



# Pacific Invasive Species Battler Series



## BATTLE INVASIVE SPECIES THAT THREATEN MARINE MANAGED AREAS



**SPREP**  
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Secretariat of the Pacific Regional Environment Programme (SPREP)

PO Box 240  
Apia, Samoa  
sprep@sprep.org

www.sprep.org

*Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures*

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Cover Photo: Posa Skelton

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## Dear Invasive Species Battler,

We are a diverse bunch of people in the Pacific region, which spans a third of the earth's surface and encompasses about half of the global sea surface. We have ~2,000 different languages and ~30,000 islands. Pacific ecosystems are one of the world's biodiversity hotspots, with a large number of species found only in the Pacific and nowhere else. In fact, there are 2,189 single-country endemic species recorded to date. Of these species, 5.8 per cent are already extinct or exist only in captivity. A further 45 per cent are at risk of extinction. We face some of the highest extinction rates in the world.

The largest cause of extinction of single-country endemic species in the Pacific is the impact of invasive species. Invasives also severely impact our economies, ability to trade, sustainable development, health, ecosystem services, and the resilience of our ecosystems to respond to natural disasters. Fortunately, we can do something about it.

Even in our diverse region, we share many things in common. We are island people, we are self-reliant, and we rely heavily on our environment to support our livelihoods. We also share many common invasive species issues as we are ultimately connected. Sharing what we learn regionally benefits us and our families economically, culturally, and in our daily lives. The "Invasive Species Battler" series has been developed to share what we have learned about common invasive species issues in the region, with information and case studies that can assist you to make a decision about what to do next or where to go for further information.

The SPREP Invasive Species Programme aims to provide technical, institutional, and financial support to regional invasive species programmes in coordination with other regional bodies. We coordinate the Pacific Invasive Learning Network (PILN), a network of practitioners battling invasive species, and the Pacific Invasives Partnership (PIP), the umbrella regional coordinating body for agencies working on invasive species in more than one Pacific country.

For knowledge resources, outreach tools, and more information on SPREP, the Invasive Species Programme, PILN, and PIP, please visit the SPREP website: [www.sprep.org](http://www.sprep.org)

Thank you for your efforts,  
SPREP Invasive Species Team



### About This Guide

Marine invasive species have received much less attention than terrestrial species worldwide. In the Pacific, the marine environment provides us with a significant part of our diet and income. Marine Managed Areas focus on protecting these important resources for livelihood purposes, biodiversity and ecosystem function, tourism, and many other benefits. Although invasive species management is more difficult in the marine environment, it is not something we can neglect, and the efforts we put in need to increase. This guide seeks to provide some options for this management. Special thanks to Anne Haas, who completed an internship with the SPREP Invasive Species Programme from Yale University in 2015, for completing the literature review and creating the text for this guide.

## What is wrong with marine invasive species?

Invasive species pose great threats to native species in the Pacific and are responsible for the extinction of more native species than any other cause (Kraus and Duffy 2010). Increased trade and transport introduce non-native species to the Pacific Islands in greater numbers than ever before (see Hulme 2009), resulting not only in severe ecological impacts but also in economic impacts on production, tourism, and trade. The threat is exacerbated by the limited human, material, and financial resources available to small island states to prevent and manage invasive species.

Marine invasive species—including marine algae, fish, invertebrates, and pathogens—are widely recognised as a major cause of marine biodiversity loss worldwide (Molnar et al. 2008). Marine invasive species are spread throughout the Pacific along a number of pathways, including commercial cargo, fishing and cruise ships, recreational boats and gear, and marine debris.

These invasives represent a growing problem due to their unprecedented rate of introduction and their harmful impacts on the environment, economies, and human health. Pacific islanders depend on healthy oceans for food, transport, traditional practices, and economic opportunity.

Therefore, marine invasive species pose a constant and costly threat, not only to the region's native ecosystems but also to Pacific islanders' livelihoods and quality of life.



### Harmful impacts on:



Environment



Economy



Culture



Human health



Photo: Invasive Crown of Thorns (COT) starfish and damaged coral reef.

© Division of Environment & Conservation (DEC), Ministry of Natural Resources and Environment (MNRE) Samoa.

## Marine invasive species in Marine Managed Areas

Marine Managed Areas (MMAs), including everything from national Marine Protected Areas (MPAs) to community level Locally Managed Marine Areas (LMMAs), are important tools for counteracting threats to the environment, such as climate change, high population growth, and economic development.

MMAs provide sanctuaries for marine species and protect, conserve, or otherwise manage particular resources or uses. They can, among other things, protect vulnerable species from fishing, maintain the biodiversity of natural communities, and facilitate ecosystem recovery after natural disturbances (Roberts and Hawkins 2000).

Given the often high ecological value of MMAs, invasive species can have devastating impacts, particularly when management is unprepared for them. Invasive species are easily carried into MMAs by currents or aboard a number of vectors. In some cases, the creation of an MMA can increase the risk of invasion by encouraging marine tourism and recreation, including recreational boating, yachting, diving and snorkelling, and, when allowed, fishing (Burfeind et al. 2013).



Photo: Stuart Clappe

## Who should I involve?

Education and outreach efforts will help to increase awareness of the existence and environmental and economic impacts of marine invasive species in MMAs. By targeting those industries and user groups that may serve as invasive species pathways and vectors, education and outreach efforts could be directly effective in preventing the introduction and spread of marine invasive species into and within MMAs. By including local communities, clubs, schools, and water users in marine invasive species management in MMAs, these groups become advocates for increased efforts against marine invasive species.



### Outreach tasks should include the following:

- 1 Develop methods to evaluate the success of outreach and education efforts and assess the effectiveness of current awareness campaigns (see the guide 'Campaign to Battle Invasive Species').
- 2 Develop, display, and distribute targeted printed materials for specific industry sectors and MMA users who are potential pathways for the introduction and spread of invasive species into and within the MMA.
- 3 Promote the value of native species for trade, purchase, and cultivation through the use of educational displays and materials for the public and industry specialists.
- 4 Support efforts to increase awareness of invasive species outside of the MMA, such as public service announcements and educational displays at airports and boat launches.
- 5 Develop presentations for the public and integrate invasive species educational efforts into local and cultural events to increase awareness within the community of the impacts and status of marine invasive species.
- 6 Target policymakers and legislative staff and identify sponsors likely to support policy issues regarding marine invasive species.
- 7 Keep legislators and decision makers abreast of the threats, impacts, and status of marine invasive species.
- 8 Encourage community members to address decision makers regarding their concerns about marine invasive species.



# How can I prevent introductions and spread of invasive species?

New introductions of marine invasive species can be damaging to MMAs, and invasive species, once established, are costly and difficult to control. Prevention is the most cost-effective and ecologically sensitive method of managing invasive species. The primary method for limiting marine invasive species introduction and spread into and within MMAs is the identification and control of potential invasive species pathways and vectors.



## You can prevent introductions on-site

- 1 Identify likely marine invasive species vectors in the MMA and prioritise them based on their risks and impacts.
- 2 Establish protocols (e.g. quarantine procedures or mandatory hull cleaning and inspection) to address priority vectors to reduce the risk of species transfers in the MMA.
- 3 Increase enforcement of any existing protocols intended to control the transport and introduction of marine invasive species into and within the MMA.
- 4 Work with relevant industry representatives and user groups who may serve as potential marine invasive species pathways to increase awareness of the threats of invasive species and to develop methods to better prevent the introduction and spread of marine invasive species into and within the MMA.
- 5 Engage MMA users, such as divers, snorkelers, recreational boaters and fishermen, in preventing the introduction and spread of marine invasive species through the use of educational displays, programmes, and materials.
- 6 Increase awareness of the ecological and economic effects of marine invasive species in areas adjacent to the MMA to reduce spillover effects from surrounding areas.
- 7 Evaluate the feasibility of establishing surveillance programmes to detect introductions and implement fines for MMA users who introduce marine invasive species into the MMA via fouling and other pathways.
- 8 Implement and enforce surveillance programmes and fines.



**Prevention is the most cost-effective and ecologically sensitive method of managing invasive species**



Photo: Coral reef survey, Palolo Deep, Samoa © Posa Skelton



Photo: Cleaning the hull of MV Hanna, Palau. © Joel Miles

Photo: Wise Jock Mai Lum, Wise Commons

## How can I monitor and detect species early?

Vigilance and regular monitoring are a critical component of an effective marine invasive species management programme.

Regularly monitoring the abundance and distribution patterns of non-native species in the MMA allows managers to detect invasions early, better understand the risk to native species, and identify potential patterns of invasion.

By developing a list of priority species, managers can focus monitoring efforts on those invasive species with the greatest potential impact.

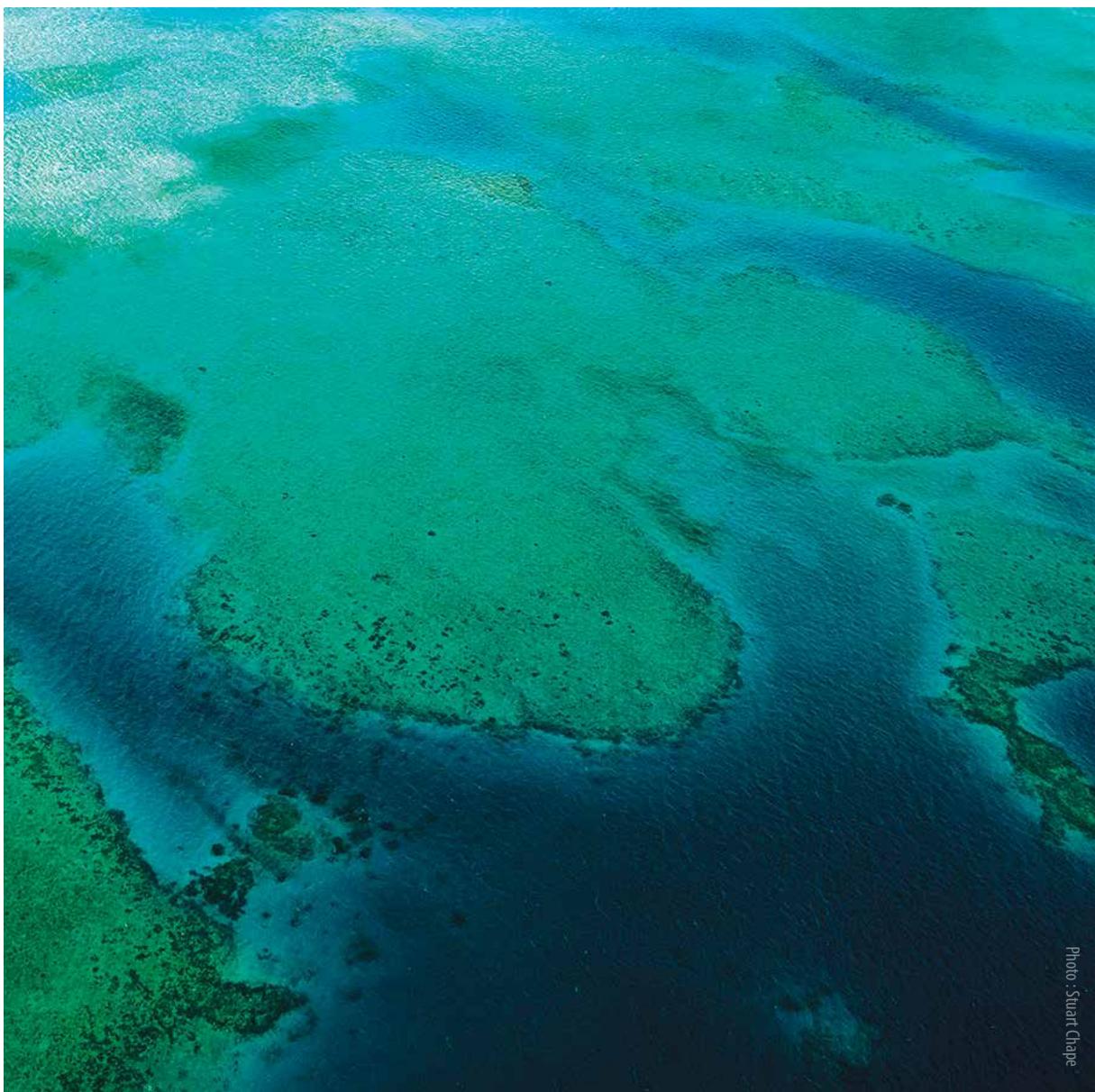


Photo: Stuart Chape



## Managers should:

- 1 Conduct surveys to identify and record the distribution of any marine invasive species currently found in or near the MMA.
- 2 Prioritise all invasive species found in or near the MPA according to factors such as invasiveness, potential impact, ease of identification, and/or practicality of eradication.
- 3 Establish detailed monitoring protocols based on science and local knowledge for priority species, including when, where, and how often surveys should be conducted.
- 4 Establish detailed monitoring protocols for the detection of new invaders and identify sampling stations that represent the various habitats, depth ranges, wave exposures, and other conditions found in the MMA.
- 5 Engage in regular surveillance to monitor existing infestations and to detect new marine invasive species within the MMA.
- 6 Increase the number of knowledgeable individuals available to participate in monitoring efforts by establishing and implementing training and action programmes for volunteers, by working with frequent MPA users, and by creating and distributing educational materials with pictures and descriptions of key species.
- 7 Develop a simple reporting system to allow volunteers and MMA users to report marine invasive species sightings.
- 8 Coordinate with other MMAs in the region to implement a standardised marine invasive species monitoring and early warning system.



Photo : MMRP, Samoa

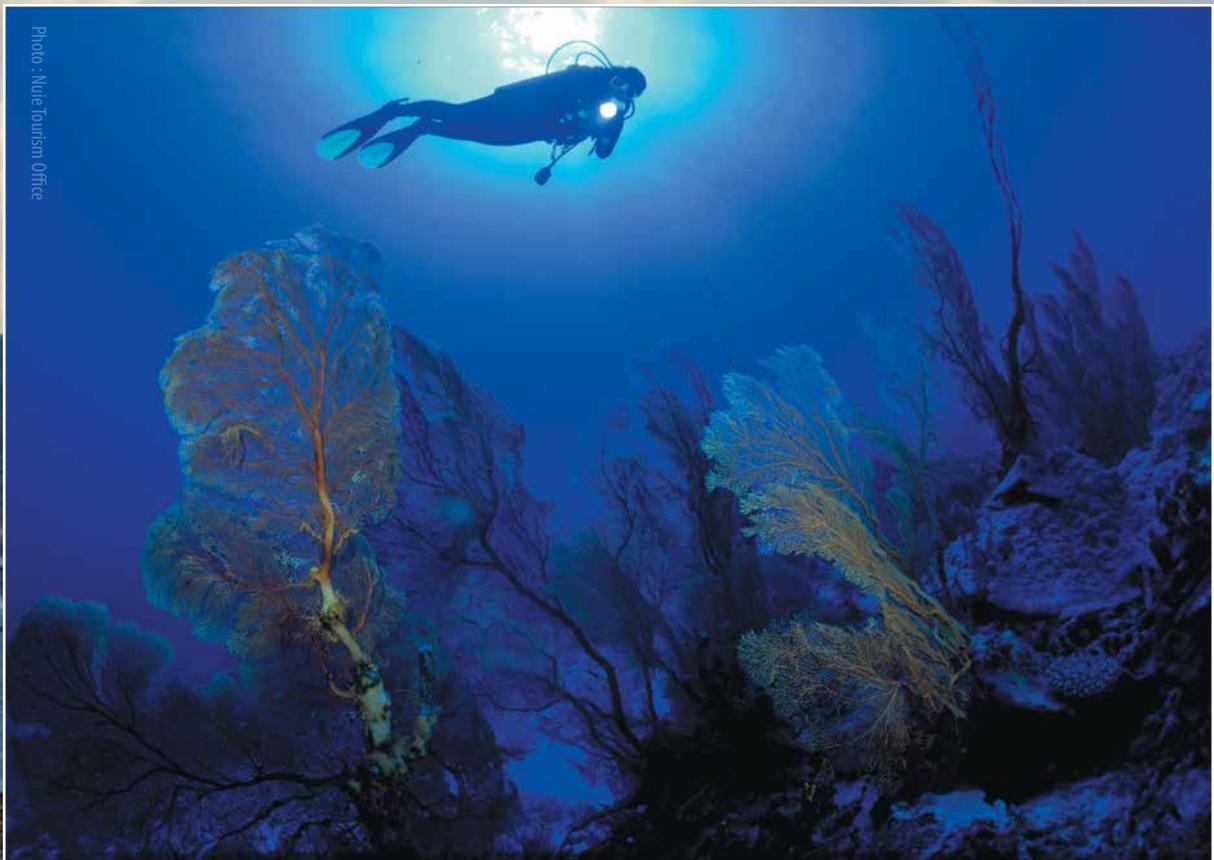


Photo : Niue Tourism Office

# How do I respond to an invasive species?

Once a marine invasive species is established, complete eradication is difficult, if not impossible.

Therefore, a rapid response plan for newly detected invaders is a key component of marine invasive species management in MMAs. Once a new invasive species has been identified, MMA managers must act quickly to control its spread and, ideally, to eradicate pioneering populations.

Where an invader cannot be eradicated, management should focus on using the proper control measures to maintain existing populations at an acceptable level and to prevent further spread.



## Responses include:

- 1 Research and review existing management strategies for priority species from other MMAs, the region, and internationally.
- 2 Develop emergency response plans for priority species, including a management chain of command and appropriate control measures (see the guide 'Catch It Early').
- 3 Identify MMA regulations and restrictions that may impact invasive species eradication and control, such as restrictions on wildlife removal or the use of biocides, and analyse the effect of these restrictions on the ability to effectively control or eradicate priority species.
- 4 Develop an online system for centralised reporting of marine invasive species sightings, verification, and response (see point 7 on p. 9).
- 5 Establish, train, and use a community volunteer network to assist in marine invasive species eradication and control.
- 6 Establish eradication, control, or monitoring. Gaining support for these efforts often benefits from calculating the economic costs of the invasive species (see the guide 'Use Economic Analysis to Battle Invasive Species').





## Where can I benefit from shared knowledge?

MMA managers can benefit by learning and sharing information with other resource managers, experts, and organisations working on marine invasive species issues at the local, national, regional, and international level. Opportunities for improved knowledge sharing, such as online platforms and regular conferences, will allow managers to more easily take advantage of other managers' knowledge and experiences.



### Benefit from shared knowledge

- 1 Identify any community groups, individuals, or organisations associated with marine invasive species management in MMAs in the Pacific.
- 2 Work with identified community groups, individuals, or organisations to identify marine invasive species management priorities so that local, national, and regional resources can be directed to manage the highest-priority marine invasive species in a cooperative and cost-effective manner.
- 3 Improve communication and collaboration among MMAs at the local, national, and regional levels.
- 4 Participate in the development and implementation of regional conferences on the topic of marine invasive species in MMAs in the Pacific.
- 5 Participate in the creation of a centralised communications forum to focus on marine invasive species in MMAs in the Pacific.

The Pacific Invasives Learning Network (PILN) is a network for invasive species practitioners battling invasive species in Pacific countries and territories: see [www.sprep.org/piln](http://www.sprep.org/piln)

## For More Information or Materials

The Battler Resource Base contains information materials and resources for battling invasive species: [www.sprep.org/piln/resource-base](http://www.sprep.org/piln/resource-base)

You can contact the Invasive Species Programme through the SPREP website: [www.sprep.org/Invasive-Species/bem-invasive-species](http://www.sprep.org/Invasive-Species/bem-invasive-species)

### Reports

Burfeind D.D., Pitt K.A., Connolly R.M. and Byers J.E. 2013. Performance of invasive species within marine reserves. *Biological Invasions* 15:17–28.

Global Ballast Water Management Programme and Global Invasive Species Programme (GISP). 2015. Poster: Preventing pests in paradise. Available at: <http://globallast.imo.org/resources/awareness-materials/>

Govan H. 2009. Status and potential of locally-managed marine areas in the South Pacific: meeting nature conservation and sustainable livelihood targets through wide-spread implementation of LMMAs. CRISP Study Report.

Jupiter S., Mangubhai S. and Kingsford R.T. 2014. Conservation of biodiversity in the Pacific Islands of Oceania: challenges and opportunities. *Pacific Conservation Biology* 20:206–220.

Kingsford R.T., Watson J.E.M., Lundquist C.J., Venter O. et al. 2009. Major conservation policy issues for biodiversity in Oceania. *Conservation Biology* 23:834–840.

Kraus F. and Duffy D.C. 2010. A successful model from Hawaii for rapid response to invasive species. *Journal for Nature Conservation* 18:135–141.

Larson D.L., Phillips-Mao L., Quiram G., Sharpe L., Stark R., Sugita S. and Weiler A. 2011. A framework for sustainable invasive species management: Environmental, social, and economic objectives. *Journal of Environmental Management* 92:14–22.

LMMA Network. 2008. Locally-managed marine areas: a guide to supporting community-based adaptive management. Available via <http://pipap.sprep.org/>

Molnar J.L., Gamboa R.L., Revenga C. and Spalding M.D. 2008. Assessing the global threat of invasive species to marine biodiversity. *Front Ecol Environ* 6:485–492.

National System for the Prevention and Management of Marine Pest Incursions. 2010. Australian marine pest monitoring manual, v. 2.0. Commonwealth of Australia.

Roberts C. and Hawkins J. 2000. Fully-protected marine reserves: A guide. Endangered Seas Campaign, WWF-US, Washington DC, and University of York.

South Pacific Tourism Organisation (SPTO). 2014. Pacific regional tourism strategy (draft), 2015–2019.



# Join the Fight

Protect our islands from invasive species



Håfa Adái

Aloha

Mogetin

Rahn Anim

Iokwe

Alii

Kaselehlie Len Wo

Ekawomir Omo

Mauri

Mālō te ma'uli

Halo

Tālofa nī

Halo

Tālofa

Halo

Tālofa

Bonjour

Ni sa Bula Fakaalofa lahi atu

Mālō e lelei

Kia Orana

Ia Orana  
Bonjour

Hello

Kia Ora

