Presents

Glass Sponges
Bioherms in Howe Sound
“Unique in the World”
Glass Sponge Reefs in Howe Sound

• Group effort – MLSS, UCBC, Vancouver Aquarium

• Significant amount of volunteer work – 1,000’s of hours on and under the water and $10,000’s in expenses
Basic Information

- Stationary, filter feeding organisms
- Animal
- Long-lived, slow growing (est. 2-10cm/yr)
- Primary structure is a matrix of silica-based spicules
- Reef forming abilities
- Unique habitat for deep marine life
Filter Feeding

- Rely on currents to transport food towards them
- Can filter 900x their body volume/hr
- Consume microscopic plankton, bacteria, detritus and sediment
- Based on recent study estimated 230 tons per day of bacteria consumed by Sponge Reefs off BC Coast
- Larger particles, vibrations & impact will cause irritation and arrest filter feeding
- Communicate to other cells through electrical signalling
Habitat

- High Si
- 9-10°C
- Low sedimentation
- High suspended sediment load (turbid water)
- Higher velocity deep currents; leeward side of ridges/sea mounts
A Brief History of Life on Earth

<table>
<thead>
<tr>
<th>MYA*</th>
<th>Eon</th>
<th>Era</th>
<th>Period</th>
<th>Epoch</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.045</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Recent</td>
<td>Modern humans worldwide distribution; sixth mass extinction event</td>
<td></td>
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<tr>
<td>1.8</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Pleistocene</td>
<td>First hominines appear</td>
<td></td>
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<tr>
<td>5</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Pliocene</td>
<td>Origin of human family</td>
<td></td>
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<tr>
<td>24</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Miocene</td>
<td>Many grazing mammals; primate radiation</td>
<td></td>
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<tr>
<td>37</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Oligocene</td>
<td>First anthropoid primates; abundant birds</td>
<td></td>
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<tr>
<td>58</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Paleocene</td>
<td>Modern mammals and angiosperms</td>
<td></td>
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<tr>
<td>65</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Cenozoic</td>
<td>Placental mammals diversify</td>
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<tr>
<td>144</td>
<td>Cenozoic</td>
<td>Tertiary</td>
<td>Cretaceous</td>
<td>Early mammals; first modern birds; first modern fishes; angiosperms appear and become dominant; climax of dinosaurs followed by their extinction at end of period; fifth mass extinction event</td>
<td></td>
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<tr>
<td>213</td>
<td>Mesozoic</td>
<td>Triassic</td>
<td>Jurassic</td>
<td>First mammals; first birds; dinosaurs dominant; therapsids extinct; abundant bony fishes; gymnosperm forests</td>
<td></td>
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<tr>
<td>248</td>
<td>Mesozoic</td>
<td>Triassic</td>
<td>Triassic</td>
<td>Reptiles diversify; first dinosaurs; many insect types; bony fishes diversify; abundant cycads and conifers; fourth mass extinction event</td>
<td></td>
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<tr>
<td>286</td>
<td>Mesozoic</td>
<td>Triassic</td>
<td>Permian</td>
<td>Insects diversify; reptiles diversify; first therapsids; cycads and conifers expand; third mass extinction event</td>
<td></td>
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<tr>
<td>320</td>
<td>Mesozoic</td>
<td>Triassic</td>
<td>Carboniferous</td>
<td>First reptiles appear; amphibians diversify; first conifers; abundant seed ferns; major coal deposits</td>
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<td>360</td>
<td>Mesozoic</td>
<td>Triassic</td>
<td>Mississippian</td>
<td>First amphibians appear; terrestrial life diversifies; fishes diversify; first true bony fishes; fist sharks; second mass extinction event</td>
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<tr>
<td>408</td>
<td>Paleozoic</td>
<td>Ordovician</td>
<td>Devonian</td>
<td>Jawless fishes diversify; first jawed fishes appear; first terrestrial plants and animals</td>
<td></td>
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<tr>
<td>438</td>
<td>Paleozoic</td>
<td>Ordovician</td>
<td>Silurian</td>
<td>All lifeforms still aquatic only; armored ostracoderm fishes diversify; invertebrates diverse and dominant; first mass extinction event</td>
<td></td>
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<tr>
<td>543</td>
<td>Paleozoic</td>
<td>Ordovician</td>
<td>Cambrian</td>
<td>Aquatic life only; all modern animal phyla present; first vertebrates appear; trilobites common</td>
<td></td>
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<tr>
<td>2500</td>
<td>Proterozoic</td>
<td>Cambrian</td>
<td>The Proterozoic and Archean Eons are sometimes referred to collectively as the Precambrian.</td>
<td>Oldest eukaryotic fossils (algae)</td>
<td></td>
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<tr>
<td>3800</td>
<td>Archean</td>
<td>Cambrian</td>
<td>Cambrian</td>
<td>Marked by the beginning of geological history; lifeforms evolved; oldest prokaroytic fossils</td>
<td></td>
</tr>
<tr>
<td>~4500</td>
<td>Hadean</td>
<td>Cambrian</td>
<td>Cambrian</td>
<td>Solar System forms; molten Earth forms and begins to cool; no geological history during Hadean (because there was no solid rock); when solid rock formed, geological history began and the Hadean ended</td>
<td></td>
</tr>
</tbody>
</table>

* Millions of Years Ago. The dates shown next to each time unit (eon, era, period, epoch) marks the beginning of that time unit. The end date of the time unit is marked by the next cell above the time unit of interest. For example, the Mesozoic dates from 248 MYA to 65 MYA.

Refs:

This timeline was downloaded from the About.com Animals/Wildlife website at www.animals.about.com.
Sponge Garden are sponges on rocky substrate.
Bioherm / Sponge Reef – A reef structure formed from new glass sponges growing on skeletal remains of older sponge
Thought to have been extinct for 65 million years
• Previously only known from fossil records
• Fossilized remains of one reef stretches 2900km from Spain to Romania (larger than present day Great Barrier Reef)
• Rediscovered in Hecate Straight / Queen Charlotte Sound in 1987
• Was compared to finding a herd of dinosaurs
• More recent discoveries in Straight of Georgia & Howe Sound
Estimated to grow 2-10cm/yr
Estimated to grow 2-10cm/yr
Sponge Reefs discovered to date
Why should we care?

- Ancient life form
- Appear to act as nursery and grow-out habitat for Rockfish and crustaceans
- Extremely delicate
- Filter huge quantities of water
- Susceptible to temperature shifts, valuable indicator of climate change
- Occur in shallow water, unique in the world
Proposal to expand Halkett Provincial Park to include offshore glass sponge reef
Request to expand current fishing closures

- April 1 2016 DFO will place a fishing closure on 12 Glass Sponge Reefs in Southern Straights of Georgia and Howe Sound
- Does not include 12 more reefs discovered by volunteers with Marine Life Sanctuary Society
- Seeking letters of support to expand the existing closure to include ALL known Sponge Reefs in Howe Sound
Islands Trust & Sponge Reefs

- Protection of Unique Habitat meets ‘Preserve & Protect’ Mandate as well as ‘Harvest Refugia’
- Letters of support previously sent regarding Galiano Reef & Halkett Bay Provincial Park
- These reefs provide important Rockfish Habitat (including 2 species listed as Threatened under COSEWIC)
Citizen Science

- Mapping
- Dive surveys, photos and video
- Technical Dives
- Drop Camera
- Temperature Monitors
- UBC Engineering Student Projects
- Collaboration with other groups
Thank You!
September 2015

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Regarding Protection of recently discovered glass sponge beds and reefs in Howe Sound

Dear Ms. Faringer,

We the undersigned would like to start a DFO sponsor initiative to have the glass sponge beds and reefs in Howe Sound protected from all types of fishing and anchoring damage as per outlined in the Pacific Region Cold-water Coral and Sponge Conservation and Strategy, DFO executive summary.

Conservation object: to conserve the health, composition and function of cold-water coral and sponge species, communities and habitats in support of a healthy ecosystem.

The purpose of the initiative would be to close the reefs listed below that support sponge bioherm formations to all types of fishing activity, including prawning and crabbing, and also prohibit anchoring on these reefs and sponge bioherm areas.

To support this initiative please find the attached documentation for Howe Sound sponge bioherms. With the support of the included documentation about the Sounds sponge bioherms we are appealing to the greater stakeholders of Howe Sound to realize that the sponge ecosystems are incredibly fragile and at this time not well understood in their symbiotic function with other marine life forms, hence need complete protection from damage inflicted by human activity.

We call upon the DFO to host a series of talks and meeting in which the greater questions of; “Can we as a Canadian society protect our marine resources and share the common public property without irreversibly damaging them, with the goal of protecting these (list below) Howe Sound sponge beds as previously achieved in the Strait of Georgia and Howe Sound?”