



Qualitative Model of Glomar Shoal Key Ecological Feature: North-west Marine Region

Introduction

Key ecological features (KEF) are elements of the Commonwealth marine area that are considered to be of regional importance for the biodiversity or ecosystem function and integrity of that region. Nationally, there are 56 KEF's identified in marine bioregional plans. Glomar Shoal KEF is located within the North-west Marine Region and is considered representative of shallow water terrace habitats of the outer shelf that attract aggregations of marine life.

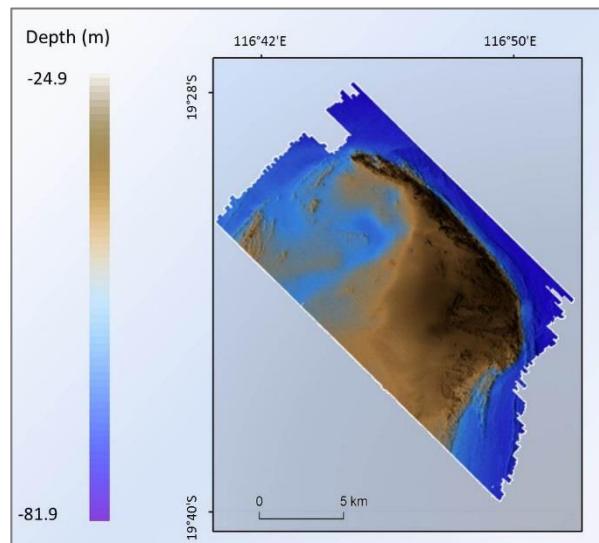
This fact sheet presents a preliminary qualitative model for the Glomar Shoal KEF, based on new knowledge of the benthic and pelagic environments.

Environmental Setting and Conservation Values

The Glomar Shoal KEF is valued primarily for its biodiversity, but also its productivity, which supports fish species important to both commercial and recreational fisheries. Located on the tropical northwest shelf and covering an area of 770 km², the shoal rises from 75 m to 30 m water depth and is characterised by mixed substrates of carbonate hardground and sediments composed of coarse shelly sand and gravel.

The presence of hard substrates on rock provides habitat for sessile benthos including hard corals, foliose corals, filter feeders (sponges and octocorals), coralline algae and macroalgae. The branching corals, macroalgae and filter feeders provide habitat and food resources that are critical for demersal fishes and also populations of sea snakes. The quality of demersal fish habitat is also enhanced by the uneven seabed topography.

Populations of demersal fishes are prey to an array of pelagic and demersal fish predators, the latter of which are targeted by recreational fishers. Glomar Shoal is an important feeding area for green turtles, which consume macroalgae, and hard shell and flat back turtles, which consume benthic filter feeders.



In general, the surface waters of the Northwest Shelf are low in nutrients, but it is thought that tidal fronts and internal waves periodically deliver pulses of nutrients that are important to plankton production. This productivity is important to populations of filter feeders, pelagic fishes, and possibly also whale sharks (though the importance of local plankton productivity to whale sharks remains a topic for further research).

This region of the Northwest Shelf experiences high cyclone activity that can lead to strong wave and current energy that is especially destructive to populations of foliose coral and branching hard corals. However, storm damage is generally limited to corals in less than 30 m water depth. With increasing water depth (beyond about 40 m) there is less available light, which acts to limit the relative abundance of branching hard corals and macroalgae.

Threats

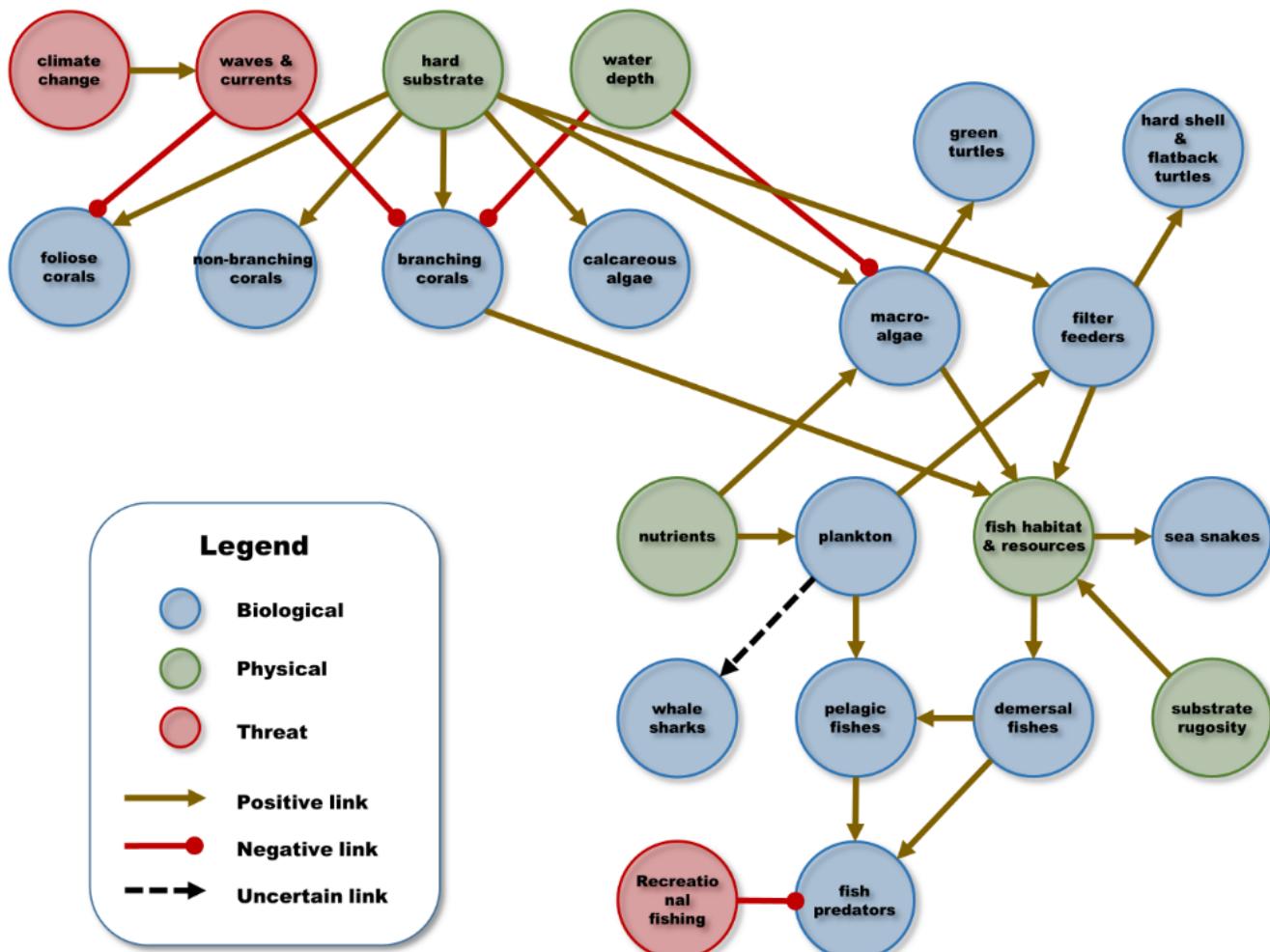
Upon this basic ecosystem structure, two key threats to the Glomar Shoal KEF are considered as being plausible within a 50 year time frame. These include 1) increased storm intensity through climate change, which most strongly affects foliose and branching hard corals, and 2) increased pressure from recreational fishing, which targets the fish predator group in the model.



Qualitative Model

The diagram below shows the generalised relationships and interactions between components of the Glomar Shoal ecosystem and potential threats to those components. For example, climate change will lead to increased wave and current energy (+ve link) that may damage foliose and branching hard corals (-ve link).

This model and the associated direct and indirect effects of the threats of increased storm intensity and fishing, provides a framework to characterize the general ecosystem dynamics for this KEF, and to suggest potential ecological indicators that are likely to be the most informative for monitoring and management purposes.



Additional Information

Department of the Environment and Energy
<https://www.environment.gov.au/sprat-public/action/kef/search>
North-West Atlas
<http://northwestatlas.org/node/1633>



Marine Biodiversity Hub

National Environmental Science Programme



The NESP Marine Biodiversity Hub is funded by the Australian Government's National Environmental Science Programme. Our goal is to assist decision-makers to understand, manage and conserve Australia's environment by funding world-class biodiversity science.

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Contacts:

Karen Miller

Australian Institute of Marine Science
k.miller@aims.gov.au

Scott Nichol

Geoscience Australia
scott.nichol@gc.gov.au