Introduction: Use of Videos

Todd Callaghan
Massachusetts Office of Coastal Zone Management
What....

- Videos towed from behind a survey vessel
- Offshore wind companies
- CZM-funded survey to characterize offshore sand
Where ....

Offshore Sand Resource Areas
Aug-Nov 2017

Vineyard Wind Cable Route
2017, 2018
Why ....

- MA Ocean Plan: Offshore sand
- Offshore Wind: COP, EIS
- CZM’s Seafloor Mapping Program: h/c seafloor
Sampling Design and Execution
Preparation

• Videos of opportunity
• Offshore Sand
  • 10 lines within each of the 5 areas of interest
  • Transition zones (sand → cobble)
  • 40-130’ depth
  • 1000 m length
• Offshore Wind
  • From site to shore every 1 km
  • Video transects perpendicular to cable pathway
  • 15-115’
  • 1000 m length
Execution

• Data Gathering
  • Towed, vessel adrift at 0.5 to 2 knots
  • Red lasers 25 cm (9.8” apart) on sled frame
  • Outland Technologies (OTI) hi res, low light, color camera
  • 2 UWL-401 LED lights w/ variable output
  • OTI-960 video recorder and topside monitor

Also,
• Hi def GoPro Hero 4+ Black in a Nimar deepwater housing
• Mounted below OTI housing
• Recording HD video at 1080P resolution, 30 fps
• AND 12 Megapixel stills every 5-10 secs

• Both cameras synched to each other and navigation computer
Data Management

- Simply use the file names provided by collector
- Data on hard drives (external and shared CZM server)
- 350 GB for offshore sand videos
- 1 TB for Vineyard Wind videos
- Use Excel for analyzed photos data
What worked well, and what didn’t …

• Need to do tows in Cape Cod Bay Jan 1-April 30 to avoid lobster gear
• Transect “lines” are actually nonlinear b/c of drift & avoidance
• GoPro is a good backup when OTI fails
Data Analysis
Approach

- Data Processing w/ VLC Media Player
- Staff or student time
- View video with spreadsheet at hand
- Drop boxes with local possibilities for easier entry
- Use stills to estimate densities (sand dollars)
## Results

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biotic Subclass</td>
<td>Biotic Group</td>
<td>Co-occurring Element 1</td>
<td>Co-occurring Elements</td>
<td>Associated Taxa 1</td>
</tr>
<tr>
<td>2</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Diverse Soft Sediment Epifauna (blood star)</td>
<td>Burrowing Anemones, Scallop Bed (Sea Scallop), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>3</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Burrowing Anemones</td>
<td>Diverse Soft Sediment Epifauna (bushy bryozoan, hermit crab, moon snail)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>4</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Burrowing Anemones</td>
<td>Burrowing Fauna (amphipods), Diverse Soft Sediment Epifauna (bushy bryozoan, sea star), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>5</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Clam bed (quahog)</td>
<td>Burrowing Fauna (amphipods), Clam Bed (mussel), Diverse Soft Sediment Epifauna (sea star), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>6</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>VERY TURID VIDEO</td>
<td>VERY TURID VIDEO</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>7</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Burrowing Fauna (amphipods)</td>
<td>Clam Bed (quahog, razor clam)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>8</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Clam bed (quahog, sea scallop, surf clam)</td>
<td>Burrowing Anemones, Diverse Soft Sediment Epifauna (bushy bryozoan, sulfur sponge), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus), Fecal mounds (worm castings)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>9</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Burrowing Fauna (amphipods)</td>
<td>Diverse Soft Sediment Epifauna (bushy bryozoan, sea star), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus), Fecal mounds (worm castings), Egg Masses (skate)</td>
<td>Mysis shrimp</td>
</tr>
<tr>
<td>10</td>
<td>Soft Sediment Fauna</td>
<td>Sand Dollar Bed</td>
<td>Clam bed (quahog)</td>
<td>Diverse Soft Sediment Epifauna (bushy bryozoan, sea star), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Cragon, Pagurus), Fecal mounds (worm castings)</td>
<td>Mysis shrimp</td>
</tr>
</tbody>
</table>

Associated Taxa 2 = commercially important species
<table>
<thead>
<tr>
<th>Substrate Group</th>
<th>CZM Barnhardt Sediment Class</th>
<th>Co-Occurring Element</th>
<th>Biotic Class</th>
<th>Mollusk Reef Biota</th>
<th>Biotic Subclass</th>
<th>Biotic Group</th>
<th>Biotic Community</th>
<th>Primary Co-Occurring Element</th>
<th>Other Co-Occurring Elements</th>
<th>Associated Taxa 1</th>
<th>Associated Taxa 2</th>
<th>Associated Taxa 3</th>
<th>Associated Taxa 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crepidula Rubble</td>
<td>Fine</td>
<td>None</td>
<td>Reef Biota</td>
<td>None</td>
<td>None</td>
<td>Gastropod Reef</td>
<td>Crepidula/Codium</td>
<td>Leathery/Leafy Algal Bed</td>
<td></td>
<td>Juvenile Black Sea Bass</td>
<td>Juvenile Whelk</td>
<td>Anomia</td>
<td>Anachis</td>
</tr>
<tr>
<td>Fine</td>
<td>Fine with Gravel</td>
<td>Crepidula Rubble</td>
<td>Faunal Bed</td>
<td>Attapine</td>
<td>none</td>
<td>None</td>
<td>None</td>
<td>Filamentous Algal Bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine</td>
<td>Fine with Gravel</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine</td>
<td>Crepidula Hash</td>
<td>Aquatic Vegetation Bed</td>
<td>Benthic Macroalgae</td>
<td>Filamentous Algal Bed</td>
<td>None</td>
<td>Sessile Gastropods</td>
<td>Burrowing Fauna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine</td>
<td>Fine</td>
<td>Microbial Communities</td>
<td>Mat/Film Forming Microbes</td>
<td>Bacterial Mat/Film</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crepidula Rubble</td>
<td>Fine with Gravel</td>
<td>None</td>
<td>Faunal Bed</td>
<td>Attached Fauna</td>
<td>Attached Sponges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crepidula Rubble</td>
<td>Fine with Gravel</td>
<td>Aquatic Vegetation Bed</td>
<td>Benthic Macroalgae</td>
<td>Leathery/Leafy Algal Bed</td>
<td>Crepidula/Codium</td>
<td>Filamentous Algal Bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crepidula Rubble</td>
<td>Fine with Gravel</td>
<td>None</td>
<td>None</td>
<td>Attached Fauna</td>
<td>Sessile Gastropods</td>
<td>Crepidula/Codium</td>
<td>Leathery/Leafy Algal Bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine</td>
<td>Fine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What worked, and what didn’t …

- Shell “reef” vs. “rubble”
  - Conglomerated, self-adhered, particle size 4096 mm or > in any direction
  - Living or nonliving shells w/ median particle size of 64-4096 mm
  - There is no way to see “particles” this size via video
From my Student Aashi:

Burrowing in sand:
• Small burrows in the sediment as well as little heaps with a hole in the middle

• Does it matter if we can see the organism or just the hole?

• Size of burrow (Biotic Group = “Tunneling Megafauna”)
What to do with sponge that is functionally cobble?