

# Marine biosecurity toolkit: Sampling guidance

## Document C

This document provides sampling guidance for rapid marine assessments performed in the field to detect new marine non-indigenous species (NIS) across the Pacific islands and territories. It provides links to existing information and resources to help support the planning of sampling activities. The protocols below have been broadly based on Rapid Assessment Survey (RAS) protocols that have been utilised by numerous researchers and citizens internationally (Campbell et al. 2007).

Identification of a new marine NIS could occur through planned pre-emptive measures such as systematic checks, regular surveys of high-risk areas such as ports or marinas or discovery by chance. Taking a precautionary approach to prevent the establishment of marine NIS through early detection is encouraged, as once a marine NIS is established, eradication can prove costly and difficult. Early detection will also result in a more cost-effective response and a lower impact on native biodiversity and the economy.

### Scope

This document describes sampling that can be conducted during existing monitoring activities (such as other biodiversity surveys) are carried out. It is in the form of rapid assessments and opportunistic sightings, rather than presenting a comprehensive monitoring strategy. These surveys are based on qualitative sampling methods; that is, sampling that is not restricted to a specific sample area and does not always need to collect organisms and is more haphazard in nature.

This guidance covers three scenarios:

- ports and marinas (Massachusetts Office of Coastal Management 2011)
- rocky shore intertidal zone (Massachusetts Office of Coastal Management 2011) , and
- roving dive surveys (Rassweiler et al. 2020)

Although the sampling protocol for ports and marinas is also relevant to taking samples from a vessel's hull, detailed guidance on undertaking assessments of vessel biofouling is provided within the wider biosecurity toolkit (Document A).

Rapid assessments of marine NIS can be carried out by a range of people in a variety of settings, including staff in ports or scientists surveying shorelines. These assessments are a form of specific surveillance where the objective is to rapidly develop a list of species (or NIS) in an area (Cohen 1999; Cohen et al. 2005; Ashton 2006; Simberloff 2014; Magaletti et al. 2018). Sightings of marine NIS may also be opportunistic encounters by government, non-governmental organisations (NGOs), academic and citizen scientists. Chance sightings could occur whilst staff are conducting shoreline and harbour biodiversity monitoring, during recreational dives by SCUBA divers (Scyphers et al. 2015), or potentially by members of the public who are outdoors on the coast. In all cases, the potential marine NIS can be identified using the species ID guides provided within this toolkit (Document D) in case a rapid response is needed, and if possible, confirmation of taxonomic identification by an expert. A data sheet is provided in Appendix 1 for recording the presence of marine NIS under any of the scenarios presented below.

This guidance does not provide information on delimiting surveys or rapid responses that may be required, but within the toolkit there is guidance on potential management strategies and mitigation measures.

## Rapid Assessment - ports and marinas

Ports and marinas are ideal locations for surveying as they are often the first place marine NIS occur. They also contain an abundance of artificial structures to which marine NIS can attach such as pontoons and vessels. Ports and marinas are also very accessible, and often easier to monitor than open water because artificial structures such as ropes can be pulled to the surface. Additionally, specific hull assessments can be conducted on vessels whilst securely anchored in port (see Document A). Although the focus of the protocol below is that of monitoring the whole port and marina, it can also be applied if undertaking vessel hull assessments and the requirement arises to also record data and undertake sampling.

### Site selection

Prioritise monitoring the most heavily used ports and marinas because there is a higher chance of finding marine NIS.

Monitoring multiple sites over time, allows for the investigation of spatial distribution and spread.

### Protocol

- Safety – monitor in pairs and beware of vessels (both stationary and in transit, if this is a controlled area, permission may need to be granted from the owner/operator).
- Supplies – ID cards, data sheet, camera, boat hook, thermometer, refractometer.
- Record site name.
- Record GPS coordinates and take picture of site.
- Record date, time, and weather.
- Record site description, including the number of boats as this may increase likelihood of the presence of marine NIS.
- Put thermometer 15 cm below water for one minute and record water temperature if possible - optional.
- If possible, record salinity with refractometer - optional.
- If the port or marina is small then monitor whole area, if this is not possible then monitor samples in different locations across the whole port or marina.
- Inspect submerged areas of floats and ropes and natural substrata, using a boat hook if needed.
- For each species (refer to Document D in the Biosecurity Toolkit) record presence/absence on the data sheet.
- If possible, take a photo of the species and record the image reference number on the data sheet - optional.
- If observers are confident that they have correctly identified a marine NIS, a specimen can be taken and preserved in alcohol or by freezing (if possible, by following the guide in Appendix B). The specimen reference number should be recorded on the data sheet - optional.
- If observers are familiar with the eradication protocol for the species, measures can potentially be taken if legal.

## Rapid Assessment - rocky shore intertidal zone monitoring

Rocky intertidal zones are a good location to monitor due to visibility of benthic species at low tide. Additionally, they can be combined with other biodiversity surveys in the area.

### Site selection

Select rocky shore sites that are accessible at low tide.

### Protocol

- Safety – monitor in pairs.
- Supplies – ID cards, data sheet, thermometer, refractometer, camera.
- Record site name.
- Record date, time, weather.
- Record GPS coordinates and take picture of site.
- Record site description, including the habitat types present.
- Put thermometer 15 cm below water for one minute and record water temperature if possible - optional.
- If possible, record salinity with refractometer - optional.
- Walk lengths of the search area systematically searching for marine NIS.
- For each of your species, record presence/absence on the data sheet.
- If possible, take a photo of the species and record the image reference number on the data sheet - optional.
- If observers are confident, they have correctly identified a marine NIS, a specimen can be taken and preserved in alcohol or by freezing (if possible, by following the guide in Appendix B). The specimen reference number should be recorded on the data sheet - optional.

## Roving dive survey

Species occurring in open water at greater depths can be surveyed using the roving diver technique. This technique can be conducted with SCUBA and allows more time to be spent looking for species than during traditional underwater transects. Additionally, volunteers can conduct the surveys as they go about their regular dives.

### Site selection

Not specific.

### Protocol

- Record dive site and GPS location of boat.
- Search time will be the same as the length of a regular dive and is limited by safe diving considerations.
- Safety - dives should be conducted in pairs.
- Supplies – ID cards, data sheet on slate, underwater camera, dive equipment.
- Opportunistic sightings of potential marine NIS should be recorded on a slate.
- For each species (refer to Document D) record presence/absence on the data sheet.
- If possible, take a photo of the species and record the image reference number on the data sheet - optional
- If observers are confident that they have correctly identified a marine NIS, a specimen can be taken and preserved in alcohol or by freezing (if possible, by following the guide in Appendix B).. The specimen reference number should be recorded on the data sheet – optional



## References

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## Appendix B Concentrations and substances for preserving specimens

<b>Taxon</b>	<b>Sorting groups</b>	<b>Taxon code</b>	<b>Fixative and/or preservative</b>	<b>Concentration</b>
<b>Algae</b>	Algae	AG	Formalin and dry	5%
<b>Ascidians</b>	Colonial ascidians	AN	Formalin 10% or ethanol 100%	
	Solitary ascidians	AN	Ethanol	100%
<b>Bryozoa</b>	Bryozoa	BR	Ethanol	100%
<b>Crustacea</b>	Amphipods, Barnacles, Crabs, Isopods, and other decapods	AM	Ethanol	80%
<b>Cnidaria</b>	Ctenophores	CN	Formalin	10%
	Hydroids, hard and soft corals	HY	Ethanol	100%
	Sea anemones	SN	Formalin	10%
	Jellyfish	JF	Formalin	10%
<b>Echinoderms</b>	Sea stars, brittle stars, sea cucumbers	BS	Ethanol	100%
<b>Fishes</b>	Fishes	FH	Formalin	10%
<b>Molluscs</b>	Bivalves and Gastropods	BV	Ethanol	100%
	Other molluscs (with shell i.e., chitons, limpets)	MU	Ethanol	100%
	Other molluscs (no shell i.e., sea slugs, nudibranchs)	MU	Ethanol	100%
<b>Sponges</b>	Sponges	SP	Ethanol 100% or formalin 10%	
<b>Flatworms</b>	Flatworms	FW	Formalin	10%
<b>Worms</b>	Worms	WM	Formalin	10%
<b>Unknown</b>	Unknown	UK	Formalin 10% or ethanol 100%	