

## Chapter 21

# **The depths of ignorance: an ecosystem evaluation framework for seamount ecology, fisheries and conservation**

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### **Abstract**

Seamounts are some of the least known habitats on the planet. Indigenous people and early navigators knew of some of them, but we are only just finding out that there may be 100 000 large seamounts and up to a million smaller features. Seamounts are steep-sided underwater volcanoes with a geological life history. The physical characteristics can generate upwelling of nutrients, the formation of density cones or the retention of water masses. These hydrological phenomena may lead to local enhancement of primary production. However, a more important mechanism appears to be the trapping of small migrating organisms, both zooplankton and mesopelagic organisms, over the summit and flanks, depending on the depth of the peak. As a result, larger mobile sea creatures visit seamounts to feed on the concentrations of small organisms. Species of seabirds, sharks, tuna, billfish, sea turtles and marine mammals can aggregate at seamounts to 'raid the larder', and sometimes to spawn. Seamount biota, especially fishes but also corals, present an attractive target for human exploitation. Small-scale artisanal fisheries from oceanic island chains have for generations taken advantage of life on nearby seamounts, and have proven sustainable over long periods. Large-scale fisheries, in contrast, have a poor record of sustainability, often causing serial and serious depletion of fish on seamounts. Unregulated distant water fleets overexploited many high seas seamount areas in the 1970s and 1980s, and catch data from this period is only now being fully assembled and analysed. Trawl gear destroys delicate and long-lived benthic organisms such as cold water corals and sponges. Seamounts need some protection from trawling and other fishing, and rational management if they are to provide sustainable fisheries as well as serve as reservoirs of abundance and biodiversity; 'islands in the deep'. We present a two-part ecosystem evaluation framework (EEF) for seamounts by pulling together information from the preceding chapters. Part A scores the extent of our knowledge about individual seamounts: a more detailed version might express the extent of local enhancement of biomass and biodiversity. Part B assesses the severity of a range of threats, mainly from human fisheries, to the abundance and diversity of living organisms found at individual seamounts.

Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan N. and Santos, R.S. (2007) The Depths of Ignorance: An Ecosystem Evaluation Framework for Seamount Ecology, Fisheries and Conservation. Chapter 21. Pp 476-488 in Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan, N. and Santos, R.S. (eds) *Seamounts: Ecology, Conservation and Management*. Fish and Aquatic Resources Series, Blackwell, Oxford, UK.