Coral reefs are “holobionts,” composed of coral-forming species, numerous algae, and bacterial species that live symbiotically with their coral hosts (Roik et al., 2022). Predominantly found in tropical and subtropical waters of the Atlantic, Pacifc, and Indian Oceans, these holobionts serve vital roles in marine ecosystems, acting as protective barriers and food reservoirs for approximately one third of marine species (Plaisance, 2011). Among those marine species are coral-dwelling fsh, which one-third gain 80% of their diet from coral reefs (Cole et al., 2008). Other fsh species utilize coral reefs as breeding grounds and nurseries for their young (Verweij et al., 2008). Despite overwhelming evidence suggesting fsh utilize coral reefs for multifold purposes, it is unknown the extent to which they would be impacted if coral reefs went extinct.

Some coral species act as ecosystem engineers, such as those belonging to the genera Scleractinia, by secreting calcium carbonate to build coral reef structures (Von Euw et al., 2017). However, this process may be halted due to environmental change. Low oceanic pH or high ocean temperatures cause available oceanic carbonate ions to be converted to carbonic acid (Mollica et al., 2018). With less carbonate ions available, cor

6RPH RIWKH HDUOLHVW FRUDOV QDPHG 6WURPDWRSRURLGHD DUH WKRXJKW WR KDYH HYROYHG GXULQJ WKH 2UGRYLFLDQ 3HULRG QHDUO\ PLOOLRQ HDUV ago (Webby, 2002). During this time, corals transitioned from microbial-based metazoan symbionts to algal and microbial-based symbionts (Webby, 2002). While the Ordovician is surely an important marking for the frst appearance of coral species, the Devonian Period displays mass-scale population shifts which are of interest to coral extinction literature. During the Devonian, coral species faced mass expansion, the formation of the frst coral reef networks, and the demise of such networks (Wendt & Kaufmann, 2006, Bridge et al., 2022). Overall, the his-

explosion of aquatic life, thus commonly referred to as “The Age of Fishes”. Alongside other marine life, coral life multiplied in increasing numbers, with one of the largest reef complexes being created by the middle of the Devonian Period (Wendt & Kaufmann, 2006). By the end of the period, these same reef ecosystems collapsed, a period referred to as the Late Devonian Mass Extinction (Bridge et al., 2022). The exact factors that may have led to this collapse are unknown, although eutrophication, anoxia, hypersalinity, red tide and algal blooming may have contributed (Gong et al., 2002). Nonetheless, while the Devonian holds remarkable developments in coral-reef complexes, it also holds the extinction of coral reef species in such complexes.

Similar to the Devonian, present-day predictions suggest corals are

Coral reefs have faced considerable threats between the Devonian Period and the Quaternary Period of the Anthropocene. Facing comet showers, volcanic eruptions, and glacial and interglacial periods during the Devonian, corals predominantly face disease and anthropogenic efects today. The similar threat to corals of global warming transverses through both periods, but it is accelerated today due to anthropogenic efects like the burning of fossil fuels. The efects of global warming on coral reefs have been studied for decades, yet literature discussing the implications of coral reef's mortality on marine ecosystems remains underserved.

Coral reefs house nearly 600,000 to 9 million species worldwide (Plaisance, 2011). From those, coral-dwelling fsh species rely extensively on coral-reefs for protection from predators and access to food (Plaisance, 2011, Cole et al., 2008).Therefore, it is important to project how marine communities, specifcally coral-dwelling fsh species, might respond if coral extinction were to occur in the future. Some fsh species are obligate coral species, meaning they rely on corals for survival, whereas other species earn facultative benefts from corals. Therefore, the consequences of coral extinction might difer among marine ecosystems.

Fish primarily utilize coral reefs by using their trabeculated coral branches as shelters from larger predators (Boström-Einarsson et al., 2018). However, as coral branches die, they become overgrown with algae, thereby minimizing available space for hiding and shelter (Boström-Einarsson et al., 2018). Researchers found as available shelter decreases, fsh are more likely to seek live coral, crossing large areas of open water between coastlines and increasing their likelihood of encountering a predator (Boström- Einarsson et al., 2018). They found a positive relationship between coral death and predation-induced mortality of coral-reef dwelling damselfsh, Pomacentrus moluccensis (Boström-Einarsson et al., 2018). The loss of available trabeculated coral branches may be particularly harmful for the 126 species of coral-dwelling fsh who use coral branches as shelter from predators during their infancy (Coker et al., 2013, Jones et al., 2004). In the case of coral extinction, we may use these fndings to suggest coral-reef dwelling fsh populations would sufer higher mortality rates due to their increased risk of fnding shelter in open waters.

It is also suggestive that coral reef fsh communities would be reshaped completely if coral reefs went extinct, potentially threatening species abundance and ecosystem functioning (Jones et al., 2004, Cheal et al., 2008). Fish species diversity at the Great Barrier Reef was measured over an eleven-year period (Cheal et al., 2008). Despite coral abundance decreasing following coral bleaching and mortality events, diversity remained the same (Cheal et al., 2008). It is important to note, however, community diversity is not necessarily indicative of communal change in species presence. As coral mortality increased, so too did the abundance of herbivorous fsh who do not depend on corals for survival (Cheal et al., 2008). Coral-dependent fsh species and other fsh species abundance declined with coral mortality, thereby reducing overall ecosystem functioning (Cheal et al., 2008). This shows that coral bleaching and coral decline can reshape fsh species abundance at coral reefs, reducing the extent to which coral reefs can provide natural services and products to the surrounding environment (Cheal et al., 2008). Overall, although community diversity (the number of coral-dwelling fsh interacting at coral reefs) may not decline, species comv39vi0 0 8 36 293.5g at P@àVX LHFWV0FRDOGZHLQJ0K0QRW0

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