



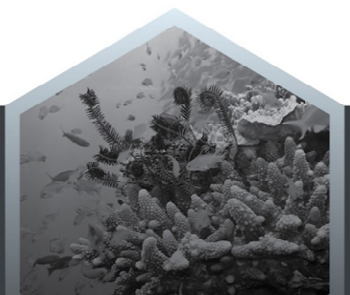
Australian Government

MARINE
PESTS

National Marine Pest Surveillance Strategy

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Nationally agreed guidance material endorsed by the Marine Pest Sectoral Committee



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Marine Pest Sectoral Committee Secretariat
Department of Agriculture
GPO 858 Canberra ACT 2601
Telephone 1800 372 746 (local calls) +61 2 6272 5232 (international)
Email mpsc@agriculture.gov.au
Web marinepests.gov.au.

Disclaimer

This surveillance strategy aims to outline priority requirements for enhancing surveillance of marine pests in Australia, and to improve coordination and implementation of these surveillance activities.

This surveillance strategy is made available on the understanding that the Commonwealth of Australia is not thereby engaged in rendering professional advice. The Commonwealth does not warrant the accuracy, currency or completeness of the guidelines, or their relevance for any particular purpose. In particular, it should be noted that legislation, regulations and by-laws may vary between different jurisdictions and ports in Australia. Consequently, the guidelines do not purport to state what is necessary or sufficient to comply with laws applying in any place.

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Executive summary

The National Marine Pest Surveillance Strategy (the Surveillance Strategy) is a key component of the national plan for marine pest biosecurity, [MarinePestPlan 2018–2023](#) (MarinePestPlan). The Surveillance Strategy outlines priority requirements for enhancing surveillance of marine pests in Australia. It also aims to improve coordination and implementation of these surveillance activities (MarinePestPlan, Activity 2.1).

The Surveillance Strategy identifies four objectives for marine pest surveillance:

Objective 1—to define the need, objectives and scope for surveillance.

Objective 2—to describe the different components and types of surveillance required to meet those objectives.

Objective 3—to outline a nationally agreed approach to marine pest surveillance.

Objective 4—to outline stakeholder roles and responsibilities, including identification of lead agencies for surveillance and communications.

As part of the development of this strategy, fifteen activities were identified as key elements that should be included within the Surveillance Strategy (Table 1). These activities were identified during a 2017 workshop of marine pest experts and government officers, and further refined through discussions with the MPSC Surveillance Strategy Task Group (a subcommittee of the national Marine Pest Sectoral Committee). These activities ensure that the surveillance capability within Australia is enhanced, activities meet objectives, data is managed appropriately and a shared responsibility amongst stakeholders is encouraged. The implementation of the Surveillance Strategy will also support commitments under the Intergovernmental Agreement on Biosecurity (IGAB) and improve marine pest biosecurity for Australia.

It is recognised that resource availability may affect the completion of activities within the term of this strategy; however, activities are flagged for action when resources permit.

For the purposes of this Strategy, surveillance is defined as the collection and analysis of data for the purpose of detecting the presence or demonstrating absence of a marine pest in a given environment.

Table 1 National Marine Pest Surveillance Strategy objectives and activities and corresponding MarinePestPlan 2018–2023 activities

Objective	Activity number	National Marine Pest Surveillance Strategy activity	Corresponding MarinePestPlan 2018–2023 activity
Objective 1 To define the need, objectives and scope for surveillance	1.1	Develop an understanding of factors associated with incursion pathways (including vessels) that may affect likelihood of introduction of marine pests.	MarinePestPlan activity 4.4
	1.2	Relevant authorities to identify priority surveillance locations for marine pests based on outcome of 1.1.	MarinePestPlan activities 2.6 and 2.7
	1.3	Maintain an agreed list of priority pest species for surveillance.	na
Objective 2 To describe the different components and types of surveillance required to meet those objectives	2.1	Develop new and maintain existing surveillance tools and information for priority pest species for use in marine pest management.	na
	2.2	Provide advice on use of surveillance techniques such that methods used across and between jurisdictions are quantifiable.	MarinePestPlan activity 3.5
	2.3	Incorporate guidance for components of surveillance in the Emergency Marine Pest Plan.	MarinePestPlan activity 3.5
	2.4	Ensure validated molecular detection techniques are nationally available for priority pest species.	MarinePestPlan activities 2.4 and 2.5
	2.5	Review and provide guidance on pest distribution modelling techniques that may be used in surveillance programs.	na
	2.6	Facilitate passive surveillance by identifying mechanisms and resources required.	MarinePestPlan activity 2.3
	2.7	Develop and implement a national marine pest surveillance data repository.	MarinePestPlan activity 2.7
Objective 3 To outline a nationally agreed approach to marine pest surveillance	3.1	Develop a national marine pest surveillance work-plan.	na
	3.2	Review marine pest surveillance activities and data sets relevant to Australia.	MarinePestPlan activity 2.8
Objective 4 To outline stakeholder responsibilities including identification of lead agencies responsible for undertaking surveillance and communications	4.1	Identify and engage stakeholder groups (including government) and educate on the importance of marine pest surveillance.	MarinePestPlan activity 2.2
	4.2	Develop and maintain relationships with stakeholders to encourage surveillance, data sharing and early reporting.	MarinePestPlan activity 5.5
	4.3	Support and develop international partnerships, to improve surveillance tools and capability.	na

na No corresponding MarinePestPlan 2018–2023 activity.

Marine pest surveillance

Invasive marine pests are a significant biosecurity risk for Australia. In the same way that introduced pests can cause damage to terrestrial environments, invasive marine pests can seriously negatively affect marine ecosystems. Unfortunately, because most of the impacts are below water, they often go unnoticed until the pest is firmly established and significant impacts to the environment and infrastructure have occurred. If a marine pest becomes established, eradication is unlikely and management is difficult and expensive.

Marine pests have resulted in significant environmental, economic and social impacts throughout the world. Impact on the environment may occur through predation and competition with native marine species, altering natural ecosystems and lowering biodiversity. Marine pests can exacerbate biofouling, smothering structures and environments, resulting in expensive maintenance costs for industry. Marine pests may affect social amenity by depleting fishing grounds and infesting shorelines, making them unattractive, unproductive and inaccessible. Marine pests have also been implicated in the introduction of aquatic diseases and harmful algal blooms that have caused serious consequences for aquaculture industries.

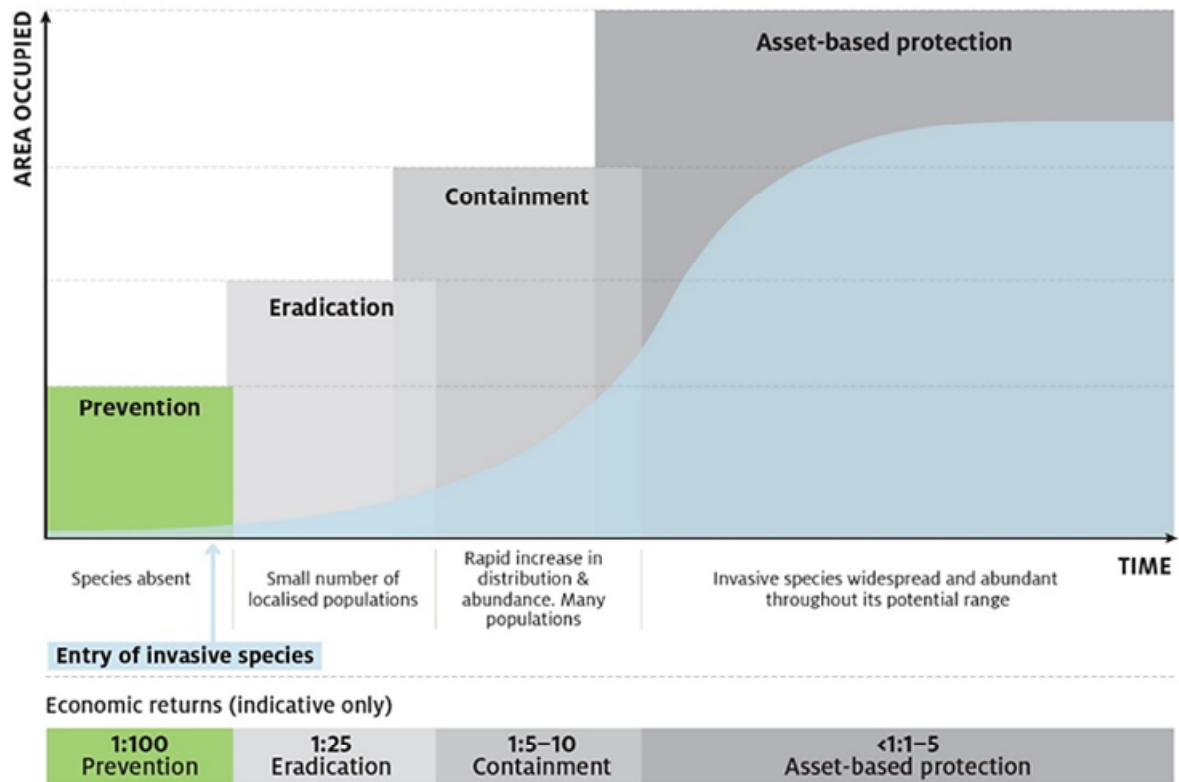
Whilst preventive measures such as ballast water and biofouling management will reduce the number of introductions and spread of marine pests, incursions will occur. Once established, marine pests have been shown to be extremely difficult to eradicate, due to the challenges of working within aquatic environments and the rapid spread of many species over large areas. Therefore, marine pests are best managed as early as possible in the invasion process (Figure 1). In order to facilitate early detection robust, reliable and practical surveillance techniques must be available, adaptable/scalable and appropriately implemented.

Robust surveillance techniques also support the monitoring of species that are already established in Australia, and are required to ensure ballast water regulations designed to limit the spread of such species, are implemented effectively.

The previous national surveillance program developed in 2008 was not implemented by all jurisdictions principally due to the lack of funding commitment and the high costs of conducting these very intensive surveys. Only five of the eighteen agreed priority locations were monitored to the national surveillance standard resulting in the goals of this program not being achieved. As recommended in the report [Monitoring for Marine Pests: A review of the design and use of Australia's National Monitoring Strategy and identification of possible improvements ABARES](#) a new approach to implementing a national strategy is required.

This new National Marine Pest Surveillance Strategy (the Surveillance Strategy) aims to provide guidance on how a cost effective nationally agreed approach to marine pest surveillance could be developed that also enhances the ability for early detection of marine pests. Early detection will in turn improve the likelihood of eradication or effective management of marine pests leading to better environmental, economic, social outcomes for Australia.

Figure 1 Generalised invasion curve showing diminishing returns on biosecurity investment along the invasion axis



Background

In 2000, following the detection of a number of serious marine pest incursions throughout Australia, the National Introduced Marine Pests Coordination Group was tasked with developing a national plan for managing marine pests. This plan became known as the National System for the Prevention and Management of Marine Pest Incursions (the National System) and comprised of Commonwealth, state, territory and non-government stakeholders. As part of this process, a National Monitoring Strategy was developed that outlined recommended surveillance procedures and methodologies for marine pests. This included the [Australian Marine Pest Monitoring Guidelines](#) and the [Australian Marine Pest Monitoring Manual](#). In 2011, the National Introduced Marine Pests Coordination Group was replaced by the Marine Pest Sectoral Committee.

In 2015, the Australian Government completed a [Review of National Marine Pest Biosecurity](#) (the Review). This included a detailed analysis of progress since establishment of the National System, and concluded that marine pest surveillance programs had not been adequately adopted across Australia. It was noted that the prescriptive approach adopted by the National System, together with the high cost of recommended surveillance methods, was a significant impediment to uptake of the National Monitoring Strategy. The Review recommended a revised national surveillance strategy for marine pests that outlined clear objectives and activities in the development and implementation of more cost-effective surveillance tools.

In response to the Review, the [MarinePestPlan 2018–2023](#) (MarinePestPlan) was developed as Australia's new national strategic plan for marine pest biosecurity. Activity 2.1 within the MarinePestPlan recommends the development of a nationally agreed approach to marine pest surveillance that clearly defines the objectives, scope and need for active and passive surveillance including describing the different components and types of surveillance required to meet those objectives and outline stakeholder responsibilities.

The Surveillance Strategy will use as appropriate, components of the National Monitoring Strategy while allowing greater flexibility in surveillance methods and use of recently developed surveillance technologies where they offer more fit-for purpose and cost-effective means of surveillance.

Responsibilities under IGAB

The [Intergovernmental Agreement on Biosecurity](#) (IGAB) is Australia's principle agreement between the Commonwealth, state and territory governments on biosecurity. It aims to facilitate a coordinated and cohesive approach to surveillance of pests and diseases, as well as ensuring timely response to biosecurity incursions. Under the IGAB, governments have committed to developing a national surveillance and diagnostic system that builds on current arrangements.

The IGAB emphasises the importance of surveillance and promotes the use of an integrated approach to activities. This should include:

- a comprehensive national surveillance and diagnostic system that provides for early detection and accurate and timely diagnosis of pests and diseases
and
- a reporting and assurance system that analyses data and provides appropriate evidence to demonstrate Australia's pest and disease status and to underpin market access.

The Surveillance Strategy uses policy directions outlined within IGAB schedule 4 (National Surveillance and Diagnostic Framework) as a guide. These policy directions state that the national surveillance and diagnostic system should allow for:

- efficient development and use of diagnostic capability and infrastructure to minimise unnecessary duplication of effort across jurisdictions
- the development and maintenance of baseline capacity, including technical capacity, for surveillance and diagnostic activities
- the provision of information on Australia's pest and disease status to support the maintenance and development of international markets for Australian food and fibre
- greater use of public and private stakeholders as participants in pest and disease investigation and reporting.

Purpose of the Surveillance Strategy

Within the context of the IGAB and consistent with the MarinePestPlan, this Surveillance Strategy aims to enhance marine pest biosecurity by outlining:

- the key need, objectives and scope for surveillance
- the different components and types of surveillance recommended to meet those objectives
- a nationally agreed approach to marine pest surveillance
- stakeholder roles and responsibilities.

This document describes Australia's strategy for development of improved marine pest surveillance and provides guidance for government, community and industry stakeholders on marine pest surveillance priorities and activities. The Surveillance Strategy aims to establish a coordinated, risk-based approach to the collection and reporting of surveillance data that ensures more appropriate and efficient use of limited resources. Stakeholders will also have clearer understanding of the operational requirements needed to fulfil their responsibilities in accordance with the strategy.

Scope

This strategy identifies surveillance objectives and describes the development of policy for the collection and interpretation of surveillance information. The Surveillance Strategy promotes new approaches to marine pest surveillance and describes how these may be used to augment traditional methods. The document is not designed to be prescriptive, but instead should be used as a guide for planning purposes. Where appropriate, the Surveillance Strategy retains elements of the National System, but also aims to identify alternative surveillance options.

This strategy adopts the definition of marine pests used in the MarinePestPlan, which is:

Marine pests are non-native marine species that may harm Australia's marine environment, social amenity or industries that use the marine environment, or species that have the potential to do so if they were to be introduced, established (that is, forming self-sustaining populations) or spread in Australia's marine environment.

The Surveillance Strategy applies only to marine pest species and does not include freshwater or terrestrial species. Similarly, it does not extend to aquatic diseases, which are addressed as part of [AQUAPLAN 2017–2019](#). The Surveillance Strategy aligns with the Marine Pest Sectoral Committee definition of marine species: species that complete—or spend the majority of—their lifecycle in marine (salinity 33–37 g/L) or brackish (3–35 g/L) waters, requiring this environment for reproduction and/or for their long-term survival.

The Surveillance Strategy does not aim to direct biosecurity management and compliance activities, these are managed through existing national and jurisdictional arrangements.

The Surveillance Strategy identifies nationally agreed objectives for marine pest surveillance as well as possible activities in order to achieve these objectives. The Surveillance Strategy does not identify funding sources in order to achieve these objectives and it is recognised that resource availability may affect the completion of activities within the term of this strategy. However, it flags activities for action when resources permit.

The Surveillance Strategy does not provide guidance on the implementation of surveillance activities listed in this document. Instead, a National Marine Pest Surveillance Work-Plan (the Work-Plan) will be developed in order to guide the implementation of these activities.

Strategy principles

Throughout the preparation of this document, a number of surveillance principals are recognised.

Principle 1

Surveillance data can be obtained from multiple sources and data on marine pest species does not have to be restricted to structured surveillance programs (active surveillance). Observations made by the general community, researchers and officers engaged in other marine activities (passive surveillance) should also be included wherever possible.

Principle 2

The Strategy should work in conjunction with a list, or lists, of identified priority pest species as part of risk based targeted surveillance, and develop strategies for early detection and identification of these species.

Principle 3

Although priority pest species lists should be used as a guide, it is also recognised that new pest species will continue to emerge or to be introduced to the Australian environment. The 'invasiveness' of new species in different environments cannot always be predicted; therefore any surveillance strategy should provide mechanisms to detect species not included in the priority pest species lists.

Principle 4

Wherever possible, data contributing to surveillance should be quantifiable. This requires that tests used are validated and an indication of their accuracy under varying environmental conditions calculated. Sampling design should also take into account probability of detection under varying locations and environmental condition.

Principle 5

Depending on the species and the purpose of surveillance, varying methods and tests—or a combination of a number of fit-for-purpose tests—will be required.

Principle 6

Tests used may be broadly separated into two groups, these being 'screening tools' and 'confirmatory tools'. Screening tools may be used to provide an indication that a pest is potentially present in an area. However, without use of appropriate confirmatory tools such as genomic sequencing or taxonomic identification, uncertainty will remain. As such, confirmation of species

detected during surveillance activities will normally need to satisfy agreed positive or negative 'case definitions' to be accepted as valid.

Principle 7

Surveillance should be done not just by governments, but should involve all stakeholders. As such, preparation of material that informs various sectors on their role in marine pest surveillance and reporting is essential.

Principle 8

The analysis and dissemination of data is an essential component of surveillance. In order to be of value, surveillance data should be available to relevant stakeholders in a format that allows interrogation in a practical manner for management and reporting purposes.

Principle 9

Marine pest surveillance requires a unique suite of skills covering appropriate sampling designs, as well as a range of field and lab-based capabilities. People working in marine pest surveillance should undertake ongoing training and participate in skills development opportunities to ensure Australia has a ready and capable workforce to conduct marine pest surveillance.

Principle 10

Surveillance outcomes should form a component of evidence-based decision making to inform marine pest management and improve the efficacy of management practices.

Recommendations

The Surveillance Strategy identifies four objectives relating to marine pest surveillance. To contribute towards the achievement of these surveillance objectives, fifteen activities are proposed. While some of these activities are already underway as part of existing marine pest arrangements (including the MarinePestPlan) they are important components of an integrated surveillance strategy and are therefore listed within this document.

Objective 1: To define the need, objectives and scope for surveillance

The prime objective of marine pest surveillance (whether general or targeted) is the early detection of marine pest species. However, the principles of this surveillance may also be applied to monitor the abundance, distribution, density, seasonality and rate of spread of established species.

The design of marine pest surveillance or monitoring programs is primarily dependent on the overall objective and specific questions that are to be answered. Specific objectives might be to:

- ensure early detection of key marine pests in high-likelihood locations such as ports
- better understand the distribution, density or spread (actual or potential) of established marine pests
- demonstrate freedom of locations and/or areas from specific marine pests.

Surveillance activities also need to target relevant high-risk introduction pathways to maximise likelihood of early detection of incursions (Table 2, Activity 1.1). High likelihood areas (Table 2, Activity 1.2) will need to be prioritised to enable best use of limited resources. The development and regular review of a list of priority marine pest species will assist in increasing awareness. It also allows for better direction of surveillance resources through the use of risk-based surveillance plans with fit-for-purpose procedures (Table 2, Activity 1.3).

Another objective of this strategy is to encourage community engagement (Table 3, Activity 3.5). Passive surveillance is recognised as a cost-effective surveillance tool that can be facilitated by community engagement. Passive surveillance is often broad (general surveillance), but can be effective in early detection of marine pests or changes in the environment linked to them.

The MarinePestPlan has identified a number of priority surveillance activities that are underway or are planned. These include MarinePestPlan activities 2.4, 2.5, 2.6 and 2.7.

Table 2 Summary of activities to achieve Objective 1

Activity number	National Marine Pest Surveillance Strategy activity
1.1	Develop an understanding of factors associated with incursion pathways (including vessels) that may affect likelihood of introduction of marine pests
1.2	Relevant authorities to identify priority surveillance locations for marine pests based on outcome of 1.1
1.3	Maintain an agreed list of priority pest species for surveillance

Objective 2: To describe the different components and types of surveillance required to meet those objectives

Surveillance tools that are most appropriate for achieving the surveillance objectives should be identified for use in Australia's marine pest surveillance system. Depending on the overall objective, one or more surveillance methods or tools may be used to provide quantifiable data on the presence, absence or spread of marine pests.

Where appropriate, the Surveillance Strategy uses principles and terms consistent with other national surveillance programs. It classifies surveillance activities according to four basic categories: active versus passive surveillance and targeted versus general surveillance (see [glossary](#) for definitions).

Information for use in surveillance, including the National Introduced Marine Pest Information System, needs to be maintained and further developed to improve its application in surveillance (Table 3, Activity 2.1). Techniques such as the analysis of eDNA and remote sensing aim to reduce costs and time delays associated with field intensive techniques, which is particularly important in port environments. The Surveillance Strategy aims to foster development of new and developing surveillance technologies.

Surveillance programs should adopt tools and methods that are risk based and fit for purpose. To allow comparison and interpretation of data for management purposes and information (Table 3, Activity 2.2). Guidance on the range of surveillance tools that can be used in particular situations and conditions is required, especially in respect to the surveillance methods that are best used during an emergency response (Table 3, Activity 2.3). Some of these detection methods have been used for marine pest surveillance for many years (such as settlement arrays and diver observations), however others include comparatively more recent developments such as the use of remotely operated underwater vehicles (ROVs) and the analysis of eDNA. In each case, the test used will vary in its ability to detect target species (detection sensitivity) and the probability of providing a true positive result (detection specificity). In order to assess the accuracy of each test used, surveillance tools should go through a process of validation (where possible) to assess their overall performance and fitness for purpose (Table 3, Activity 2.4). Consideration must also be given to the sampling design for the surveillance program, which will include the aims of the program, number of samples to be collected, the period over which these will be collected and the location of sampling within the target environment.

Application of modelling for marine pest distribution is rapidly evolving. A review of current modelling techniques and their application will assist in directing surveillance activities, particularly in emergency response scenarios (Table 3, Activity 2.5).

Two activities in the MarinePestPlan target passive surveillance. This is recognised in Activity 2.6 (Table 3) of this strategy. Surveillance programs must also be supported by data storage processes that allow access by multiple stakeholders, and be relatively simple to enter data and interrogate for management and research purposes (Table 3, Activity 2.7).

Table 3 Summary of activities to achieve Objective 2

Activity number	National Marine Pest Surveillance Strategy activity
2.1	Develop new and maintain existing surveillance tools and information for priority pest species for use in marine pest management
2.2	Provide advice on use of surveillance techniques such that methods used across and between jurisdictions are consistent and quantifiable.
2.3	Incorporate guidance for components of surveillance in the Emergency Marine Pest Plan.
2.4	Ensure validated molecular detection techniques and relevant diagnostic expertise are available for priority pest species.
2.5	Review pest distribution modelling techniques that may be used in surveillance programs.
2.6	Facilitate passive surveillance by identifying mechanisms and resources required.
2.7	Develop and implement a national marine pest surveillance data repository.

Objective 3: To outline a nationally agreed approach to marine pest surveillance

The Surveillance Strategy is intended to provide policy direction by identifying and seeking national agreement on identified marine pest surveillance priorities. The strategy will set objectives for national surveillance to ensure activities, tests and processes are practical, risk based, fit-for-purpose and follow best practice. Guidance should be flexible and consider application across the range of available resources, legislation, surveillance objectives and environments in Australia. The development of this guidance will be ongoing to incorporate advances in technology, changes in approach and changes in resource availability. The first step in the implementation of the Surveillance Strategy is the development of the Work-Plan (Table 4, Activity 3.1).

Although the Surveillance Strategy aims to develop a consistent approach to surveillance, it recognises that there are valuable surveillance activities that are currently underway or have previously occurred. In recognition of the wealth of surveillance information that already exists, a review of marine pest surveillance activities and data sets relevant to Australia is essential (Table 4, Activity 3.2).

Table 4 Summary of activities to achieve Objective 3

Activity number	National Marine Pest Surveillance Strategy activity
3.1	Develop a national marine pest surveillance work-plan
3.2	Audit historical marine pest surveillance activities and data sets relevant to Australia to document the available baseline

Objective 4: To outline stakeholder responsibilities including identification of lead agencies responsible for undertaking surveillance and communications

The national approach to biosecurity operates across the biosecurity continuum, including pre-border, at the border and post-border measures. As part of this integrated approach, it is important to recognise that biosecurity is a shared responsibility of government, industries and the wider community. All of these stakeholders should contribute to improving Australia's marine pest biosecurity. The concept and understanding of shared responsibility should be communicated and understood by stakeholders if Australia is to maintain a robust marine pest surveillance system. Furthermore, Australia should engage cooperatively with international partners in information sharing to enhance surveillance intelligence gathering and improve surveillance practices.

The Work-Plan will identify and promote engagement of stakeholders, including educating stakeholders on the importance of marine pest surveillance and their respective roles (Table 5, Activity 4.1). The Work-Plan will also identify lead agencies, organisations or groups that are involved in surveillance activities.

Australia has over 59,000 km of coastline and a collaborative approach is necessary for effective surveillance and the early detection of marine pest incursions. An effective national marine pest surveillance system requires ongoing engagement and cooperation from stakeholders. Passive surveillance from marine industry sectors and the wider public can play an integral role in marine biosecurity (Table 3, Activity 2.6). Furthermore, information and data sharing between stakeholders can lead to more complete surveillance intelligence information. In order to expand the role of passive surveillance in Australia's marine pest surveillance system, relationships with stakeholders that interact with the marine environment will be developed and maintained. This aims to encourage passive surveillance, data sharing and early reporting for marine pests (Table 5, Activity 4.2), making use of resources developed in activity 2.6.

To complement a national approach to marine pest surveillance, collaboration with international partners will provide opportunities for improved information sharing and cooperation in surveillance activities. International partnerships are particularly beneficial for intelligence sharing on high risk vessel movements, and on developments in detection and management techniques and technologies; and to learn from partners that undertake surveillance of priority marine pest species that are exotic to Australia. International partnerships are important in the development of tools and techniques for surveillance, by sharing costs of research and development. This Surveillance Strategy recommends ongoing support and development of international partnerships, to improve surveillance tools and capability (Table 5, Activity 4.3).

Table 5 Summary of activities to achieve Objective 4

Activity number	National Marine Pest Surveillance Strategy activity
4.1	Identify and engage stakeholder groups (including government) and educate on the importance of marine pest surveillance, and their respective roles.
4.2	Develop and maintain relationships with stakeholders undertaking marine surveillance to encourage passive surveillance, data sharing and early reporting for marine pests.
4.3	Support and develop international partnerships, to improve surveillance tools and capability

Next steps: strategy implementation

The Surveillance Strategy has undergone stakeholder consultation and has been endorsed by the [Marine Pest Sectoral Committee](#) (MPSC) 29 May 2019. It is an agreed national guidance document for marine pest surveillance. Biosecurity is a shared responsibility, and successful implementation of the Surveillance Strategy will require cooperation between stakeholders and ongoing community engagement.

As the national sectoral committee responsible for marine pest biosecurity, the MPSC will oversee the development and implementation of the Work-Plan. The Work-Plan will describe an approach to the activities identified as priorities in achieving the objectives listed in this document. Progress towards these activities will be communicated to stakeholders on the [Marine Pest](#) website and through targeted communication.

The Surveillance Strategy has a five-year implementation term from June 2019 and the MPSC is responsible for monitoring its progress and reviewing the Surveillance Strategy as required. The Surveillance Strategy is a component of the MarinePestPlan and therefore the Surveillance Strategy priorities may be reassessed if new MarinePestPlan priorities are identified as part of any future reviews.

Glossary

Term	Definition
Biosecurity	The management measures applied to reduce the likelihood of pest species being able to enter, establish or spread within a defined area or region.
Containment	Restriction of a pest species potential range to a defined region through the establishment and maintenance of biosecurity conditions.
Detection sensitivity	The probability that a surveillance method will correctly detect the presence of the target organism in a sample or area where they are known to occur. Sensitivity is expressed as the proportion of samples containing the target organism or originating from a known infected area (S+) that produce a positive test result (T+), for example, $Pr\ Sens.=T+/S+$. Sensitivity may also be referred as 'test sensitivity' or 'diagnostic sensitivity'.
Detection specificity	The probability that a surveillance method will correctly indicate absence of a target organism in an area or sample where they are known to be absent. Specificity is expressed as the number of samples not containing the target organism or originating from a known free area (S-) that test negative (T-), for example $Pr\ Spec.=T-/S-$. Specificity may also be referred as 'test specificity' or 'diagnostic specificity'.
Eradication	Elimination of a pest species from a defined region. Eradication may be to an agreed level of confidence.
Fitness for purpose	A measure that assesses the suitability of a surveillance test or method. Fitness-for-purpose takes into account the stated objective, test accuracy and robustness, as well as the conditions in which it will be applied.
Marine pest	Marine pests are non-native marine species that may harm Australia's marine environment, social amenity or industries that use the marine environment, or species that have the potential to do so if they were to be introduced, established (that is, forming self-sustaining populations) or spread in Australia's marine environment.
Monitoring	The structured collection of data for the purposes of assessing changes in the density or distribution of known pests in a defined area. The main distinction between surveillance and monitoring is that surveillance is concerned with new pests or recently introduced pest species, whilst monitoring is concerned with changes in the population structure and distribution of an established pest species.
Proof of freedom	The probability, based on analysis of available data, that a defined geographic area is free of a marine pest.
Remote sensing	The acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation (for example, the use of ROVs for underwater visual assessments).
Risk-based approach	A quantitative methodology that aims to understand the overall risk for the purpose of reducing likelihood of an incursion and/or mitigating impact. The approach acknowledges that risk can rarely be eliminated completely, but instead should manage key introduction pathways and/or mitigate impact through management procedures
Surveillance	<p>The structured collection and analysis of data for the purpose of detecting the presence or demonstrating absence of a marine pest in a given environment. Surveillance may be further classified into 'active' and 'passive' activities or 'general' and 'targeted' activities:</p> <ul style="list-style-type: none"> • active surveillance—collection of data specifically for marine pest surveillance purpose, usually to answer a certain question (for example are particular marine pests present in this port?) • passive surveillance—observer-initiated (for example, when a recreational diver sees an unusual animal (a potential marine pest) while out diving and reports it to the marine authority) or the result of sample collection for another purpose (for example marine ecology research) • targeted surveillance—surveillance activities targeted at a specific pest species (for example, eDNA surveillance programs using PCR will only provide data on a single or limited number of selected species)

National Marine Pest Surveillance Strategy

Term	Definition
	<ul style="list-style-type: none">• general surveillance—surveillance activities not specifically focused on a single or small number of pest species.
Surveillance procedure	The combined surveillance process used to provide data on presence or absence of a pest species. The surveillance procedure includes the surveillance tool and surveillance test. May also be referred to as ‘surveillance method’, ‘surveillance activity’ or ‘surveillance technique’.
Surveillance test	An analytical process used to provide a quantifiable result. Usually laboratory based, but may include field tests.
Surveillance tool	A process or method used to collect samples for testing. For example, use of plankton tows, settlement arrays or divers to collect samples for testing.
Validation	A process that determines fitness-for-purpose of a specific test or assay. The validation process takes into account test sensitivity, specificity, repeatability and robustness. The process is described in detail within the Guidelines for Validation of Tests for Marine Pests .
Vessel	Any ship, boat or other description of a craft used in marine environments. Includes ships, floating platforms, boats and barges (structures that can float and be steered or moved by their own means or by other means, such as if towed). Also, specifically includes smaller craft including recreational boats and other craft.

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