



SPOTLIGHT 4 | New England and Corner Rise Seamounts

By Timothy M. Shank

One of the longest seamount tracks in the Atlantic Ocean was formed by the Great Meteor or New England hotspot. This more than 3000-km-long hotspot track formed both the New England and Corner Rise seamounts, with a pause in volcanism 83 million years ago as evidenced by the morphological gap between chains (Figure 1). The New England and Corner Rise seamounts each have more than 35 and 50 major peaks, respectively, with summit reliefs from 400 m to more than 5000 m. Under highly diverse oceanographic settings, these seamounts harbor complex coral ecosystems comprised of host corals and sponges as well as many associate species (Shank et al., 2006; Mosher and Watling, 2009) that are now the focus of intense ecological and evolutionary studies. More than 270 morphospecies have been observed within this region,

with ~ 75 morphotypes unique to the Corner Rise and ~ 60 unique to the New England Seamounts (Cho, 2008). Interestingly, a variety of invertebrates are revealing differing levels of specificity to their host corals, ranging from “facultative” to “obligate” (see Shank, 2010). For example, the galatheid *Uroptychus* has been observed only on the antipatharian *Parantipathes* sp., and the ophiuroid *Ophiocreas oedipus* only on the coral *Metallogorgia melanotrichos* (Figure 2).

Paleoclimate studies, using water mass chemical properties (such as uranium and thorium) recorded in the fossil skeletons of the solitary coral *Desmophyllum dianthus*, have revealed that changes in coral population density coincide with times of large-scale ocean circulation changes in the deep North Atlantic (e.g., Robinson et al., 2007). Corals thus provide excellent records

for understanding the changes in North Atlantic open-ocean circulation through time and the impact these changes have on population connectivity. For example, corals in the northern North Atlantic prospered during past interglacial periods and in particular throughout the past 11,000 years, yet apparently disappeared during glacial times (above 50°N). In contrast, corals in the temperate North Atlantic were sustained during glacial times.

All of the studies noted above postdate intense fishing practices in the 1970s and 1980s, which caused extensive seafloor damage due to trawl fishing (Figure 3; Waller et al., 2007). Reports indicate that ~ 20,000 tons of fish (175 species, predominantly *Alfonsino*) were removed from the Corner Rise seamounts from 1976–1996 (Vinnichenko, 1997). However, in a precautionary management measure, 13 fishable seamounts, including 25 peaks shallower than 2000 m on the New England and Corner Rise seamounts (Figure 1), were closed to demersal fishing gear beginning January 1, 2007. This closure is scheduled to be lifted on December 31, 2010. Future knowledge of the connectivity of deep-water corals and their associates will provide fundamental insights into coral habitat dependence and “co-connectivity,” and can be used to inform and guide effective management and protection of diverse and valuable cold-water resources in our deep ocean.



Figure 1. Map of the North Atlantic locating the New England and Corner Rise seamounts. Yellow boxes indicate regions protected by North Atlantic Fisheries Organization closings due in large part to damage from bottom-trawling fisheries activities.

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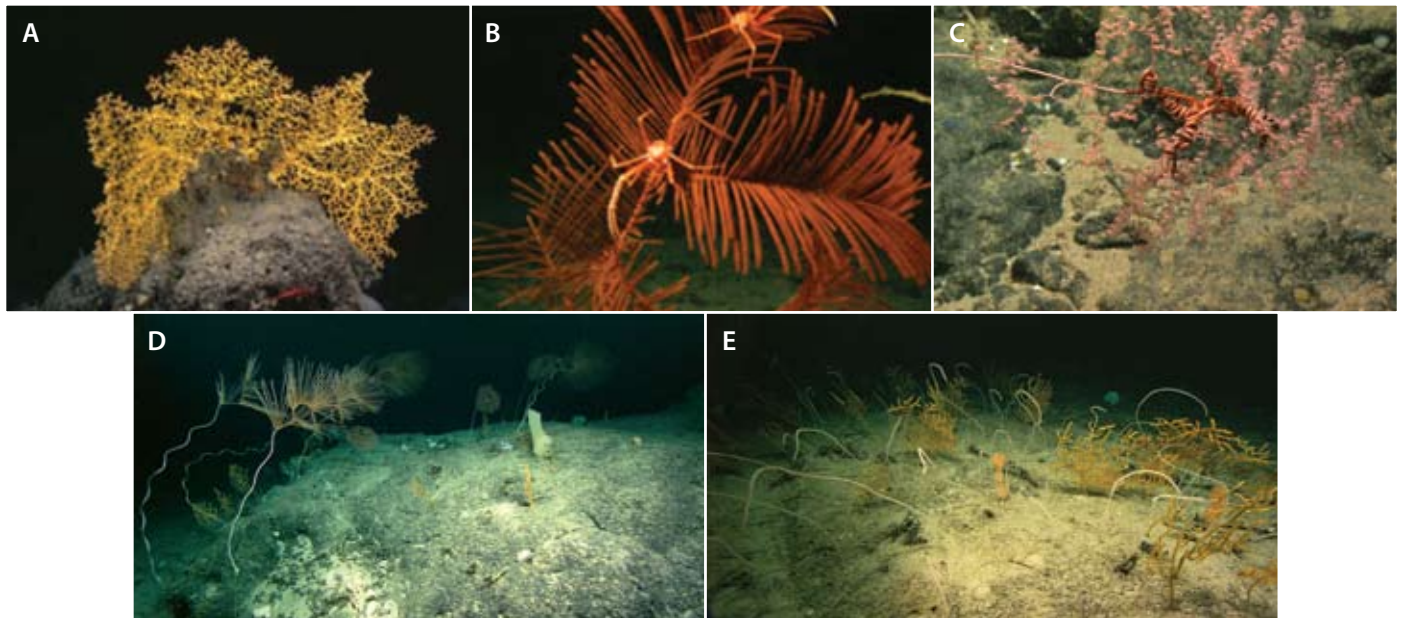


Figure 2. Characteristic features of the New England and Corner Rise seamounts. Habitat-forming coral ecosystems support diverse invertebrate associations on the New England and Corner Rise seamounts, including (a) ophiuroids, shrimp, hydroids, and galatheid crabs associated with the scleractinian *Enallopsammia* on Lyman Seamount (1450 m), (b) chyrostylid crabs on the antipatharian *Plumapathes* on Küenthal Seamount (915m), (c) *Ophiocreas oedipus* ophiuroid wrapped around the coral *Metallogorgia melanotrichos*, (d) spiraling *Iridogorgia* corals along with *Metallogorgia* corals and sponges living on an outcrop on the Corner Rise Seamounts, and (e) a soft coral community of *Paramuricea* sp., *Calyptrophora* sp., and *Chrysogorgia* sp. from Corner Seamount (1220 m).

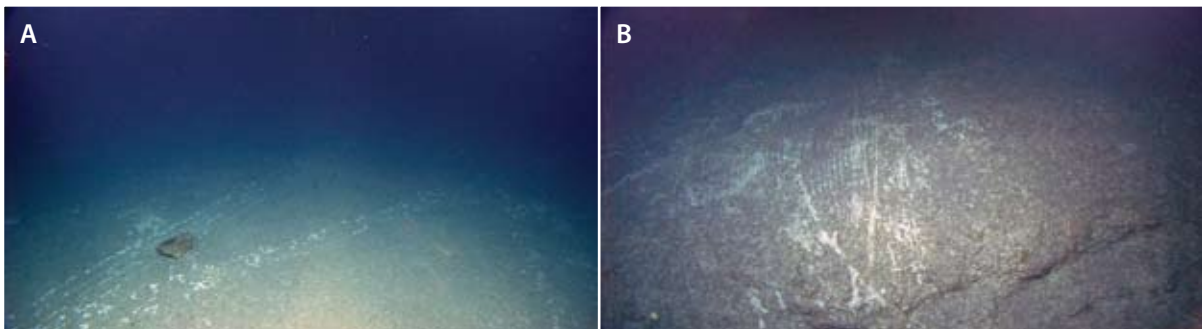


Figure 3. Fisheries damage on the Corner Rise Seamounts. Habitat destruction from years of fisheries activities, now evident by the crisscrossing trails of gear marks on the Küenthal peak on Corner Seamount (725 m), and (b) large scar marks on the edge of the summit of Küenthal peak caused by trawling gear impact with the seafloor.

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