

EVALUATING THE RESTORATION OF THE FAIRMOUNT DAM FISHWAY WITH APPLICATION TO ANADROMOUS FISH RESTORATION IN THE SCHUYLKILL RIVER, PENNSYLVANIA



Lance H. Butler

Office of Watersheds, Philadelphia Water Department

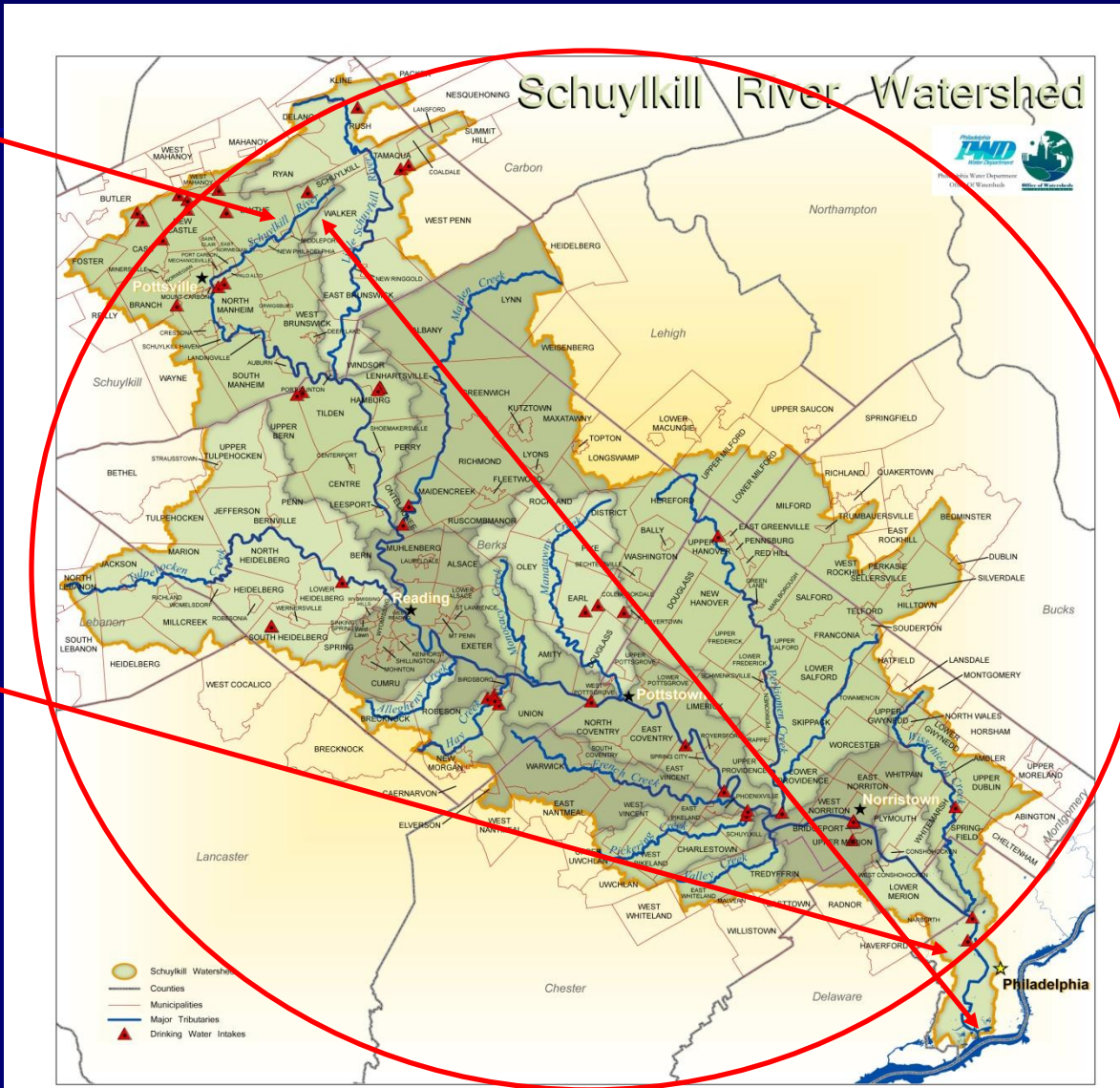
Joseph A. Perillo

Bureau Of Laboratory Services, Philadelphia Water Department

Schuylkill Watershed: A Geographic Perspective

Schuylkill County

- Drains approximately 2000 square miles
- Encompasses 11 counties
- Travels approximately 130 miles Philadelphia County



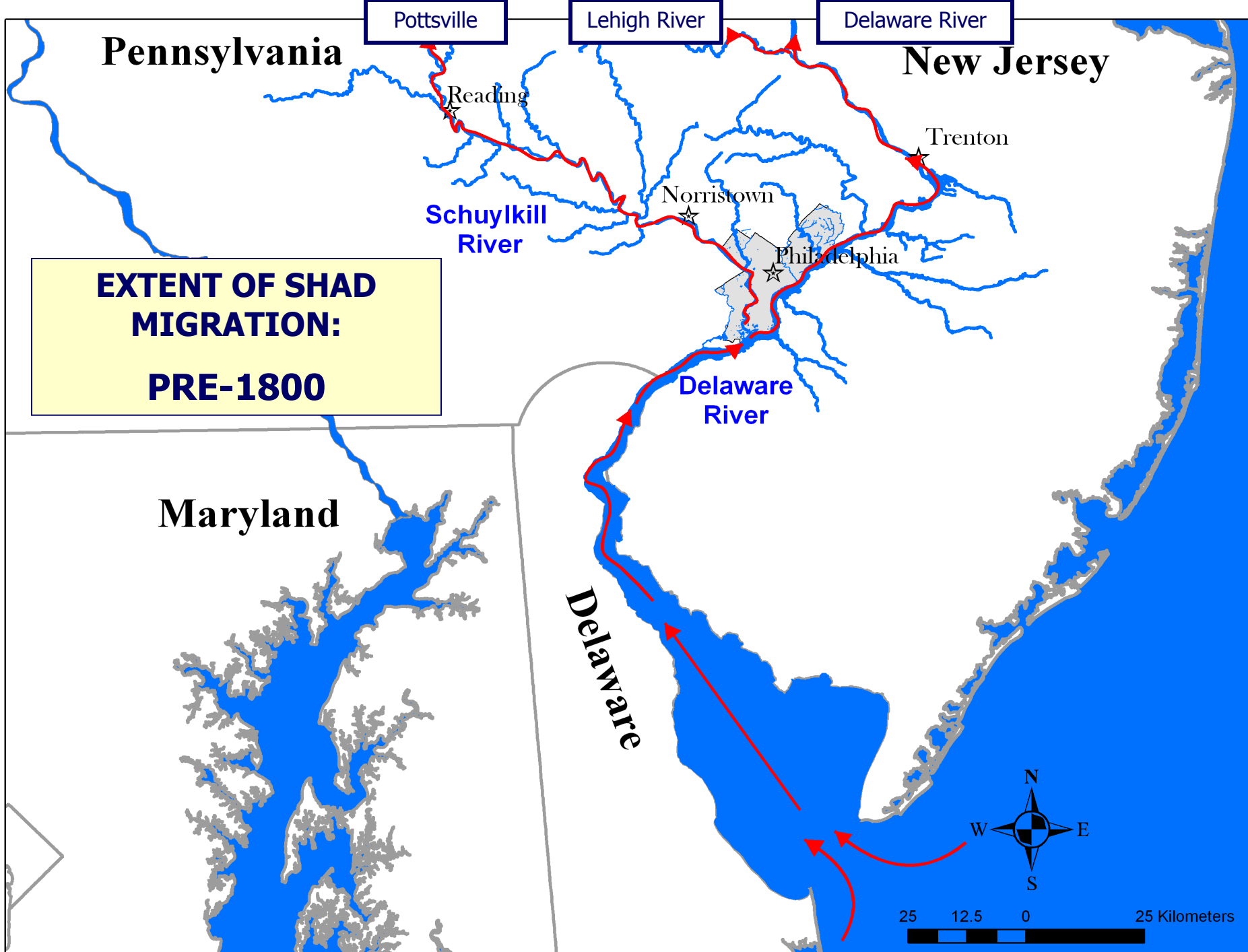
Schuylkill Watershed: *A Historical Perspective*

- Known as “Hidden Creek”
- Provided much of our country’s colonial and revolutionary history
- Supported a large commerce
 - Farming
 - Timber
 - Coal
 - **Fisheries**



Seining For American Shad Near Philadelphia,
Delaware River (Circa 1905)

Source: *Library Of Congress*



Pennsylvania

Pottsville

Lehigh River

Delaware River

New Jersey

Reading

Trenton

Schuylkill River

Norristown

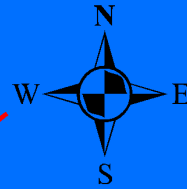
Philadelphia

**EXTENT OF SHAD
MIGRATION:
PRE-1800**

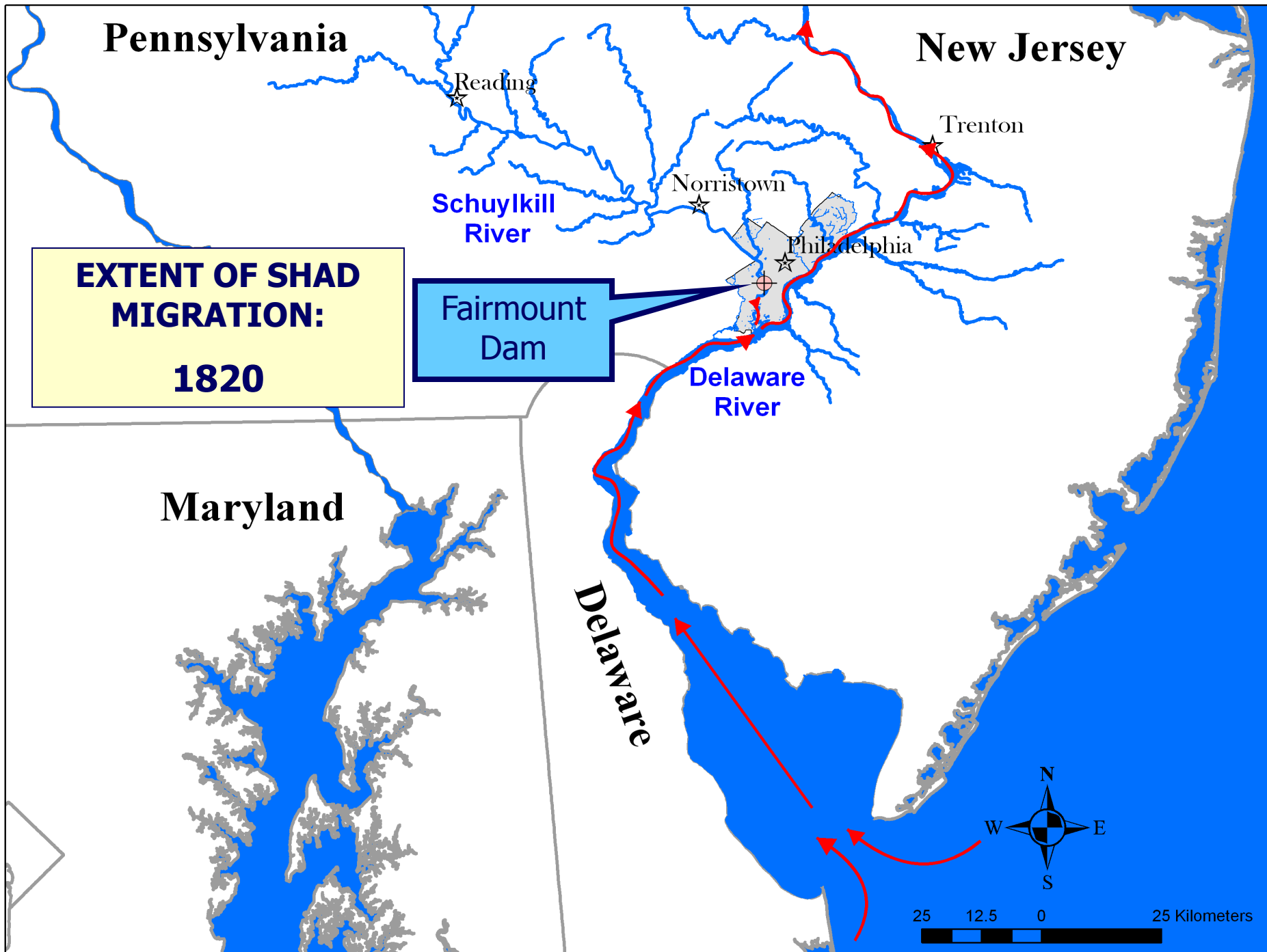
Delaware River

Maryland

Delaware



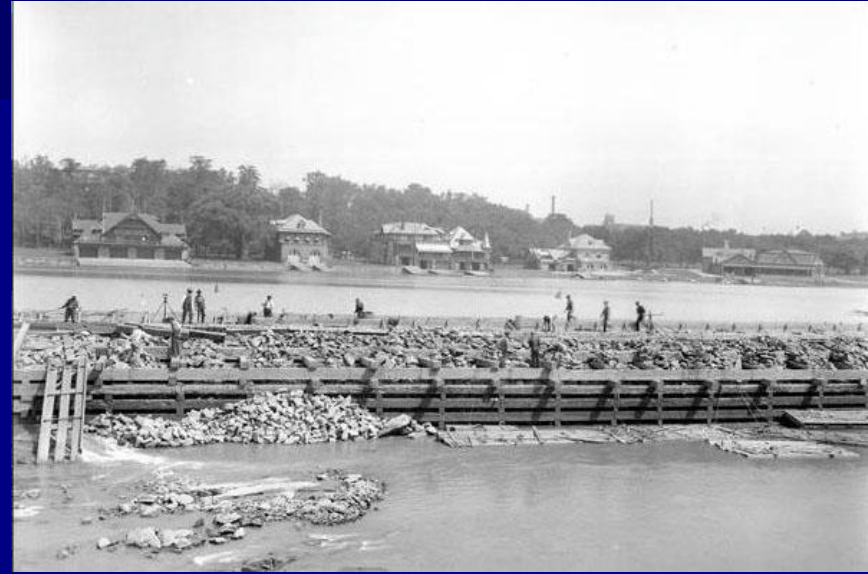
25 12.5 0 25 Kilometers



Historical Perspective

■ Fairmount Dam

- Created in 1820 as a source for drinking water
- Diverted water to power pumping station for distribution
- Eliminated runs of anadromous fish species and other semi-migratory species in the Schuylkill Drainage
- Prevented upstream dispersal (i.e., genetic transference) of resident fish species



Fairmount Fishway

- Completed In 1979
- Vertical slot fish passage facility
- Heavily used by resident fish species
- By 1984, restoration and monitoring activities of migratory species were diverted to other drainages.



Construction Of Fairmount Fish Ladder, 1978

Philadelphia Water Department's Involvement:

- In 2002, PWD took over the responsibility for O&M of the Fairmount Fish Ladder
 - Developed a sophisticated video monitoring system
 - Implemented a standard fish monitoring program
 - Created a public outreach and education website
 - Entered an agreement with USACE to restore and optimize fish passage facility



9:1 scale of the Fairmount Fish Ladder
(Alden Laboratories, Worcester, MA)

Video Monitoring System:



Video Transmission



Wireless Transmitter

Fish Sampling Locations

- Four Sampling Stations
- Low Tide Sampling
- Uniform Level Of Effort
- Consistent Electrical Output
- Minimal "Handling"



Fish Surveys



Species Identification, Sex, Weight & Length
Measurements

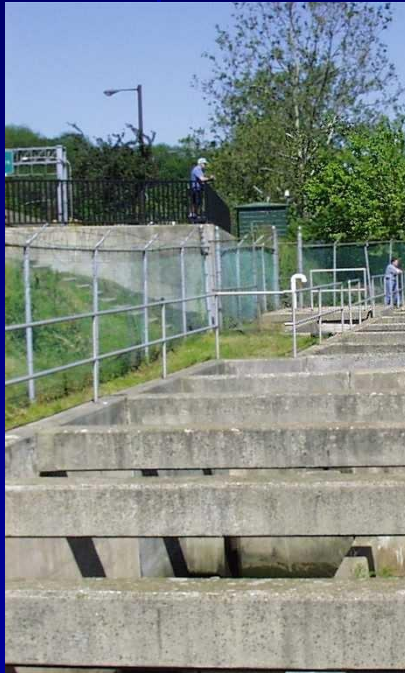
Fish Surveys

- Community Level Survey
 - All Species Recorded
 - Game Fish
 - Native Species (Non-Game Fish)
 - Migratory Species
 - Invasive/Exotic Species
 - Sub-sample Collected For Stocking Analyses (PAF&B)
 - American Shad (n=25)
 - Hickory Shad (n=25)



Where Are We Now?

- Restoration of the Fairmount Fish Passage Facility is “Completed”.



5/14/2002



12/1/2008



6/23/09

Where Are We Now?

- Major structural modifications



New chambers

Where Are We Now?

- Major structural modifications



Before



After

New entrance channel with automated gate system

Where Are We Now?

- Major structural modifications



After
Before

New "Non-Overflow" section of fish ladder

Where Are We Now?

- Major structural modifications



After
Before

New exit channel with attraction flow system and debris deflection system

Where Are We Now?

- Public Education & Outreach



www.fairmountwaterworks.org

Creation of an outdoor classroom and public viewing system

Where Are We Now?



2004



2009

Updated Scientific Monitoring System

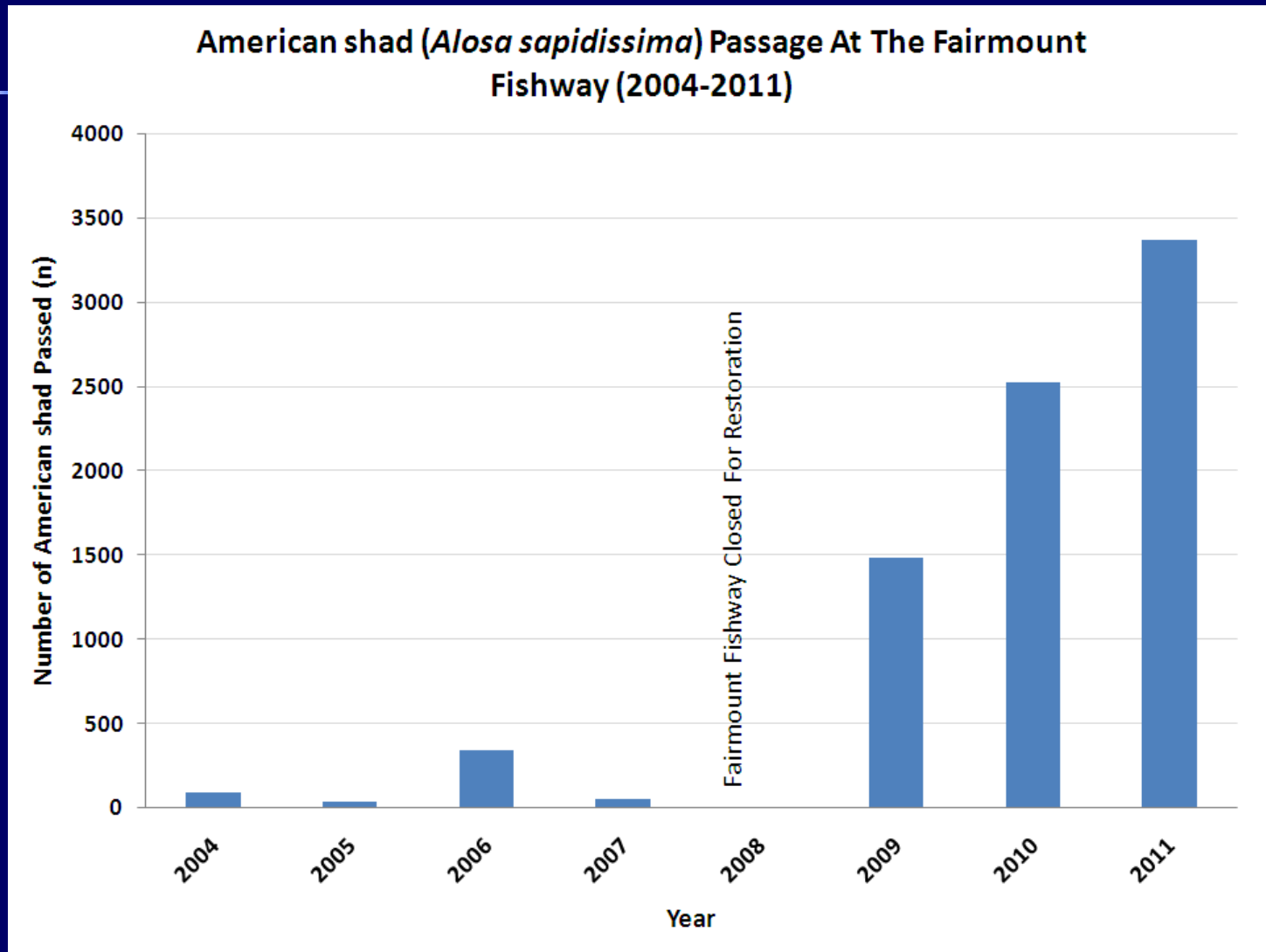
Preliminary Results:

- Overview (2004 – 2012)
 - 34 species of fish surveyed below the fishway between 2002-2011.
 - 28 species observed passing through the fishway.
 - 5 anadromous species observed using the Fairmount Fishway
 - 1 catadromous species observed using the Fairmount Fishway



Preliminary Findings

Pre-Restoration vs. Post-Restoration

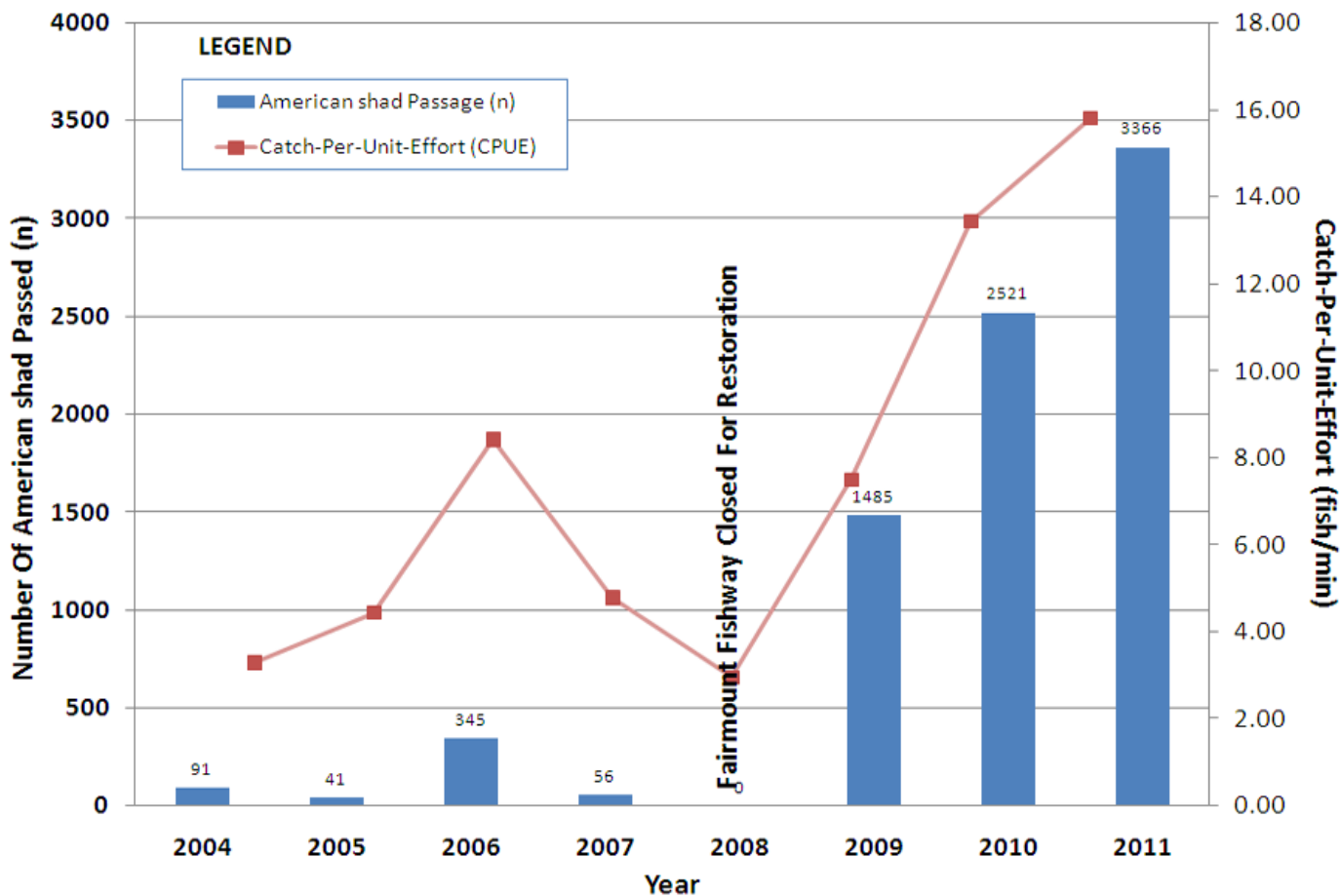


Video Monitoring Results (2004 – 2011)

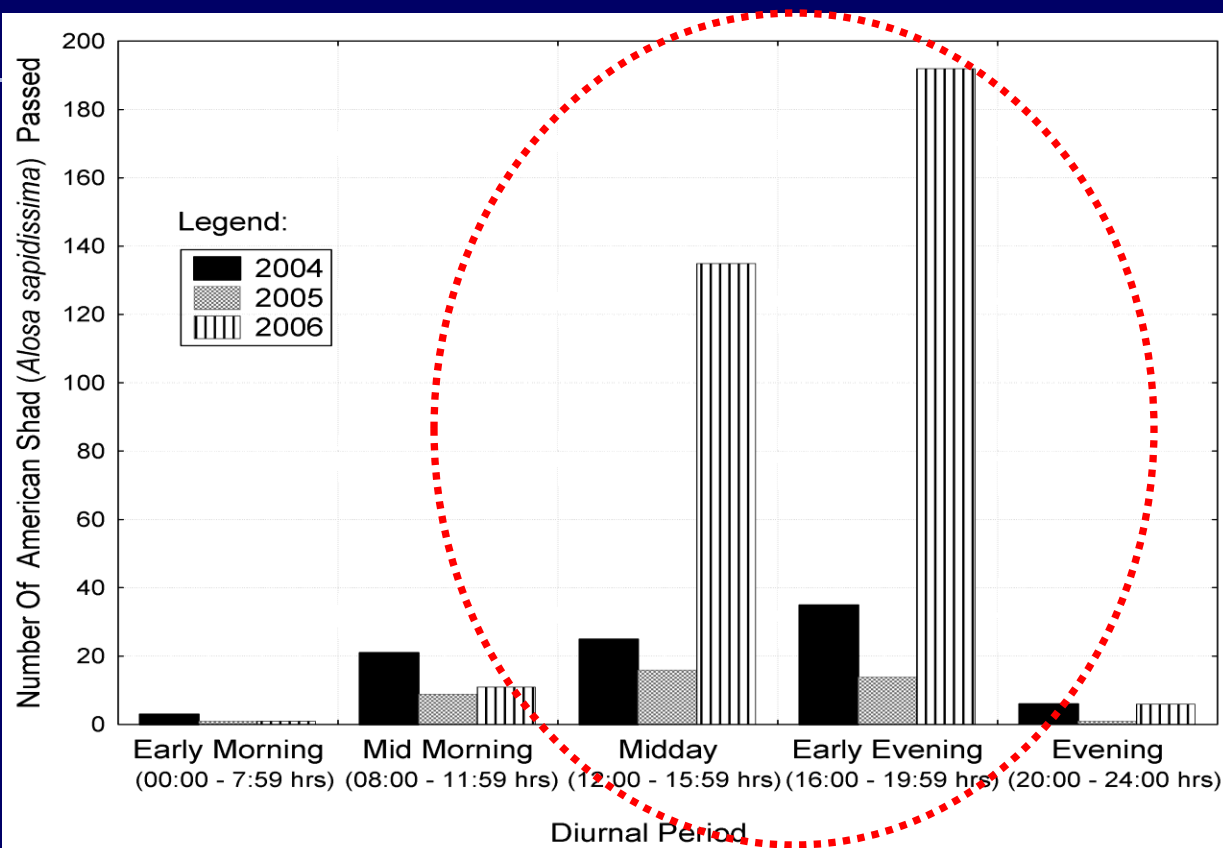
Preliminary Findings:

Catch-Per-Unit-Effort (CPUE) vs. American Shad Passed

Schuylkill River American Shad Passage & Relative Abundance At Fairmount Dam (2004-2011)



Preliminary Findings: *Pre-Restoration (2004-2006)*

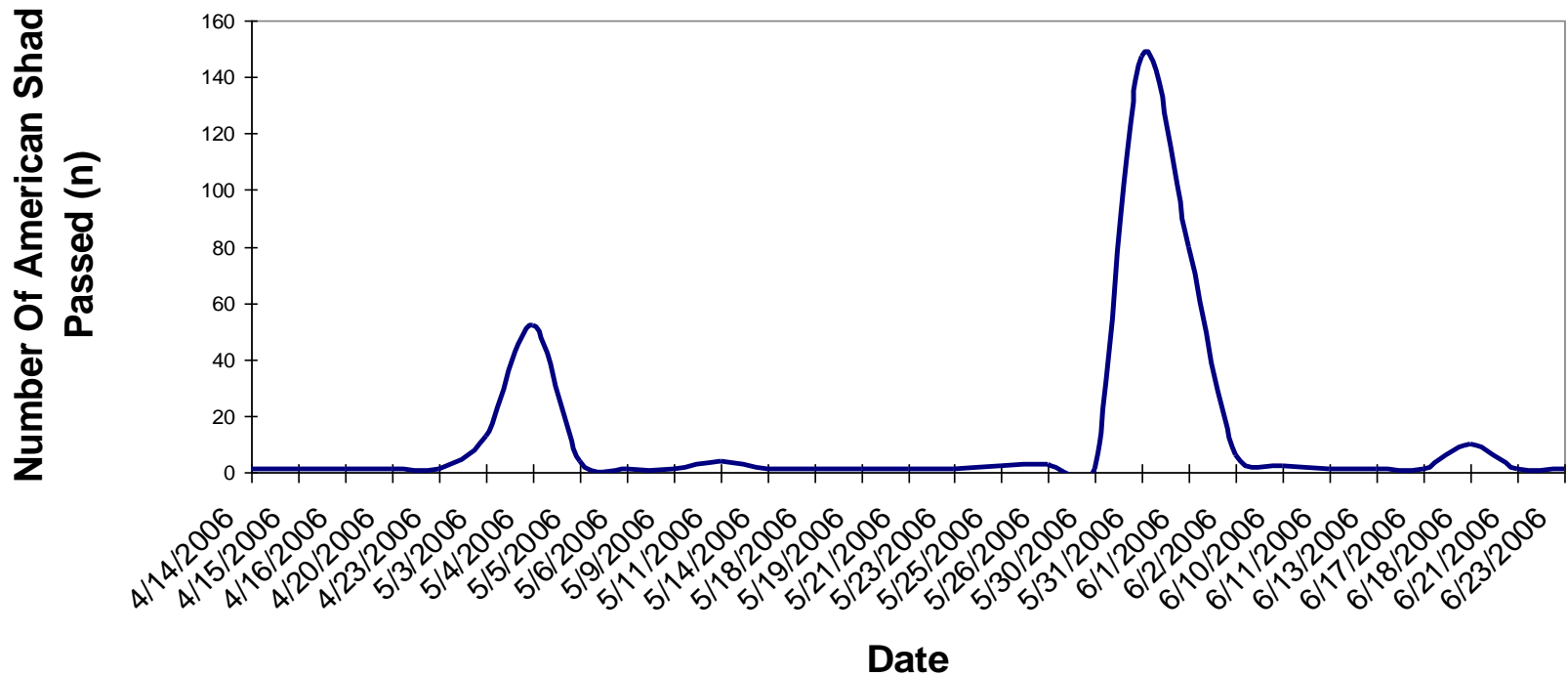


Temporal Variability In Passage Of American Shad-
Environmental Or Biological Trigger?

Preliminary Findings:

Effects of Seasonality

2006 American Shad Passage



Temporal Variability Of American Shad Passage-
Environmental Or Biological Response?

Discussion:

■ Fairmount Fish Ladder

- Total fish passage numbers have steadily increased
- Resident fish species are utilizing the passage facility with seemingly minimal difficulty
- Initial design of fish ladder was not “optimized” for passage of American shad and other migratory species
- Initial post-restoration results look promising. . . .



Quillback passing through ladder
Alosa sapidissima

What's Next ?

- Continued Field Monitoring
- Continued Video Monitoring
- Additional Studies
 - Population Dynamics
 - Efficiency Studies
 - Recruitment



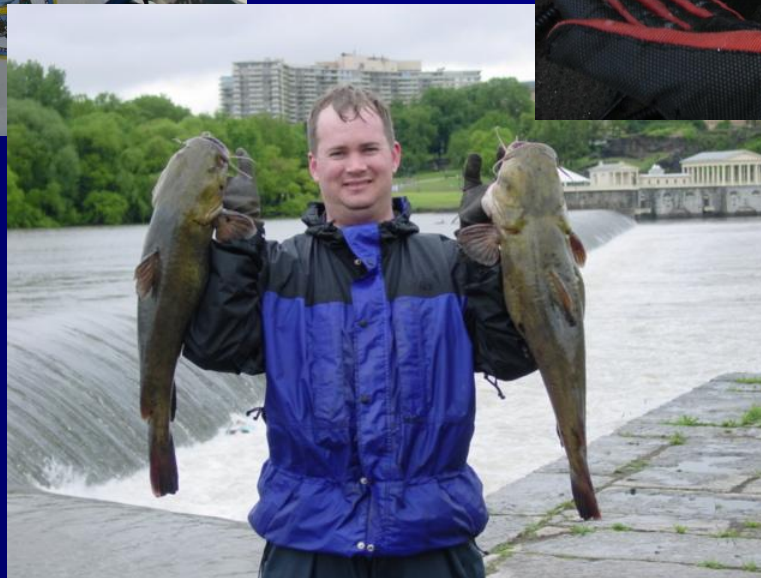
QUESTIONS?



The Good



. . . And The Ugly



The Bad