

## What Does the Quaternary Fossil Record Tell Us about Marine Extinctions Threats?

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The emerging field of Conservation Paleobiology demonstrates that the Quaternary fossil and archaeological records can document ecological transitions from the pre-human biosphere into its current state. The conservation paleobiology studies demonstrate that geohistorical approaches are applicable to many groups of organisms, including mollusks, corals, ostracods, foraminifera, fish, and marine mammals. Many of these taxa have an excellent fossil record and may help elucidate biodiversity dynamics in marine ecosystems during and before the early modern times. Moreover, rapid advances in dating techniques, other advanced instrumentation, and numerical methods enable conservation paleobiology to contribute powerful insights into the most recent history of marine ecosystems. For example, age-dating of shells or bones continues to uncover extinctions and extirpations in the recent past and help us to assess if humans played a significant role in those events. The age distributions of dated specimens can also estimate the timing of extinctions and extirpation events and provide numerical assessments of decimations, which can help identify extinction threats. In short, geohistorical archives are a great resource for understanding the recent past and identifying human-driven changes that already took place. Geohistorical studies also indicate that many marine ecosystems have deteriorated in terms of taxonomic and functional diversity – marine ecosystems have been accumulating a human-driven extinction debt for centuries or even millennia. Despite limitations and assumptions that underlie geohistorical archives, they represent a key source of data that complement conservation efforts and play an important role in assessing extinctions, extirpations, extinction debts and extinction threats. Geohistorical approaches document biodiversity losses and threats that would not and could not have been discovered otherwise and provide direct insights into the transition of the pre-human biosphere into its current state.

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