Salish Sea Ecosystem Conference

Apr 6th, 11:00 AM - 11:15 AM

Using passive acoustics to monitor Galiano glass sponge reef

Amalis Riera
Univ. of Victoria, Canada, ariera@uvic.ca

Stephanie Archer
Fisheries and Oceans Canada, Canada, Stephanie.Archer@dfo-mpo.gc.ca

William Halliday
Univ. of Victoria, Canada, whalliday@wcs.org

Xavier Mouy
Univ. of Victoria, Canada, xavier.mouy@jasco.com

Matthew Pine
Univ. of Victoria, Canada, matt.k.pine@hotmail.com

See next page for additional authors

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Speaker
Amalis Riera, Stephanie Archer, William Halliday, Xavier Mouy, Matthew Pine, Anya Dunham, and Francis Juanes

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Using passive acoustics to monitor the Galiano glass sponge reef

Stephanie Archer, William Halliday, Amalis Riera, Xavier Mouy, Matthew Pine, Anya Dunham, Francis Juanes

Photo courtesy of S. Archer & A. Dunham
What are glass sponge reefs?

- Built by Hexactinellid (glass) sponges
- Nursery habitat for rockfish
- Ecosystem similar to coral reefs
- Depth range: 25 - 270 m
• Common 200 MYA, believed extinct 40 MYA
• Discovered in Hecate Strait in 1987
• More exist from the Strait of Georgia to Alaska
• Require a suite of very specific conditions for growth

• Slow growth rate (1-9 cm/year)

Photos courtesy of S. Archer & A. Dunham
Why are they important?

Photo courtesy of S. Archer & A. Dunham
Why are they important?

1. Historical value
Why are they important?

1. Historical value
2. Ecological value
Cause sediment in suspension to settle
1 km² of healthy sponge reef can filter enough water to fill ~84,000 Olympic swimming pools a day.

Kahn et al. 2016

Slide courtesy of S. Archer & A. Dunham
Why are they important?

1. Historical value
2. Ecological value
3. Economic value
Why are they in trouble?

Photo courtesy of S. Archer & A. Dunham
• Slow recovery rates
• Syncytial rather than cellular tissues
• Bottom trawling causes sediment plumes
How can Bioacoustics help?
Objectives of the Study

1. Do GSRs (Glass Sponge Reefs) have a distinct biophony? What do they sound like?
2. What levels of vessel noise are GSRs exposed to?
3. Can Passive Acoustics be used to monitor GSR ecosystem health?
Galiano Glass Sponge Reef in the Outer Gulf Islands
3 Sound Traps deployed in Sept 2016 (for 4-5 days)

Continuous duty cycle (96 kHz, 16 bit)

3966 recordings (5 minutes each)
Fish sounds
Reef-center: 41
Reef-margin: 120
Off-reef site: 7

“Quiet”

“Noisy”
Peaks for shipping noise
Largest from propeller cavitation

Peaks 10-20 KHz from ROV noise

20 – 100 Hz

100 Hz – 48 KHz
Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef

Ship noise throughout

ROV noise

Reef-Center

Reef-Margin

Off-Reef
Summary of counts of vessels within 10 km of each recorder and the distance (m) of the closest vessel to each recorder for each minute of recording.

<table>
<thead>
<tr>
<th>Location</th>
<th>Minimum</th>
<th>Median</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Vessels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reef-Center</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Reef-Margin</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Off-Reef</td>
<td>0</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td><strong>Minimum Distance</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reef-Center</td>
<td>14</td>
<td>4952</td>
<td>9998</td>
</tr>
<tr>
<td>Reef-Margin</td>
<td>19</td>
<td>5122</td>
<td>10653</td>
</tr>
<tr>
<td>Off-Reef</td>
<td>8</td>
<td>4800</td>
<td>10262</td>
</tr>
</tbody>
</table>

No difference between locations

---

*Archer et al. (in press)*
Species observed during recorder deployment and retrieval at each location.

<table>
<thead>
<tr>
<th>Off-reef</th>
<th>Reef-margin</th>
<th>Reef-Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>No species observed</td>
<td>Cribrinopsis fernaldi</td>
<td>Acantholithodes hispidus</td>
</tr>
<tr>
<td></td>
<td>Crossaster papposus</td>
<td>Chorilia longipes</td>
</tr>
<tr>
<td></td>
<td>Hydrolagus colliei</td>
<td>Gephyreaster swifti</td>
</tr>
<tr>
<td></td>
<td>Metridium sp.</td>
<td>Henricia sp.</td>
</tr>
<tr>
<td></td>
<td>Munida quadrispina</td>
<td>Unidentified Lithodidae sp 1.</td>
</tr>
<tr>
<td></td>
<td>Pandalus platyceros</td>
<td>Munida Quadrispina</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unidentified Osmeridae sp 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pandalus platyceros</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peltodoris lentiginosa</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sebastes elongatus</td>
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<tr>
<td></td>
<td></td>
<td>Sebastes sp. 1</td>
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<tr>
<td></td>
<td></td>
<td>Sebastes sp. 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unidentified Asteroidea sp. 1</td>
</tr>
</tbody>
</table>

Archer et al. (in press)
Objectives of the Study

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Conclusions

1. This Glass GSR has a distinct biophony. More fish sounds were detected on the GSR.
2. Vessel traffic increased noise levels on the GSR.
3. Passive acoustics may complement traditional visual surveys.
Future Work

- Longer deployments + fine-scale community mapping to investigate temporal changes
- Identify fish calls to species level
- Impact of vessel noise on the community?
- Relationship between sound production, community structure, and ecosystem health?
Thank you!!!

Questions?
