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

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Schuylkill Watershed: A Geographic Perspective

- Drains approximately 2000 square miles and travels about 130 miles
- Encompasses 11 counties

Schuylkill County

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
EXTENT OF SHAD MIGRATION:
1820

Fairmount Dam
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

SOURCE: Philadelphia Water Department Archives
Fairmount Fish Ladder

- 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.
Fairmount Fish Ladder

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Construction Of Fairmount Fish Ladder, 1978
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:

Wireless Transmitter

Wireless Receiver

Network Router

Archive Backup Harddrive

“Safe Store” Computer

Biologist FishCam Workstation

Cable Modem

COMCAST INTERNET Cable Modem

T-1 Connection

Internet

Monitor

Imaging Computer

Digital WebCam

Fish Ladder Viewing Room

Schuylkill River

Fairmount Water Works Interpretive Center

PWD Lab 1500 Hunting Park

Public Access FWWIC & Wweb site
Video Monitoring System:
Video Monitoring System:

Wireless Transmitter
Video Monitoring System:

Video Transmission

Diagram showing the flow of video transmission:

1. Wireless Receiver
2. Network Router
3. T-1 Connection

- "Safe Store" Computer
- Archive Backup Harddrive
- COMCAST INTERNET Cable Modem
- Cable Modem
- Biologist FishCam Workstation

Locations:
- Faimount Water Works Interpretive Center
- PWD Lab 1500 Hunting Park
- Public Access FWWIC & Wwsite
Fish Sampling Locations

- Four Sampling Stations
- Low Tide Sampling
- Uniform Level Of Effort
- Consistent Electrical Output
- Minimal “Handling”
Fish Sampling Locations

- Four Sampling Stations
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Fish Surveys

Weight Measurements
Fish Surveys

Species Identification, Sex & Length Measurements
Fish Surveys

DELTA Observations
Overview

- 34 species of fish surveyed below the fish ladder between 2002-2008.
- 27 species observed passing through the fish ladder.
- 5 anadromous species observed using the Fairmount Fish Ladder
Preliminary Results: *Pre-Restoration (2002-2008)*

Tidal Schuylkill River Fish Survey Results

Data Analysis Not Completed

<table>
<thead>
<tr>
<th>Year</th>
<th>Catch-Per-Unit-Effort (CPUE) (Shad/min.)</th>
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<tbody>
<tr>
<td>2002</td>
<td>0.16</td>
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<td>2003</td>
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<td>2004</td>
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<td>2006</td>
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<td>2007</td>
<td>4.78</td>
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<td>2008</td>
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Preliminary Results:

*Pre-Restoration (2002-2008)*

**Video Surveillance Results**

- **Number Of American shad passed**
  - 2004: 91
  - 2005: 41 *
  - 2006: 345
  - 2007: 56

- **American shad CPUE (fish/min)**
  - 2004: 0
  - 2005: 1
  - 2006: 9
  - 2007: 2

* *Power outage*
Preliminary Results:

Pre-Restoration (2002-2008)

Temporal Variability In Fish Passage
Preliminary Findings:
Pre-Restoration (2002-2008)

- Fairmount Fish Ladder
  - Total fish passage numbers have steadily increased
    - Operation & Maintenance
  - 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

![Graph showing total fish passage numbers from 2004 to 2006, with a significant increase in 2006.]
Where Are We Now?

- Restoration of the Fairmount Fish Passage Facility is near completion

5/14/2002

12/1/2008
Where Are We Now?

- Major structural modifications

New chambers
Where Are We Now?

- Major structural modifications

Before

New entrance channel with automated gate system

After
Where Are We Now?

- Major structural modifications

Before

New “Non-Overflow” section of fish ladder
Where Are We Now?

- Major structural modifications

After

New “Non-Overflow” section of fish ladder
Where Are We Now?

- Major structural modifications

Before

New exit channel with attraction flow system and debris deflection system
Where Are We Now?

- Major structural modifications

New exit channel with attraction flow system and debris deflection system
Where Are We Now?

- Public Education & Outreach

Creation of an outdoor classroom and public viewing system

www.fairmountwaterworks.org
QUESTIONS?

The Good
(Striped Bass)

The Bad
(Flathead Catfish)

...and The Ugly
(Snakehead)