Diadromous Fish Monitoring in Mill River and Lake Sabbatia, Taunton MA

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March 1, 2022 - Taunton City Council
Presentation Outline

1. Restoration Update
2. Lake Sabbatia Habitat Assessment
3. Lake Sabbatia Video Monitoring
4. Lake Sabbatia Eel Ramp and Tagging
Mill River Cooperative Restoration
Diadromous Fish in Massachusetts

- rainbow smelt
- American eel
- alewife
- blueback herring
- American shad
- white perch
- sea lamprey
- Atlantic tomcod
- sea-run trout
- striped bass
Mill River Watershed Restoration

▪ Four dams with no fish passage limit migratory fish to <10% of historical habitat

▪ MA Division of Ecological Restoration began restoration effort soon after 2005 flood

Lake Sabbatia – 265 acres

Watson Pond – 78 acres

Winneconnet Pond

2011
Mill River Watershed Restoration

- Hopewell Mills Dam – 2012 removed
- Morey’s Bridge Dam – 2012 fishway and eel ramp
- Whittenton Mills Dam – 2013 removed
- West Britannia Dam – 2018 removed

- Provided access over 18 miles of river and 417 acres of spawning and nursery habitat
- Extensive collaborative monitoring ongoing
Mill River Diadromous Fish Monitoring

1. River herring – annual video count
2. American eel – annual ramp count and lake tagging
3. Sea Lamprey – annual spawning redd survey
Installed video monitoring station at fishway in 2016

Sharp rise in river herring in spawning run after last dam removed

5 species of diadromous fish
10 species of freshwater fish
( 3 species of trout and river otter )

May shift to electronic counter after 2022 season (grant ends)
Post-Restoration Spawning Run Improvement

Counts (1,000)

Year

Herring Brook, Pembroke

Mystic River, Medford

No passage in 2011
Massachusetts River Herring 20-Year Count Index 1996 - 2021

Counts (1,000s)

Year

Nemasket River, Mattapoisett River, Monument River and Back River
River Herring Habitat Assessment

• Monitored Lake Sabbatia, Watson Pond, and Winnecunnet Pond (2013-2014)

• Extensive summer anoxia and hypoxia

• Dense biomass of invasive plants - fanwort and variable milfoil

• Found invasive water chestnut in 2018
River Herring Habitat Assessment: Classification Results (*red* = exceedance)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sabbathia exceedances</th>
<th>Watson exceedances</th>
<th>Winnecunnet exceedances</th>
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<tbody>
<tr>
<td>Temperature</td>
<td>≤ 28.3/26 °C</td>
<td>0</td>
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<tr>
<td>DO</td>
<td>≥ 5.0</td>
<td>51%</td>
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<tr>
<td>pH</td>
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<td>TP</td>
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<td>100%</td>
<td>100%</td>
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**Recommendations:**
- Watson passage
- Invasive plant management
- Nutrient management
American Eel - Unique Biology

- Catadromous (born at sea)
- Panmictic (no homing)
- Semelparous (spawn and die)
- High age of maturity (8-15 years old)
- High fecundity (3-10 million eggs)
- Geographic range (Greenland to Brazil)

Highly Successful Fish
Lake Sabbatia Eel Ramp

- Custom eel ramp designed, fabricated and installed by DMF in 2014

![Graph showing eel count by year for Lake Sabbatia. The graph displays two lines: one for YOY and another for Age-1+. The Y-axis represents the eel count ranging from 0 to 10,000, and the X-axis represents the years from 2014 to 2020. The graph indicates fluctuations in eel count over the years.]
Lake Sabbathia Eel Abundance Study
Lake Sabbatia Eel Mark/Recapture Population Estimate

- Anoxia limiting eel habitat use
- Relatively low abundance given Lake size
- 2022 may be last year of study

Evaluating the Effect of Dam Removals on Yellow-Phase American Eel Abundance in a Northeastern U.S. Watershed
Sara M. Turner, Bradford C. Chase, and Michael S. Bednarski
North American Journal of Fisheries Management, April 2018
Sea Lamprey - Redd Survey

• Male lamprey build nests in gravel and compete for female interest

• Conduct survey 2014-2021 at Hopewell Mills site in mid-June

• Documenting 10-40 redds annually

Fishway Operations

Fishway Operation and Maintenance Plan - 2012/2014

Pond Level Target  60.5 ft

Fishway Target  60.85 ft (30 cfs / 2.5 ft in baffles)

Upstream Migration Period  March 15th to June 30th
Downstream Migration Period  July 1st to Nov. 15th
Eel Ramp Period  March 31st to Oct. 31st

Drawdown Period  Start - Oct. 15th
  Recharge start - March 15th
  Recharge complete - April 15th
Recommendations

1. Invasive plant control

2. Watershed nutrient reduction

3. Create fish passage into Watson Pond

4. Continued coordination on drawdown, dam operations and fish passage operations