Lessons Learned from the 2017 Long Island Sound and 2021 Rhode Island Tier 1 Eelgrass Surveys: Steps Toward a Comprehensive Monitoring Strategy

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2021 Rhode Island Tier 1 Eelgrass Survey

- **Tier 1 Survey:** From Neckles et al. 2012; smallest scale; uses digital orthophotography as a basemap
- **Utilizes extensive boat surveys with GPS and underwater video**
- **Goals:** Comprehensive survey of all RI’s coastal water in one calendar year; examine trends
2006 - 2021 Rhode Island Eelgrass Trends

- Steady declines in all RI since 2012
- Narragansett Bay acreage is holding (for now)
- Declines are mostly in the enclosed basins (Coastal Ponds, Narrow River)

http://www.crmc.ri.gov/sav.html
Lessons Learned from 2021 Mapping effort

- Record and archive underwater video tracks
- Developed python script (character recognition) to manage underwater video
- Consistent video interpretation classes
# Review of LIS Tier 1 Surveys

<table>
<thead>
<tr>
<th>Year</th>
<th># of GPS pts</th>
<th>Total Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>246</td>
<td>1582</td>
</tr>
<tr>
<td>2006</td>
<td>290</td>
<td>1904</td>
</tr>
<tr>
<td>2009</td>
<td>193</td>
<td>1980</td>
</tr>
<tr>
<td>2012</td>
<td>?</td>
<td>2061</td>
</tr>
</tbody>
</table>

Legend:
- 2002 FIELD DATA
- 2006 FIELD DATA
- 2009 FIELD DATA

884 total GPS points
2017 Tier 1 Results

• Final GIS database created with 169 polygons of eelgrass (49% field visited)

• 1,581 total acres of eelgrass in LIS for 2017 (87% field visited)

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>New London East</td>
<td>766</td>
</tr>
<tr>
<td>Fishers Island</td>
<td>347</td>
</tr>
<tr>
<td>New London West</td>
<td>338</td>
</tr>
<tr>
<td>Little Nar. Bay</td>
<td>93</td>
</tr>
<tr>
<td>Orient Point</td>
<td>39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,581 acres</strong></td>
</tr>
</tbody>
</table>
2017 Tier 1 Change Analysis (2012 – 2017)

Decrease of 480 acres from 2012 (2061) to 2017 (1581)? Probably not

- Union of 2012 and 2017 polygons; added fields to the database
- Sorted the table by the largest polygons and assessed for change by comparing against the 2012 imagery and data
- Systematically assessed all polygons \( \geq 3 \) acres (\( n = 216; 87\% \) of the total area)

<table>
<thead>
<tr>
<th>2012</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>xx</td>
</tr>
</tbody>
</table>

Total area of change between the 2 years: 1261 acres

Yes = eelgrass mapped in that year

<table>
<thead>
<tr>
<th>Type of Change</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probably Gain</td>
<td>103</td>
</tr>
<tr>
<td>Probably Loss</td>
<td>254</td>
</tr>
<tr>
<td>Uncertain</td>
<td>575</td>
</tr>
<tr>
<td>Not Assessed</td>
<td>328</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1260</strong></td>
</tr>
</tbody>
</table>

151 acre decrease more likely
Lessons Learned from 2017 Mapping effort

• Need a more standardized approach (i.e. record all video, field work, and Little Narragansett Bay (?)
• Eelgrass mapping Taskforce RI (2009)
• Historical imagery needs to be available
• Need an accuracy assessment of the Tier 1 survey method
Tier 1 Accuracy Assessments

- Accuracy assessments were conducted in 2017 and 2021 for surveys in R.I.
- Based on Users versus Producers Accuracy Matrix (Congalton, 1991)
- Random points were selected to survey within “suitable” potential eelgrass habitat (Short et al., 2002)

A total of 121 video locations were withheld (reference data) to identify errors during the photointerpretation and delineation process (classified data). The overall user’s accuracy is for the 2021 mapping is 83%.
Tier 2 Efforts

- Hexagonal approach (Neckles et al., 2012)
- Underwater video transects (Quonchontaug Pond, RI)
- Summary: first survey is great; the rest? Not so much. Too much spatial variability
Tier 2 Efforts – Little Narragansett Bay

- Lead by the Watch Hill Conservancy, Eastern Connecticut University, and URI-EDC
- RTK Transects (wading and snorkel)
- Side scan sonar surveys
- Underwater video plots (20 m circles) – diver (GoPro) vs tethered underwater drone

Surveys 2019, 2021, 2022

Courtesy of Dr. Bryan Oakley and E. Watling, ECSU

August et al., 2019
UAS (drone) Imagery
Collection June 18th
2017

Photo acquisition altitude = 16,000 ft AGL

Photo acquisition altitude = 400 ft AGL
UAS (drone) Imagery Collection

URI Bay Campus (Narragansett, RI) July 26th 2023

Photo acquisition altitude = 400 ft AGL
Summary and Recommendations

Tier 1 surveys can determine regional trends but more detailed approaches and data (Tier 2 and 3) are needed.

Recommendations

1. Tier 1 surveys every 2-3 years
2. LIS Collaborative could develop mapping and monitoring approaches (SOP?) in a technical report or publication
3. Drone imagery and plot assessments (20 m) for Tier 2 at selected sites; These data and reports need a central repository
4. Satellite imagery should be explored for yearly assessments