

Age distribution of *Lophelia pertusa* colonial scleractinian cold-water coral fragments from the NE Scotian margin

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Introduction

- The *Lophelia* Coral Conservation Area (LCCA) is a protected area on the southeastern portion of the Scotian Shelf and contains the first scientifically documented colonies of *Lophelia pertusa* in the eastern Atlantic ocean (Buhl-Mortensen et al. 2017).
- Although the quantity of coral rubble at the site indicates extensive past growth, the living *L. pertusa* at the site are small and few in number (Beazley et al. 2021).
- The time period during which this widespread mortality took place is unknown, and has been hypothesized to be related to human activity (Buhl-Mortensen et al. 2017).

Methods

- Physical specimens were collected within the LCCA during the 2022 expedition cruise of the Atlantic Condor.
- Of the samples collected, six were chosen to undergo radiocarbon dating; the colour values of the fragments informed this selection.
- Radiocarbon analysis took place at the André E. Lalonde Accelerator Mass Spectrometry Laboratory (Ottawa, Canada), with additional reservoir correction later being performed.



Figure 1: Colour grading of coral fragments selected for radiocarbon analysis

Results

Sample ID	Reservoir corrected date range (68.3%)	Reservoir corrected date range (95.4%)	Reservoir corrected median date
Condor M09 - 1	1380 CE – 1504 CE	1308 CE – 1566 CE	AD 1437
Condor M09 - 2	515 CE – 657 CE	428 CE – 703 CE	AD 578
Condor M09 - 3	1203 CE – 1334 CE	1135 CE – 1409 CE	AD 1270
Condor M09 - 4	434 CE – 581 CE	360 CE – 652 CE	AD 507
Condor M09 - 5	553 CE – 684 CE	464 CE – 759 CE	AD 617
Condor M09 - 6	29 CE – 197 CE	60 BCE – 268 CE	AD 108

Table 1. AMS radiocarbon dating results and reservoir corrected ages of coral fragments collected from the LCCA

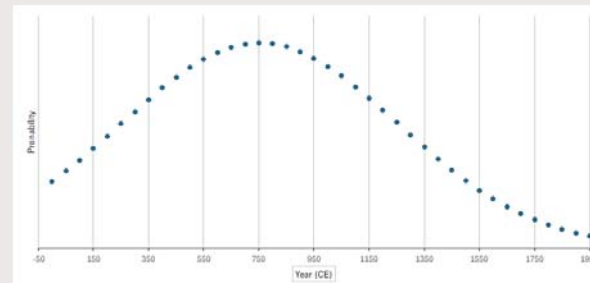


Figure 2: Probability analysis showing the likelihood of coral fragment collected from the LCCA being radiocarbon dated to a given year, informed by the radiocarbon dating results presented here

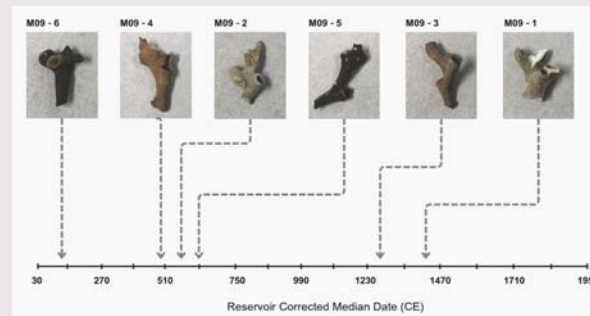


Figure 3: Timeline highlighting the estimated reservoir corrected median date of mortality for each of the samples relative to one another.

Discussion

- Considering current growth, *L. pertusa* has persisted in the LCCA for at least the past 1,914 years.
- The oldest coral fragment dated to the ancient period.
- None of the coral fragments examined here had estimated dates of mortality within the modern period.
- Intensive fishing was practiced off the Scotian Shelf in the late 1400s and early 1500s (Lear 1998). All of the coral fragments here experienced mortality prior to that period.

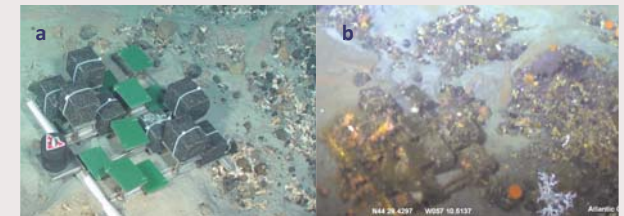


Figure 4. Comparative imagery demonstrating the continued growth of *L. pertusa* within the LCCA, where a) represents growth in 2007 and b) represents growth in 2022

Conclusion

- We found no evidence of human-induced mortality.
- Natural events, such as long-term climatic changes, may have altered habitat suitability in the area (Lotze et al. 2022).
- Work is ongoing to examine past climatic changes and estimate via photogrammetry the modern-day growth rate of *L. pertusa* in the LCCA.

References

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