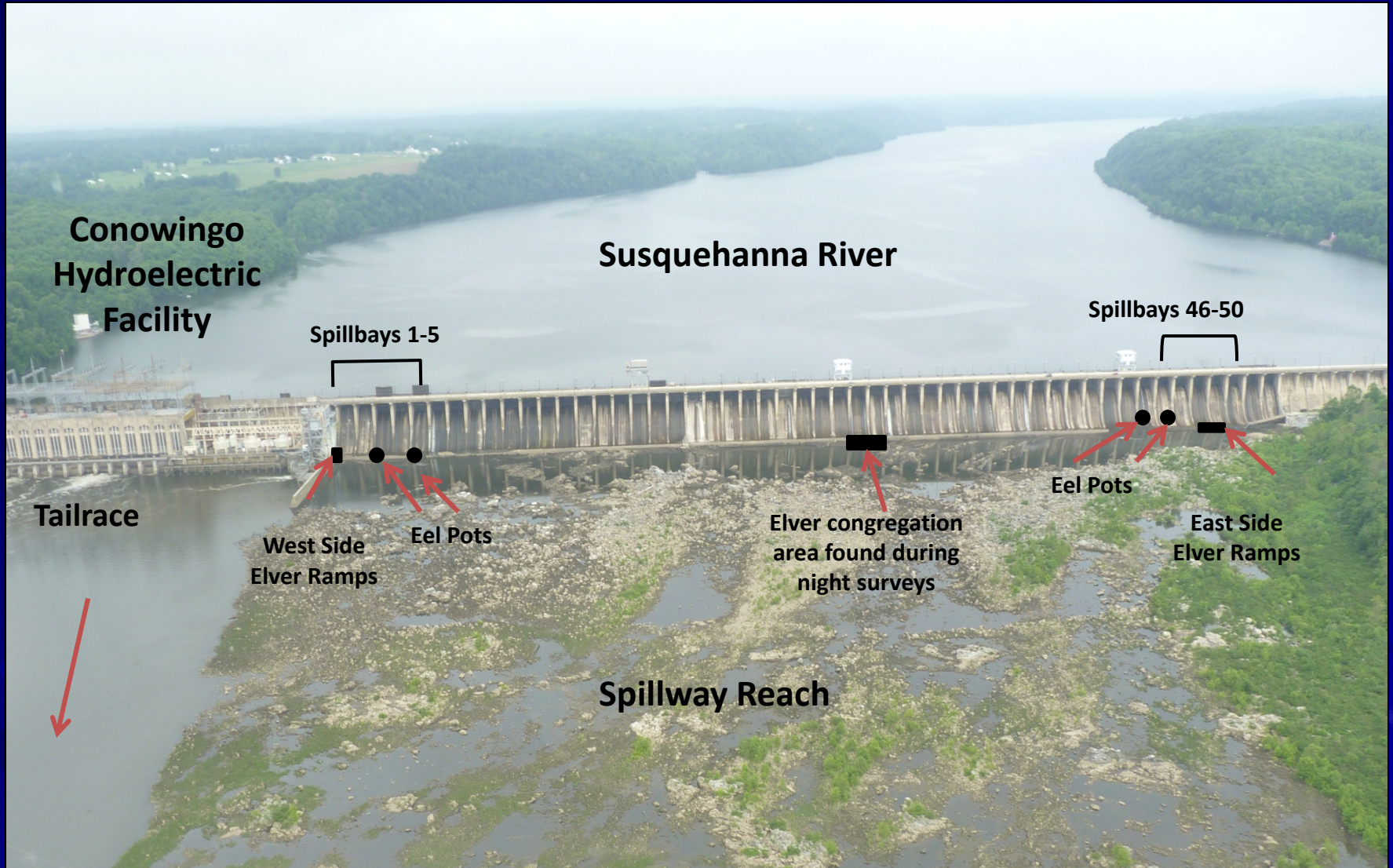
Study Objectives and Test Conditions

- Two year study to determine potential areas of upstream migration.
- Construct ramps and collect migrating elvers /yellow eels below Conowingo Dam in Spillway area.
- Utilize two different substrates per ramp, and introduce heavier attraction flow.
- 2010 ramps run from June 14 to September 30. 2011 ramps run from June 24 to September 6.
- Due to structural damage to Conowingo Dam caused by heavy spring rains, east ramp construction is delayed and moved to adjacent location. East side elver ramp begins operation on July 1, 2011.
- Two different sized mesh eel pots are fished every week from both ramp locations.

Study Objectives and Test Conditions Cont.

- Elvers ramps are checked three times a week, with the eel pots checked after second fishing day.
- Water temperature, rain amount, and lunar fractions are recorded daily.
- Average water temperature for the study was 82.3°F/27.9°C, with a low of 73.7°F/23.2°C on 9/3/11, and a high of 90.8°F/32.7°C on 7/24/11.
- Study implemented during two complete lunar cycles.
- Conducted three night surveys in spillway to document areas of elver/juvenile eels congregation.

Location of Elver ramps and eels pots fished in Conowingo Spillway Reach



2010 West Ramp Location



2011 West Ramp Location



2010 East Ramp Location



2011 East Ramp Location



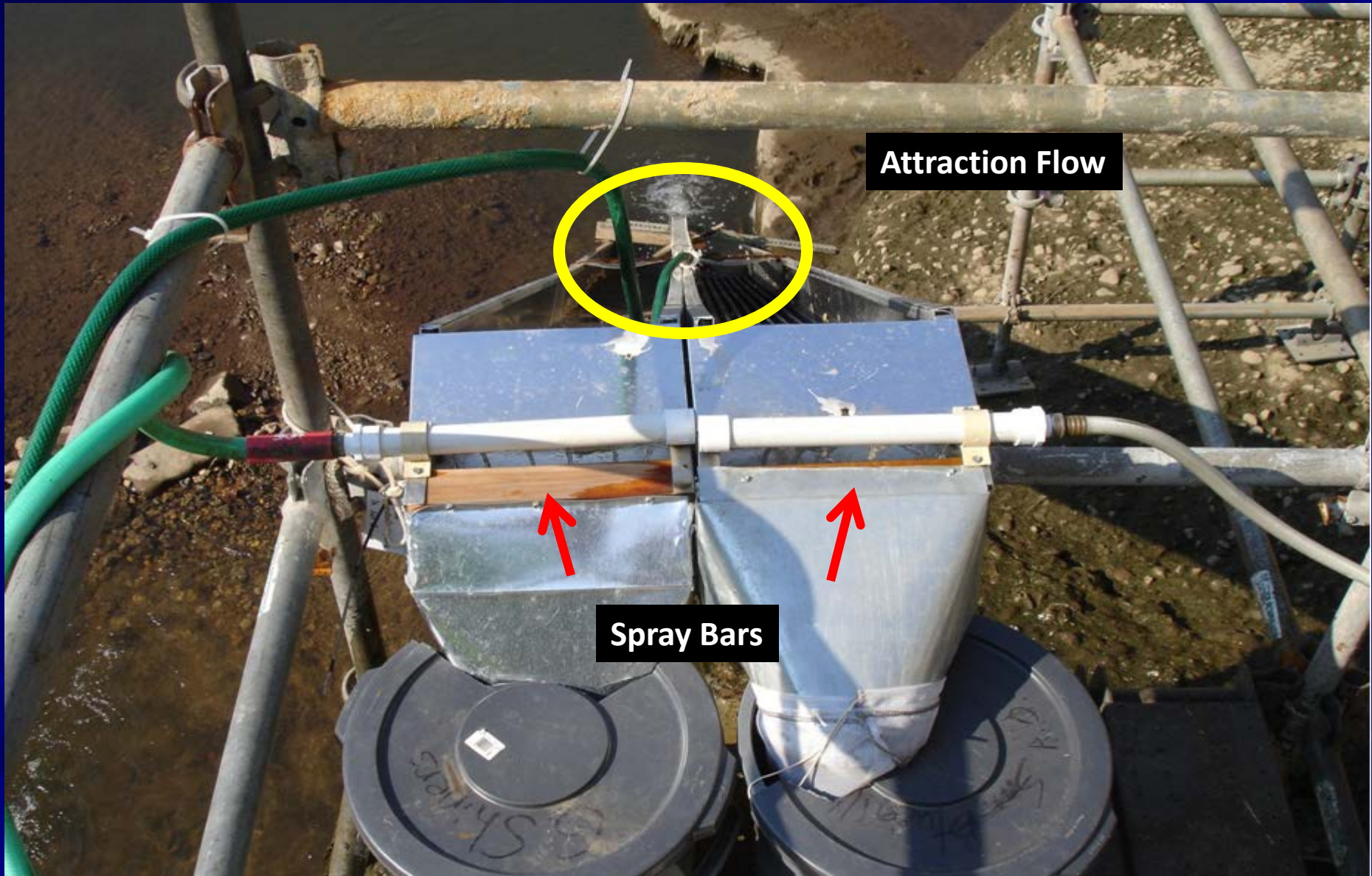
Akwa Drain, and Enka Mat Substrates Utilized on Elver Ramps



West Side Spray Bars, Water Supply, and Collecting Buckets



East Side Ramp with Attraction Flow



Attraction Flow

Spray Bars

Added Attraction Flow



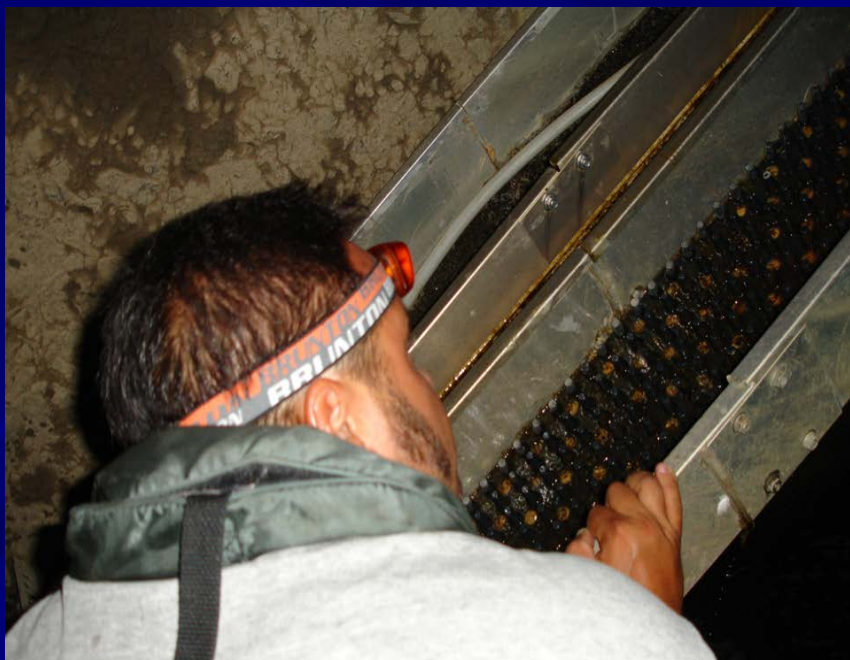
Processing Elver Techniques



Yellow Eel Processing Techniques



Night Surveys Conducted in Conowingo Spillway



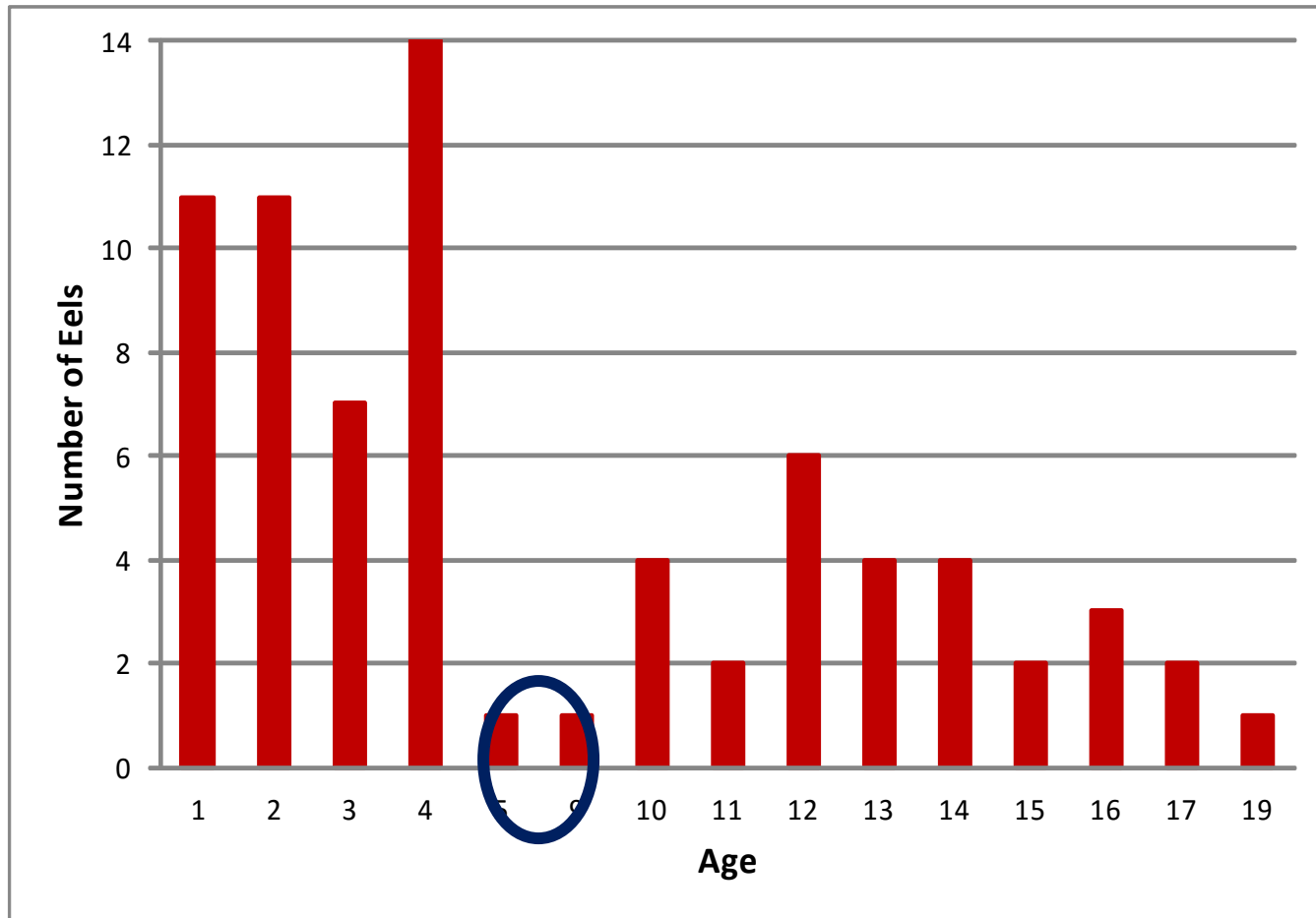
2011 Results

- A total of 1159 eels were collected at Conowingo Dam in 2011. 1100 were classified as elvers and 59 as adult eels.
- The west ramps collected 561 elvers. 405 of these were collected on the Enka Mat ramp with an average length of 124.8 mm. The remaining 156 were collected on the Akwa Drain ramp with an average length of 124.3.
- The East ramps collected 539 elvers. 133 of these were collected on the Enka Mat Ramp with an average length of 123.3 mm. The remaining 406 were collected on the Akwa Drain ramp with an average length of 126.1.
- 77 eels (46 elvers, 31 yellows) were frozen and processed for otolith aging.
- 1007 elvers collected by the Conowingo Dam spillway ramps were given to USFWS for transportation upstream.

Comparison of Sampling Efforts in 2010 and 2011

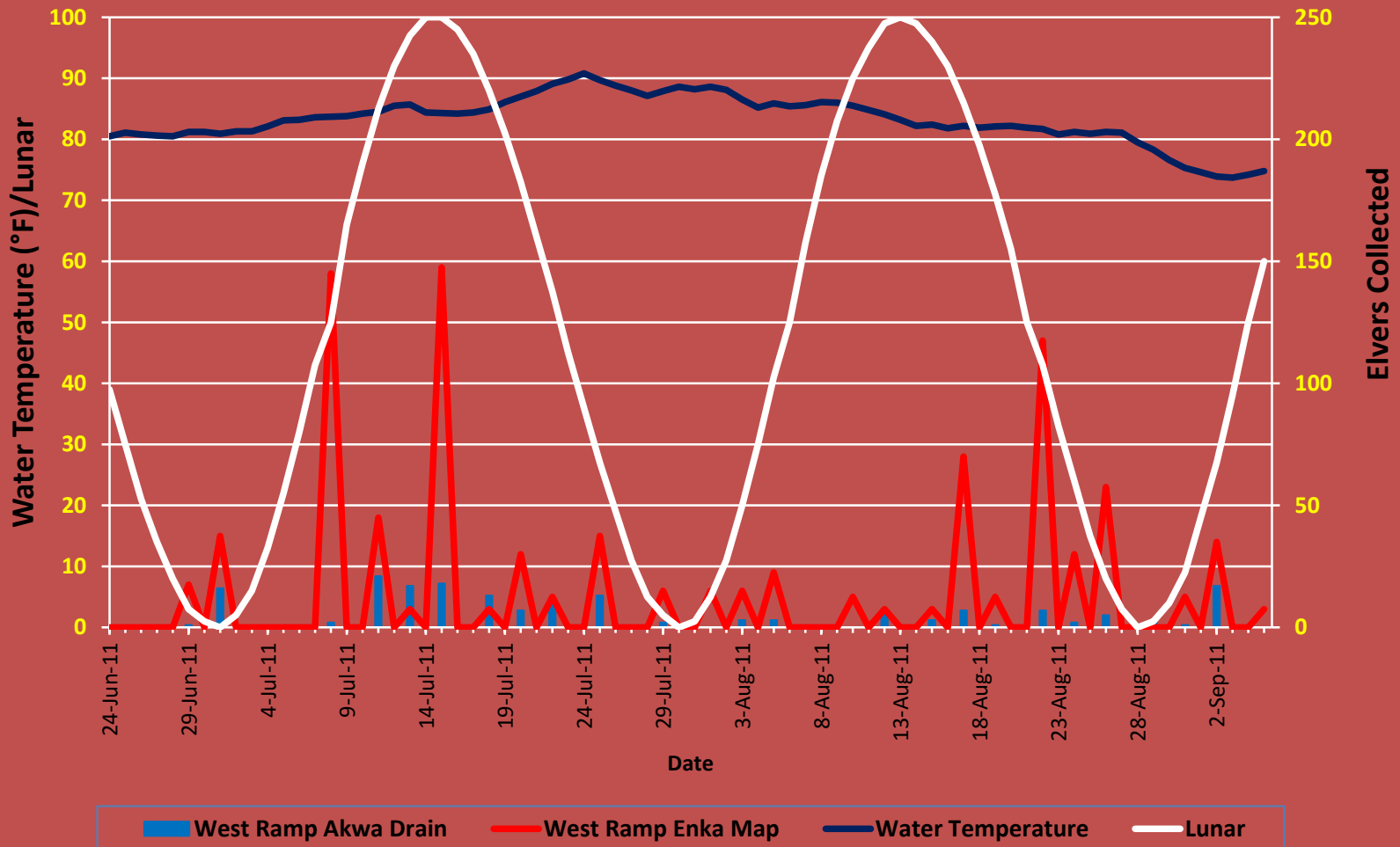
	<u>2010</u>	<u>2011</u>
Sampling Dates:	June 14 to September 30	June 24 (West); July 1 (East) to September 6
East Spillway Ramp:	158 elvers	539 elvers
West Spillway Ramp:	8 elvers	561 elvers
Total elvers collected:	166	1,100
East eel pots:	1 yellow eel	0
West eel pots:	90 yellow eels	59
Moon Phases:	4 full and 3 new moon periods	2 complete lunar cycles

Results of Otolith Aging



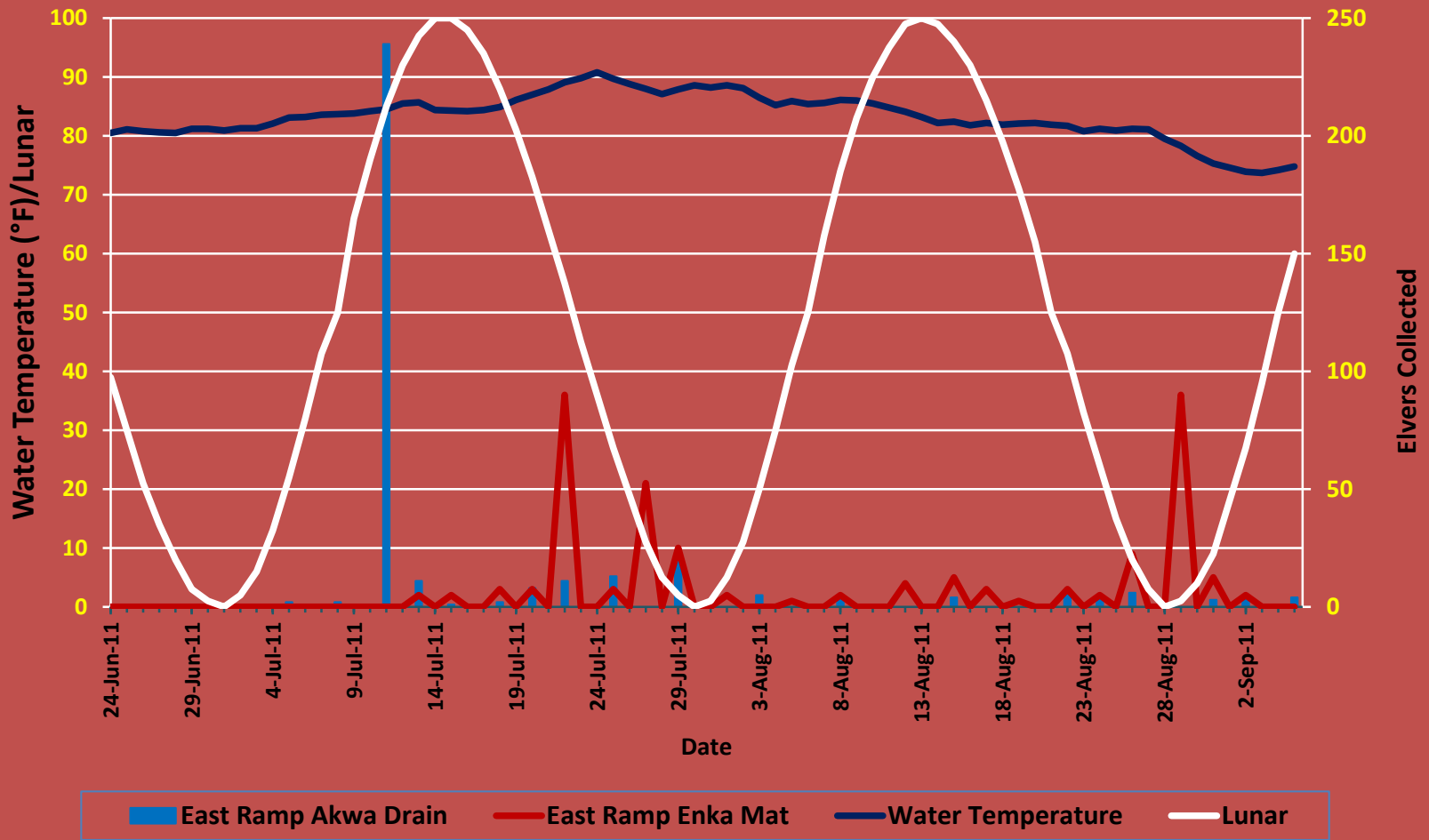
West Side Ramp Elver Results

Number of Elvers Collected at West Ramp in Relation to Water Temperature/Lunar in 2011



East Side Ramp Elver Results

Number of Elvers Collected at East Ramp in Relation to Water Temperature/Lunar in 2011



Location of Heavy Elver Movement



East Side Ramp

Plateau Where Large Numbers of Elvers Observed



Octorara Creek Temporary Eel Trapping Facility

- Further testing of substrate types.
- Octorara trib to Susquehanna River on eastern bank downstream of Conowingo Dam.
- Muddy Run Pumped Storage Facility ~12 miles upstream of Conowingo, sister hydro facility.
- PADEP 401 WQC finalized 2014, incorporated into FERC license issued for Muddy Run in Dec., 2015.
- As part of 401 requirements, Exelon committed to operating temporary eel trapping facility on Octorara Creek for 3 years.
- Recourse agencies determined “success” and permanency.
 - 1st year operation = 2015 ~7,200 eels.
 - 2nd year operations = 2016 9,563 thus far.
- Eels collected transported upstream in Susquehanna Watershed.

2009



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