Australian Government
Great Barrier Reef Marine Park Authority

Reef Authority

Stewardship Guides:
Coral predator control

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Coral Predator **Monitoring and Control**

INTRODUCTION

The Great Barrier Reef is among the most biologically diverse and economically valuable ecosystems on the planet, and like many coral reefs it is increasingly under threat.

Among these threats are coral predators, most notably the crown-of-thorns starfish (*Acanthaster solaris*) and marine snails of the *Drupella* genus (*Drupella* spp.). Both feed on coral tissue and can cause significant damage to hard coral cover in outbreak numbers, leading to severe coral loss, reduced reef resilience, and long-term habitat degradation. These predators are native to the Reef, but the cumulative pressure of climate change is exacerbating the severity of their impacts. Of all disturbance events that occur on the Great Barrier Reef, controlling these outbreaks is the most efficient and effective intervention to protect coral cover.

Regular users of the Marine Park such as tourism operators, traditional owner and community groups are uniquely placed to support coral predator control. This is thanks to their frequent site visitation, unrivalled site knowledge, and, in many cases, existing infrastructure. These users also often rely on healthy reef sites for their businesses and communities, so integrating predator management into regular operations helps protect the ecosystems they depend on while contributing to broader Reef protection efforts.

This document provides practical guidelines for designing effective coral predator control programs on the Great Barrier Reef, covering planning, training, reporting, and collaboration. Whether responding to a local outbreak or proactively maintaining reef health, the steps below aim to support effective, consistent, and ecologically responsible action.

This document should be used in conjunction with the **Crown-of-thorns starfish control guidelines**.

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1

Permits and **reporting**

1.1 Permit requirements



FIGURE 1

Sorting and counting collected ***Drupella*** into size classes for counting and reporting.

01 ***Confirm collection is permitted in your zone.*** Permits allow collection everywhere except Preservation Zones. Permits are typically bundled as a combined permit covering both coral predators.

02 ***Obtain a permit before removing crown-of-thorns starfish or Drupella from Marine National Park (Green) Zones.*** A combined permit covers both species and is issued via the Reef Authority's **online permits portal**.

03 ***Permit holders must ensure all permit requirements*** (including reporting) are adhered to.

1.2 Reporting via Eye on the Reef – Incident

01 ***Coral predator control activities within the Great Barrier Reef Marine Park*** must be reported to the Reef Authority as stated in permit conditions.

02 ***Lodge each activity as an 'Incident' in the Eye on the Reef system***, via **https://eotr.gbrmpa.gov.au/** or the Eye on the Reef app. This includes surveys where no predators are found. In these cases, a 'null sighting' entry must be submitted.

03 ***Submit a 'Zero Value' entry*** when a survey records zero predators.

04 ***Reports must include time spent looking***, total individuals seen, and confirmation if culling has occurred.

05 ***Refer to the the EotR Platform Data Entry guide*** for further guidance.

Reporting provides information for Reef-wide management of these coral predators and is an important tool to assist Marine Park managers in ensuring control programs function at maximum efficiency.

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2

Implementing a monitoring and **control program**

2.1 Overview

Monitoring populations of crown-of-thorns starfish and *Drupella* snails is essential for coral reef health. Regular surveys of these often difficult to find animals can identify hotspots and aid early detection of potential outbreaks.

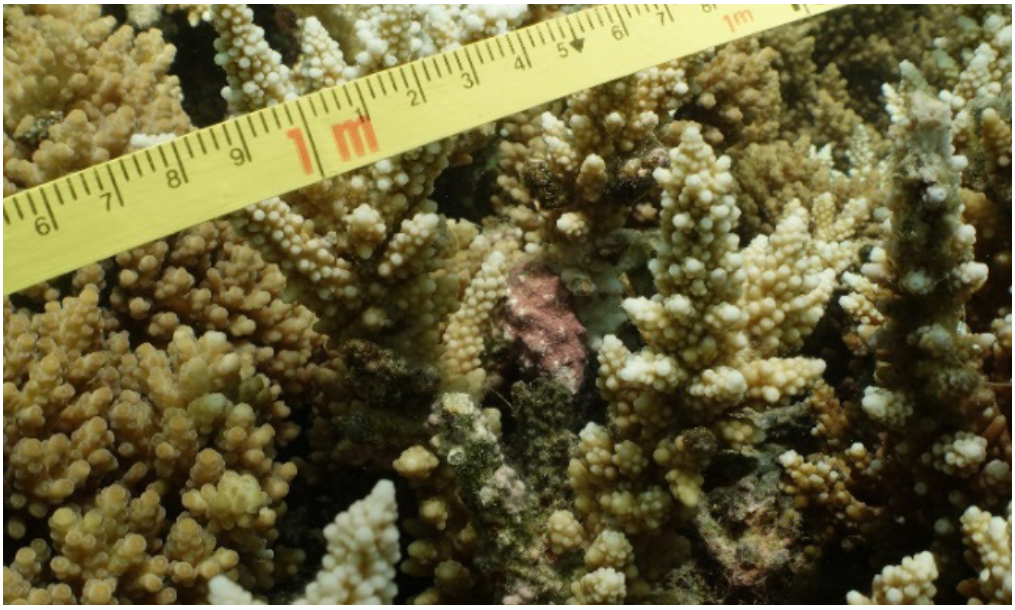

FIGURE 2

A single ***Drupella*** snail under a transect tape.

01 ***Survey crown-of-thorns starfish and Drupella populations regularly to catch outbreaks early.*** Both species are often hard to spot so understanding what a predation scar looks like is vital.

02 ***Focus surveys on areas of high coral cover,*** particularly *Acropora* and *Montipora* species, which both predators prefer.

03 ***Include coral health assessments in each survey*** to track potential impacts. Reef Health and Impact Surveys (RHIS) or Rapid Monitoring surveys are ideal for this.

04 ***Set up a Site Monitoring Plan*** (see Section 2.2) for any site you visit regularly.

2.2 Monitoring and control program design

2.2.1 Approach to defining zones within a Site Monitoring Plan

Effective coral predator management typically requires multiple, methodical passes across the site. To ensure this effectiveness is maximised, it is beneficial to divide the area into smaller, more manageable areas/zones. These zones are usually a distinct area or habitat such as sides of an island or distinct sections of a reef site. By identifying and naming distinct zones, monitoring and control efforts can be systematically applied and ensure comprehensive coverage over time.

01 ***Divide the site into smaller zones*** to keep monitoring and control systematic and repeatable.

02 ***Set zone boundaries using clear features*** such as reef edges, ridgelines, depth changes distinct habitat types (e.g. shallow reef flats vs. deeper reef slopes). Habitat types should also be considered; areas dominated by rubble or live coral with high rugosity may provide distinct boundaries and will influence species distribution and control effort required. Man-made markers such as moorings and snorkel stations can also serve as reliable reference points when defining zones.

03 ***Size each zone to match what teams can safely and effectively access*** during standard weather and environmental conditions, and any other operational factors

04 ***Map and label zones*** (using Google Earth or similar software) and record their key reference features (such as in-water references for zone boundaries).

05 ***Communication and training of in-water team members*** with regards to the layout of each zone within a site boundary will help ensure consistent application and improve overall control efforts.

06 ***Monitor each zone in a fashion that rotates between each identified zone*** and utilises search patters that suit each habitat within the zone.

07 ***Keep records of which zones have been surveyed*** and the outcomes of the monitoring activities to establish a baseline understanding of the population at the site.

08 ***Monitoring for Drupella should occur over a period of time*** to ascertain whether aggregations naturally dissipate. Particular species, *Drupella rugosa* or *fragum*, can naturally aggregate in large numbers.

09 ***Predator control or culling efforts can be coordinated based on the knowledge gained from the monitoring activities*** enabling targeted effort to be focused on smaller areas within zones with higher predator populations or those that exhibit signs of reinfestation.



FIGURE 4

Example of predator control zones covering different aspects of a fringing reef in a large bay area.

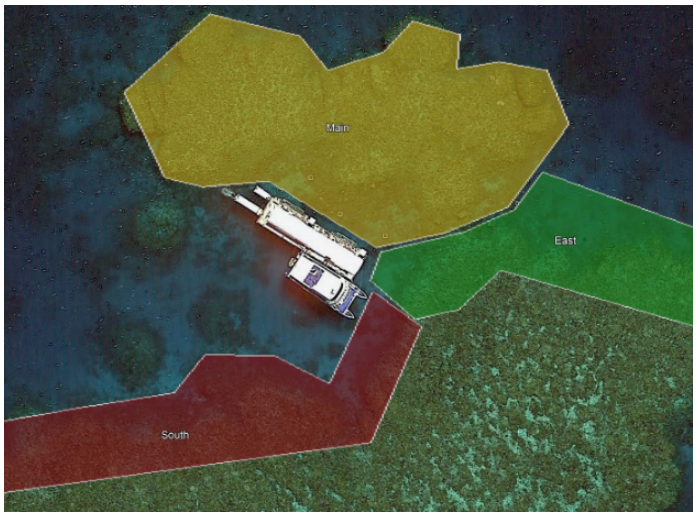

FIGURE 5

Example of predator control zones at a fixed structure Reef site.

Both examples show large sites split into three zones around a fixed reference point (a mooring or pontoon). Each zone needs multiple visits to monitor fully and benefits from further, smaller target areas for control.

2.2.2 Approach implementing a structured monitoring and control plan

When implementing a control plan, it is highly recommended to make use of a search pattern when conducting a swim to monitor and control predator populations. The exact search pattern may be dependent on the site however parallel band/belt transects are an excellent method to employ at most sites.

01 ***Use parallel belt transects spaced 5-10 m apart*** as a default search pattern, adjusting to suit the site.

02 ***Lay a tape measure across the reef*** for the most accurate transect reference.

03 ***Swim a zigzag across the transect area,*** briefly focussing on each coral colony to check for scarring.



FIGURE 6 Example diagram of a search pattern employed in a lagoon habitat.

04 ***Surveyors should move slowly along the path,*** ensuring they are slow enough to properly survey corals, as even large populations can be easily missed if rushed.

05 ***Inspect any 'recently dead' coral for predators,*** even where another cause such as disease is suspected. Predators can be present as a disease vector. Predators may still be present and can often be the vector through which diseases enter coral tissue.

06 ***Check for feeding scars.*** White patches indicate recent impacts, whereas a film of algae indicates an older scar. Thoroughly inspect the area around any scar found, including the underside and base of corals.

07 ***Identifying scarring and locating coral predators is a learned skill.*** With time, and dedication to proper technique, crew can become highly proficient locators of both predators.

08 ***Increase frequency of removal*** if a large population or outbreak is detected.

09 ***Where possible, weekly swims of an area*** ensure that changes in population are noticed early. Where numbers are not as high, monthly monitoring and the occasional removal is recommended.

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Predator **control**

3.1 Crown-of-thorns starfish control (adult)



FIGURE 8 A diver uses specialised equipment to deliver an injection to a crown-of-thorns starfish

01 ***Cull adult and sub-adult crown-of-thorns starfish via injection.*** Injecting vinegar or other solutions as detailed in the ***Crown-of-thorns starfish control guidelines***.

02 ***If injected, the animal can be left in place*** in the environment.

03 ***Injection kits are available to purchase*** through the Association of Marine Park Tourism Operators (AMPTO).

3.2 Crown-of-thorns starfish juveniles and *Drupella* collection

Drupella and juvenile crown-of-thorns starfish can be treated similarly. Due to their small size, juvenile crown-of-thorns starfish are often not able to be euthanised via injection and should be collected.



FIGURE 9 Long entomology forceps are useful for easy ***Drupella*** snail and juvenile crown-of-thorns starfish extraction.

01 ***Extract animals carefully using forceps, tweezers, or tongs*** to protect both the collector and the coral.

02 ***Store collected Drupella*** in mesh catch bags, screw-top containers, or Velcro pockets.

03 ***Store crown-of-thorns starfish only in a hard container,*** to prevent contact with venomous spines.

3.3 Crown-of-thorns starfish juveniles and *Drupella* disposal

3.3.1 *Drupella shells*

01 ***Euthanise Drupella by freezing.*** Place the snails in a sealed container and freeze them for a minimum of 24 hours ensures they are effectively euthanised.

02 ***Alternatively, submerge in freshwater.*** it should be noted that *Drupella* can survive for long periods of time in freshwater and an appropriate amount of time should be given to ensure successful euthanasia and prevent accidental re-introduction to the marine environment

03 ***Return empty shells to the reef,*** spread across the habitat, to provide shelter for other marine life such as hermit crabs.

04 ***Alternatively, dispose of live snails in deep water*** away from coral reefs, or seal in a container for disposal on land.

3.3.2 *Juvenile crown-of thorns starfish*

In the case where crown-of-thorns starfish are too small to be injected in-situ, removal and submersion in freshwater is a viable alternative for smaller animals.

01 ***Submerge animals too small to inject in freshwater to euthanise,*** then return them to the marine environment.

02 ***Leave any animal large enough to inject in place,*** and euthanise as stated in section 3.1 following the process detailed in ***Crown-of-thorns starfish control guidelines***

Juvenile crown-of-thorns starfish are significantly harder to locate than their adult counterparts and basic predator control surveys are unlikely to locate the majority of juveniles that are present at a site. To effectively impact the juvenile population, fine-scale surveys conducted by trained professionals are required. This guide is designed to help reef users get started in coral predator management, and does not cover the more advanced fine scale survey and control methodologies.



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