

Recovery of seagrass impacted by artificial shelters used in Caribbean Spiny Lobster fisheries

Recuperación de pastos marinos afectados por refugios artificiales utilizados en pesquerías de langosta espinosa del Caribe

Rétablissement des herbiers marins touchés par les abris artificiels utilisés dans la pêche à la langouste des Caraïbes

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EXTENDED ABSTRACT

The Caribbean Spiny Lobster (*Panulirus argus*) fishery is one of the most valuable fisheries in the Caribbean region and the only industrial-scale fishery in The Bahamas, responsible for the country's primary commodity export. In the last decade, this fishery has been awarded Marine Stewardship Council certification as a sustainable fishery; however, impacts and interactions between the fishery and wider environment remain to be quantified (Higgs, 2016a). In particular, there are several outstanding questions as to the function and ecological impacts of the artificial shelters used in the fishery, known as condos.

Of particular concern is the potential impacts on seagrass beds that support much of the fishery (Higgs et al., 2016b). This is especially important, given the prominent role of seagrass habitats as a reservoir of 'blue carbon' in The Bahamas and its economic significance for the country's carbon credit scheme. We conducted an experiment to replicate the impact that 'condo' type shelters have on seagrass habitats, where they are typically deployed by fishers.

Artificial shelters, also known as condos, were constructed using a standard design and materials employed in the Bahamian fishery. The shelters consisted of a sheet of corrugated, galvanised aluminium 1.2 m wide and 2.4 m long, which had a 2.4 m length of pressure-treated marine grade timber (2" x 6") nailed along each of the long sides. Twelve shelters were deployed across dense seagrass habitats in the vicinity of the Schooner Cays, off south Eleuthera, The Bahamas. The shelters were left in place for 3 months before being moved to simulate fishing activity, when fishers slide the shelter to a new patch of seabed each time they fish the shelter. The shelters were subsequently left in place on the new patch for 12 months and then moved again to assess potential longer-term impacts. This created two treatment levels: 3-month and 12-month impact. Multiple aspects of seagrass condition were measured after the shelters were moved, specifically: percentage cover of seagrass, shoot density and canopy height. Measurements were taken at four locations around each shelter: directly under the shelter (0m), at 1 m away, at 3 m away and at 10 m away, the latter distance acting as a control reference for the other measurements.

After being covered by the shelters for 3 months, the seagrass directly under the shelters showed a 100% reduction in seagrass cover with almost bare patches of seabed under the shelter (Fig.1A). Seagrass percentage cover at 1 m and 3 m away were not significantly different from the control. Any seagrass leaves that remained directly under the shelter were approximately 25% shorter than at the control site but again there was no difference in the seagrass at 1 and 3 m distances compared to the control (Fig. 1B). Shoot density did not differ at any of the distances measured from the background control. Periodic measurement of the impacted sites over time showed that by 30 months after the shelters were moved, the sites had recovered with all parameters equal to the control measurements (Figure 1). A similar pattern was observed for the 12 month treatment except that shoot density seems to have been reduced by ~30% under the shelters left in place for the extended period.

This experiment shows that the seagrass under artificial shelters used in the spiny lobster fishery does not necessarily kill the seagrass under the shelter, despite an initial drastic reduction in benthic coverage of seagrass. Rather, the shoots and roots remain alive and connected to the wider seagrass bed via the seagrass rhizome network. The loss of canopy is probably a reaction by the plant to reduced light levels under the shelter. Once the shelter is removed and light levels return, the shoots begin to regrow leaves and recovery to background seagrass coverage occurs within 2 years.

KEYWORDS: Condo, Casita, Crawfish, Bahamas

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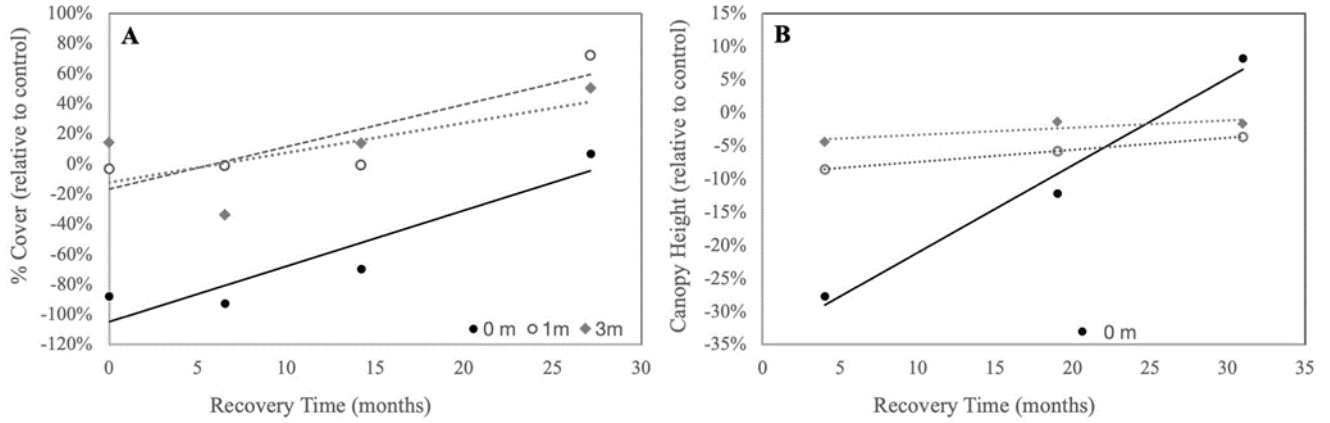


Figure 1. Recovery in seagrass percentage cover (A) and canopy height (B) after the removal of artificial shelters that had been in place for three months. Measurements were taken directly under the shelter at 0 m (solid circles), at 1 m away (open circles) and 3 m away (diamonds) and are expressed relative to values obtained from a control reference point 10 m from the shelter. .