



# Pacific Invasive Species Battler Series



## **CATCH IT EARLY: INVASIVE SPECIES EARLY DETECTION AND RAPID RESPONSE**



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



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

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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

Early Detection and Rapid Response (EDRR) systems are the first line of defence against invasive species once they have penetrated national or inter-island biosecurity systems. For these systems to be effective, a plan is required to coordinate the responsible agencies and ensure both the systems and equipment to address the detected species are in place prior to the response. Several countries have developed these plans recently, which are available on the Battler Resource Base ([www.sprep.org/piln/resource-base](http://www.sprep.org/piln/resource-base)). SPREP thanks James Stanford, who drafted the text for this guide.

## What is early detection and rapid response (EDDR)?

Invasive species can have devastating effects on environments and economies.

For biosecurity, it is important to focus on risk assessments, pre-arrival hygiene, and border security as essential tools for preventing the introduction of potentially harmful invasive species.

Pre-border and border biosecurity, no matter how well developed, will not prevent all new species arrivals, and therefore, there is a need to develop capacity to detect novel species after the border and respond appropriately to incursions. This post-border biosecurity is generally referred to as **early detection and rapid response (EDRR)**.

Well-developed EDRR increases the likelihood that localised invasive populations will be found, contained, and eradicated before they become overly problematic and wide spread. By removing potentially harmful species before they become well established, EDRR can reduce and/or eliminate harmful impacts of these species. When applied successfully, EDRR eliminates the need for costly long-term management and remediation efforts.

Functional EDRR systems are composed of early detection and rapid response but also of broad, cross-sectorial awareness and buy-in, rapid reporting, and rapid assessment.



## Effective EDRR depends upon the timely ability to answer a variety of questions, including:

- What is the species of concern, and has it been authoritatively identified?
- Where is the species currently located and where is it likely to spread?
- What harm may the species cause?
- What actions (if any) should be taken?
- What actions are actually feasible given available resources?
- Who has the needed authorisation and resources to take action?
- How will actions taken be funded?



Photo: Pared Kirilov, Wiki Commons

## In successful EDRR programs:

- Potential threats are identified in time to allow risk-mitigation measures to be taken.
- New invasive species are being detected in time to allow efficient and environmentally sound decisions to be made.
- Responses to invasions are effective and environmentally sound and prevent the spread and permanent establishment of invasive species.
- Adequate and timely information is provided to decision-makers, the public, and to trading partners concerned about the status of invasive species within an area.
- Lessons learned from past efforts are being used to guide current and future efforts.



## What happens during an EDRR event?

- 1 New organism is detected
- 2 New organism report is filed (*ideally this happens within minutes of the detection*)
- 3 Initial assessment made (*ideally within minutes of receiving the detection report*):
  - A If deemed not plausible, no response action is taken
  - B If the report is deemed plausible, then:
    - 1 Start field searches to encounter and remove organisms (*ideally this happens within minutes of making a plausible determination*);
    - 2 Conduct a full-length interview including site visit (*ideally this happens within 24 hours of the detection*); and
    - 3 Make a full assessment: (*ideally this happens within 24 hours of the detection*)
      - A If action is not deemed plausible, then end response action
      - B If action is deemed plausible, then:
        - 1 take response action (*ideally this happens within 24 hours of the detection*); and
        - 2 terminate response action after specified period (*event/ planning dependent*)



Photo: Helen Clark, Wiki Commons

## Who is involved in EDRR?

### *Preventing the establishment of invasive species benefits everyone*

Early detection is based on the concept that novel species can be detected quickly. There are various considerations regarding who or what segments of society need to be responsible for detecting new arrivals. In general, broader awareness, with more eyes looking, means better detection.

More specific training provided for key personnel should create better detection ability. Ideally, both community members and visitors will be well informed of concerns, realise that their reporting of encounters with potential novel species is important, and report encounters with novel species quickly.

Underlying any efforts to improve detection capabilities should be a clear understanding that if new invasive species are permitted to establish, they will invariably impact most if not all segments of society, and therefore everyone should be engaged in detecting and reporting potential invasive species.

Outreach is an essential part of a functional early detection system. Community members and visitors alike should be aware of species of concern and be empowered to report potential novel species encounters.



Photo: Carlo Iacovino, SPREP





Photo: Carlo Iacovino, SPRP



## Awareness, buy-in, and advertising reporting systems

- Posters and signs
- Presentations and websites
- Local TV channel and visitor channel programs and advertising
- Educational videos: in transit, on arrival, and at departure
- Brochures and bumper stickers
- Community work days (getting community members out to remove already established pest species is a great way to engage them)
- Displays/booths at community events like Earth Day
- T-shirts, hats, and other types of swag



# What are my options for detection and response?

## Early detection options include:

- 1** Not responding. A typical default in early detection is to not have a specific focus on this element of biosecurity. Encounters with novel organisms might go unreported or underreported; reports might be filed with a variety of offices with no specified coordination and without some offices keeping adequate records or taking action; encounters may be reported after a long delay (limiting the ability to mount an appropriate response); and reported detections may occur after the species is already entrenched and wide spread, again reducing the potential for an appropriate response.
- 2** Reliance on those working in the existing biosecurity structure to make early detections. This reliance may be supported by additional training for a sub-set of frontline staff and managers. Providing specific detection and response training to biosecurity workers is a good step, but sole reliance on this relatively small group for all detections will likely result in many organisms establishing without being detected until they are already entrenched. Ideally, this option should be part of a larger overall early detection plan.
- 3** Expanded training and reliance on early detections to include not only biosecurity but also quarantine, agriculture, aquaculture, and other sectors with direct contact with one or more of the likely pathways for invasive species arrival and/or establishment. This option significantly expands detection capabilities in areas beyond those in which biosecurity officers regularly operate.
- 4** Expanding early detection awareness to additional sectors/communities (preferably all). Having society members, regardless of position or profession, involved in early detection is likely preferable for most locations because it can maximise detection capacity, but it does require (1) methods for engaging various sectors and communities and (2) a functional and user-friendly early detection reporting system.

## Rapid response options include:

- 1** Not developing a local response capacity.
- 2** Establishing one or more Emergency Response Plans in case a response needs to be enacted. Be wary that plan development does not become only a paper exercise. To be effective, expected participants must not only agree with the planning but also have the appropriate authorities and ideally response training. A response plan should be a detailed mechanism linking in leadership, resources, and funding.
- 3** Establishing a local response team with leadership approval, funding, and one or more emergency response plans or other procedure.
- 4** All of the options for early detection listed above, plus training for response team members and cooperation with a regional response network (if one exists).

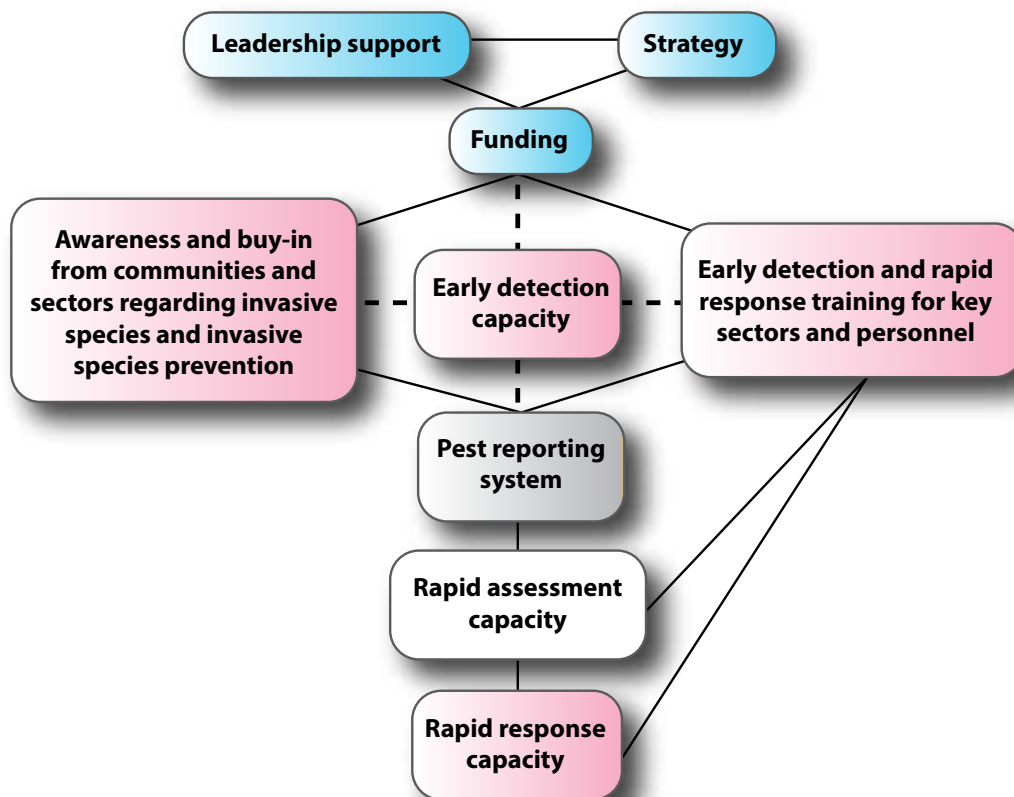
## How are novel species reported?

A reporting system must be in place. A dedicated pest-reporting hotline that is answered 24/7 by trained staff is ideal. If such a hotline is not feasible, it might be possible to use an existing emergency hotline, but be sure to verify that emergency operators are willing and authorised to receive novel species-detection calls. It might be possible to use a biosecurity work phone that is answered by a trained staff member during working hours. It might also be feasible to have after-hours calls received by an emergency operator, but again ensure that this use is authorised first.

While most reporting mechanisms will depend on some type of phone hotline, it may also be valuable to consider developing other types of reporting mechanisms, such as interactive websites, email addresses, and/or a staffed office where walk-in reports can be filed.

Regardless of the reporting system, novel species detection reports need to be taken by operators trained to work with the public and to record appropriate information without influencing the observer. These operators need to be supplied with appropriate resources including short interview forms with standardised questions for collecting key information during detection reports plus a list of 24/7 contact information for key individuals who are to be alerted immediately after a detection report, such as the rapid assessment lead, response team lead, and agency contacts. Once encounter report information is collected, it should also be entered into a database where all reports are documented and can be reviewed and shared as needed.

**Figure 1: Overview of a typical EDRR system**



## Assessing novel species encounter reports



Determining who will make the assessments of novel species reports is critical. It is also worth noting that there will likely be an initial rapid assessment that is followed by a more in-depth full assessment in the case of a plausible initial assessment. Who carries out these assessments may vary, and in the case of the rapid assessment, it may be a single officer from biosecurity, or perhaps a single knowledgeable individual will take the lead with the understanding that they will contact various experts depending on the type of organism anticipated.

Whatever strategy is used, this initial assessment should be made rapidly, ideally within a few minutes of receiving the report. Remember, this initial rapid assessment is to determine whether it is an actionable report or one that is deemed non-actionable for a variety of reasons, such as a false report or what appears to be a report of an organism already known to be established.



### How do people report an encounter?

- Full name of observer and contact information
- Location, time, and date of encounter
- Potential organism encountered with brief but detailed description
- Number of organisms detected
- Answers to the following questions:
  - 1 Was the organism captured or destroyed?
  - 2 If so, is it still available for pick-up for identification?
  - 3 Did the organism move? If so, how and in what direction?
  - 4 Was anyone else involved in the encounter? If so, what are their names and contact information?
  - 5 May an expert contact you to talk more about the encounter?
  - 6 If necessary, would you be willing to meet with an expert to talk about the encounter and to show them the encounter location?
- Full name of operator and date and time the report was received



**Figure 2: There are several options when a novel organism is reported**

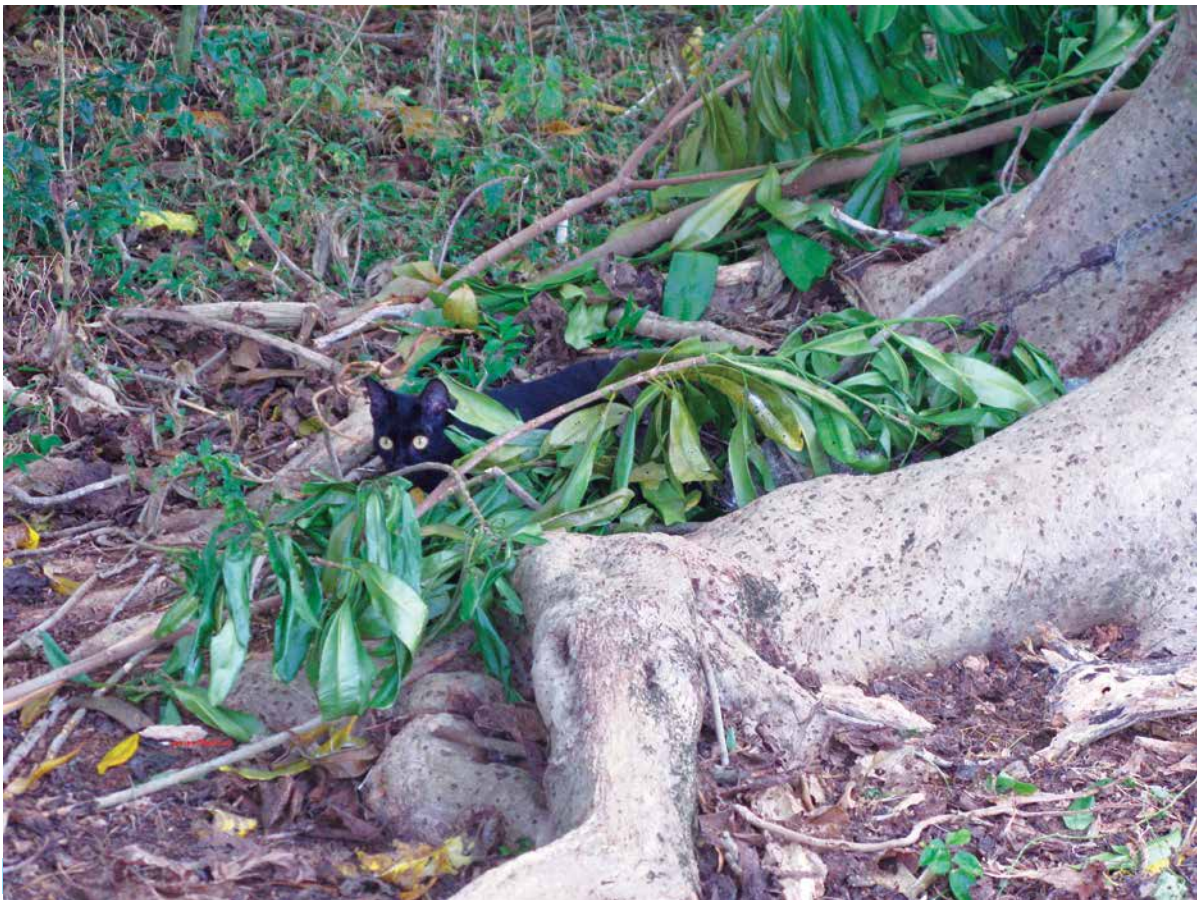
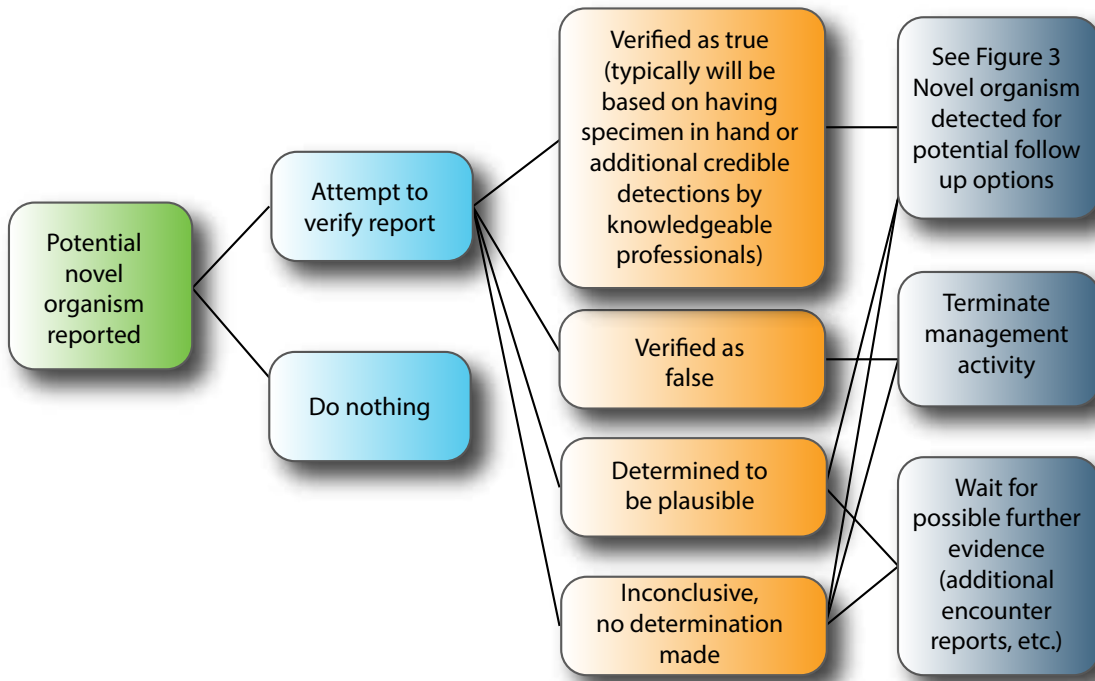


Photo - J. Stamford

If an encounter report is determined to be plausible and actionable, field action must commence rapidly, ideally within a few minutes of receiving the encounter report. The initial field action might consist of 2 to 5 trained field staff going to the encounter location to visually search for the suspect organism(s) and remove any that are encountered. The best opportunity to encounter and remove a live organism is as soon as possible after the actual encounter. Living organisms generally move, and longer periods between the initial encounter and the commencement of field searching increase the likelihood that the organism has moved from the original encounter location, making detection more difficult. With every passing hour, the organism can be further from the encounter area. Ultimately, this leads to an ever-increasing search area as time passes by. Larger potential search areas require more resources to get the same search coverage.

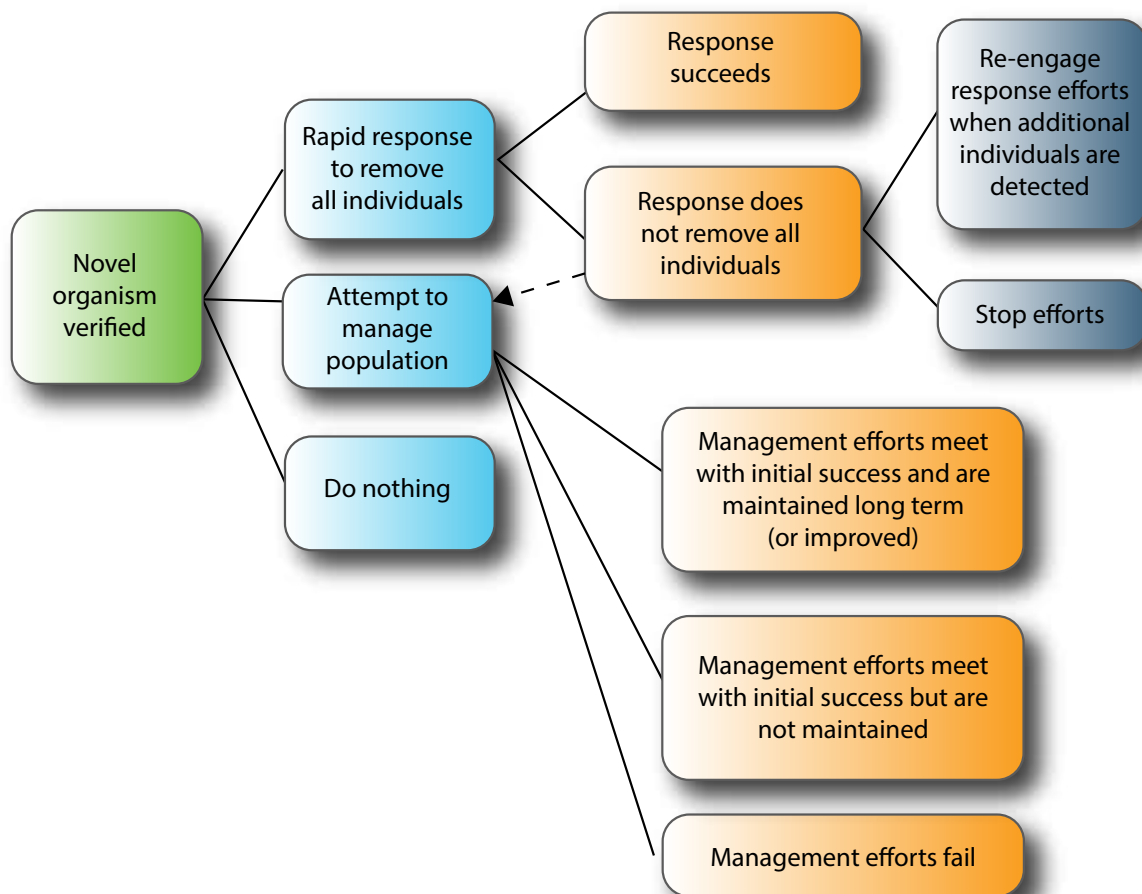
Response actions are most effective when they are implemented rapidly. However, responding rapidly is not always feasible, especially when encounter reports are filed after delays. It is still better to respond later than to not respond at all.



For an actionable encounter report, once the initial field action has begun, it is usually valuable to meet with the encounter observer for a more detailed interview regarding the encounter. This detailed interview can be used to collect more detailed information from the observer. If it is possible, as part of the interview process, the encounter site should be visited so that the observer can point to where the organism was and where it moved to (if it moved at all). This more detailed interview process will ideally occur within a few hours of the initial encounter report but may take longer depending on circumstances. Again, details from this interview process should be entered into a database.

Ramping up the field action usually occurs after the detailed interview has been completed and if, at that point, action is deemed necessary. The full assessment, completed after the detailed interview, will determine if action is necessary or if the response should be shut down. This full assessment may be made by an individual or a small group and should be done rapidly, preferably within 24 hours of the encounter.

**Figure 3: There are several options when new organisms are found**



The duration of response actions will depend on the level of threat from the particular organisms, the number of organisms encountered, and the availability of resources.

Remember, if an observer has reported a single organism, there may very well be many individuals present. Therefore, if a single organism is recovered during the response, the response might not be over but in fact additional search efforts might be needed to find any other individuals.

Organisms found should be well documented, including photographed and preserved. Ideally, the organisms can be examined by taxonomic specialists to verify identification. The entire response process should be well documented and a synopsis shared with appropriate offices internally and externally. Any available information on potential pathway of arrival should also be well documented to help improve overall biosecurity efforts.

## How do I prepare for EDRR?

There are several key elements of an EDRR system, the first being that such a system is in place. A comprehensive EDRR strategy should be established that is supported by leadership and includes sections on major threats, awareness and buy-in, early detection, pest-reporting system, rapid assessment, rapid response, and funding avenues. This strategy will require funding to support activities and needed resources: revolving funds that can be carried across fiscal years are best for supporting EDRR activities.

Improved invasive species awareness and buy-in of all sectors and communities, including visitors, will increase EDRR capacity. A pest-reporting system, preferably centred around a 24/7 hotline, coupled with detection training for specific sectors such as biosecurity, agriculture, forestry, aquaculture, port workers, and transportation personnel is necessary.

Appropriate development of detection, assessment, and response elements is essential; incident command structure modelling may be helpful. Having established emergency response plans (ERPs), updated regularly, will facilitate response action management. Generic ERPs for freshwater, marine, and terrestrial organisms can be adjusted per situation. ERPs for specific high-risk organisms may be warranted.

**To make sure your EDRR plan is ready, check to make sure the following components are in place:**

- funding in place to support EDRR actions;
- leadership and regulatory support;
- emergency response plans and standard operational procedures;
- awareness and buy-in across sectors and communities of invasive species and of the need to report novel organism encounters in a timely manner;
- a well-publicised and user-friendly reporting system, including interview forms and trained operators;
- an appropriately trained expert available 24/7 to make timely initial assessments of novel organism reports;
- a skilled incident commander to lead response efforts;
- a trained rapid response team, with team members willing and able to respond within minutes to novel organism reports regardless of time of day, location, or weather;
- full-length interview form(s), trained interviewer(s), and established interview format(s); individual or small group(s) established to make full assessments;
- ability to ramp up response action as needed including additional resources and team members; and
- linkages to local/regional/international experts to provide response support and scientific identification of any recovered organisms.





## Case Study: Brown treesnake in Guam

It is impossible to determine if an arriving novel organism will establish a population and have negative impacts, but this is exactly what happened on the island of Guam when the Brown Treesnake (BTS) arrived sometime in the late 1940s or early 1950s and over the course of the next several decades established an island-wide population that has had tremendous negative impacts on the island's natural resources, economy, and human inhabitants.

Because Guam serves as a shipping and transportation hub for much of Micronesia and also is linked to Hawaii, the USA mainland, and other locations, snakes could be accidentally transported from Guam to other places where they could establish and cause similar or worse impacts.

There have been numerous BTS interceptions and encounter reports from locations within Micronesia and beyond. In 2002, a regional response coordination office for alien snake encounters was established to focus on BTS in Micronesia and Hawaii, but which can potentially support broader concerns as permitted (i.e. other snake species, lizards, etc.). While regionally coordinated, this effort is driven by localised EDRR capacity, which in general has been developed to respond not only to BTS but to invasive species in general.

By 2013, the regional response team had over 100 trained and active team members spread across the region (throughout Hawaii, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, the Republic of Palau, the Republic of the Marshall Islands, Guam, and the USA mainland). Awareness, encounter reporting, and response actions are handled locally, and support from the region can be requested and is supplied when feasible to support local activities. Components of this regional team have supported response efforts throughout the region for more than 10 years. More details on BTS and EDRR can be found at <https://www.fort.usgs.gov/staff-details/432>.



Photo: J. Stanford

Photo: Jeffrey Jay Price, Wiki Commons



## Remember!

- **Detection is good; early detection is better**
- **Response is good; rapid response is better**

Responses happen haphazardly, and therefore response protocols, funding, and personnel need to be flexible. Remember: what works in one location might not work for another. An experienced response leader (incident commander) can make the difference between success and failure of the EDRR system. Few untrained individuals are well prepared for the rigors and scheduling adjustments that may be imposed by a response action. Therefore, responders need training, including realistic response-style field exercises or mock response actions.

Trained responders should come from a variety of partnering agencies and groups and should include subject-matter experts for various habitats and organisms. Most response team members will have full-time positions, and coverage of their duties during a response should be pre-planned.

Rapid responders need to be able to work on short notice, sometimes in less than ideal field scenarios, including inclement weather and at night. Rapid responders need follow-up training to stay affective and to improve teamwork. When feasible, consider using volunteers from local communities to supplement response actions (trained response team members can work hand-in-hand with volunteers)

The underlying reason for having EDRR capacity is to add to available preventative tools regarding invasive species. With EDRR, novel organisms that make it through pre-border and border biosecurity measures could be detected, and there is the option of mounting a response before new populations become well established and invasions become wide spread. Later response or long-term management activities in general will be much more costly both in terms of costs and impacts than early detection and removal.

Developing and funding true EDRR capacities is not as straightforward as, say, responding to impacts that can be linked directly to an already established species. However, having the ability to detect and respond to novel organisms shortly after arrival ultimately results in a net savings in terms of both management needs and remediation to address impacts. If organisms are detected and removed before they can become entrenched and widespread, then long-term management of these organisms is not required, and impacts can be limited or possibly even prevented completely.

## Additional resources

The EDRR plans created for Pacific islands under the Global Environment Facility – Pacific Alliance for Sustainability (GEF-PAS) project “Prevention, Control and Management of Invasive Alien Species in the Pacific” are available at the Battler Resource Base.

The Battler Resource Base contains information materials and resources for battling invasive species. You can contact the Invasive Species Programme through the SPREP website:

[www.sprep.org/piln/resource-base](http://www.sprep.org/piln/resource-base)

US/Canada national EDRR systems for invasive plants: State/provincial EDRR work plan template.

[www.eddmaps.org/](http://www.eddmaps.org/)

Australia Biosecurity, Plant Pest Incursion Website: [www.planthealthaustralia.com.au/biosecurity/incursion-management/what-happens-in-a-pest-incursion/](http://www.planthealthaustralia.com.au/biosecurity/incursion-management/what-happens-in-a-pest-incursion/)

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Stanford J. and Wilson J. 2008. [Stalking snakes: Days \(and nights\) in the life of a Brown Treesnake rapid responder](#)

The Nature Conservancy and Environmental Law Institute. 2007. Strategies for Effective State Early Detection/Rapid Response Programs for Plant Pests and Pathogens.

USFS Invasive Species Program EDRR: [www.fs.fed.us/invasivespecies/earlydetection.shtml](http://www.fs.fed.us/invasivespecies/earlydetection.shtml)



# Join the Fight

Protect our islands from invasive species



Håfa Adåi

Aloha

Mogetin

Rahn Anim

Iokwe

Alii

Kaselehlle Len Wo

Mauri

Ekawomir Omo

Mālō te ma'uli

Halo

Tālofa nī

Halo

Tālofa

Halo

Tālofa

Ni sa Bula Fakaalofa lahi atu

Bonjour

Mālō e lelei

Kia Orana

Ia Orana

Bonjour

Hello

Kia Ora

