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Guidelines for General Surveillance Programs

INSIGHTS AND CONSIDERATIONS FROM SYSTEMS THINKING AND NINE CASE STUDIES

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The Australian Bureau of Agricultural and Resource Economics and Sciences is the research arm of the Australian Government Department of Agriculture, Water and the Environment.

Our mission is to provide professionally independent data, research, analysis and advice that informs public and private decisions affecting Australian agriculture, fisheries and forestry.

ABARES performs applied economic and scientific research, through developing innovative modelling techniques, undertaking comprehensive surveys and developing internationally recognised data management processes.

Contents

1 Introduction

- Australia and New Zealand have developed world-renowned biosecurity systems in response to the threat that biological invasions pose to agriculture, biodiversity, society and the economy.
- However, biosecurity risks are increasing as a result of expanding trade volumes, increasing population, growing traveller numbers and climate change.
- Surveillance is a vital component of biosecurity. It refers to the processes related to collecting, recording and analysing data about the presence or prevalence of pests, weeds or diseases and using the data to inform action.
- Surveillance can assist with:
  - early detection of invasive species, which maximises the chances of eradication or containment being feasible
  - understanding the spread of pests, weeds and diseases to inform activities related to prevention, management and preparedness
  - evidence of freedom claims for exotic pests and diseases that can support access to lucrative markets that have stringent biosecurity requirements.

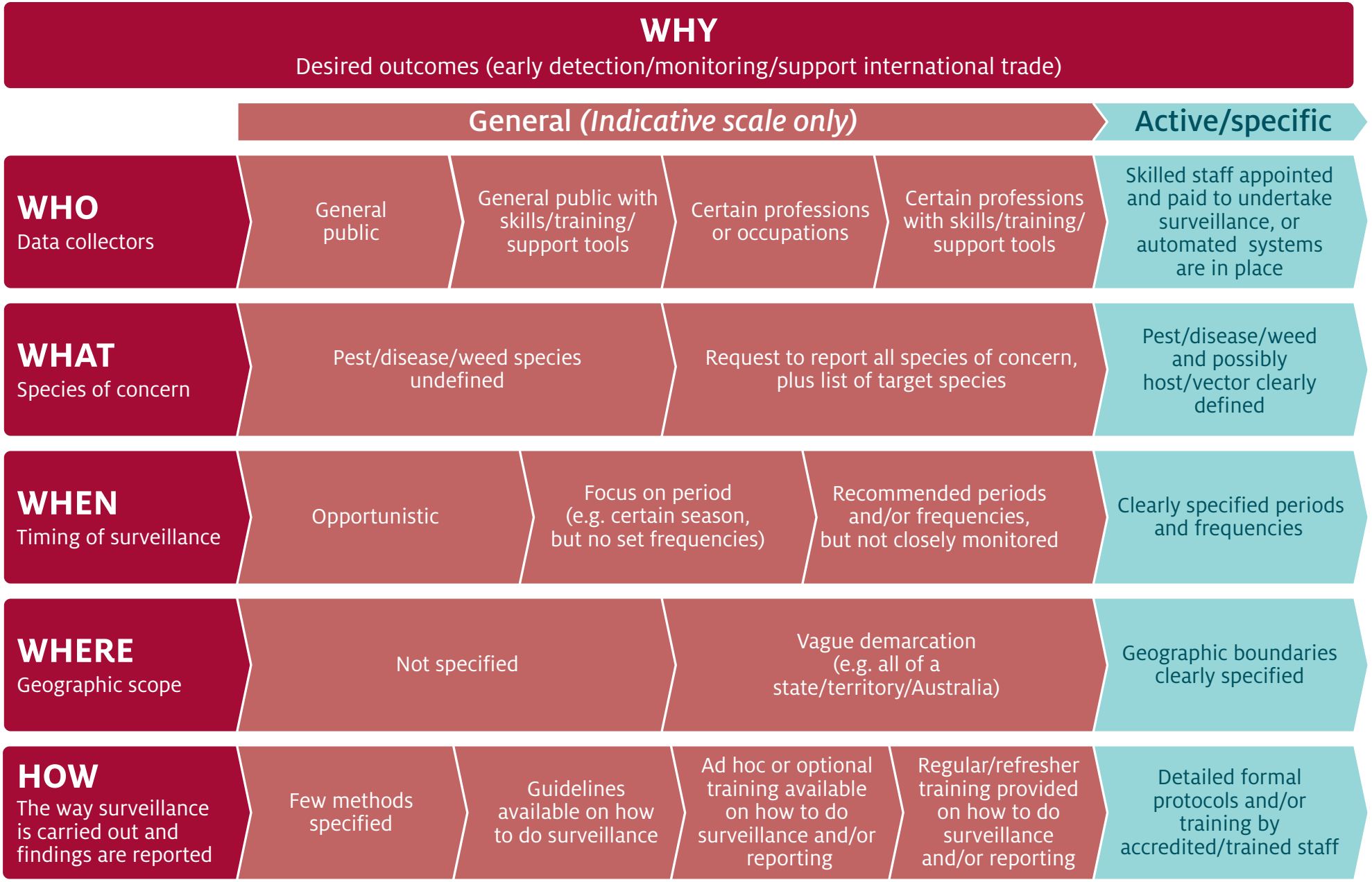
1.1 What are general surveillance programs?

- The definition of general surveillance varies between sectors. For the purpose of this document, general surveillance programs involve people from all walks of life in a process of gathering and reporting information about the presence of pests, weeds and diseases in a way that is fit for purpose. General surveillance activities usually involve elements of opportunism to broaden the coverage of surveillance and/or achieve more cost-effective biosecurity outcomes.
- General surveillance programs involves a continuum of activities ranging from unstructured fortuitous ad hoc detections to relatively highly structured and carefully designed activities, but excluding active surveillance (also called specific surveillance). The opportunistic aspect of general surveillance programs can relate to who is doing surveillance, what is being monitored, when, where and/or how activities are undertaken. The general surveillance program, continuum is illustrated in Figure 1.
- General surveillance complements active surveillance, which is the more traditional form of surveillance involving a rigorously designed sampling strategy and allocated staff. While scientifically rigorous, active surveillance tends to be costly and not well placed to deliver the extent of surveillance needed in response to increasing biosecurity risks.

1.1.1 What are data collected through general surveillance programs used for?

- General surveillance program data are used for a wide range of purposes, such as:
  - producing evidence of freedom from important pests or diseases to support trade
  - enabling the early detection of pests, weeds and diseases of concern that maximises the feasibility of eradication or containment, including forms of syndromic surveillance programs in the livestock industry
  - contributing to understanding current and likely spread of pests, weeds, including adding data to state/territory-based and national databases that monitor spread; and modelling of future spread
  - early warning for farmers, community groups, vets and local governments to know what pests, weeds or diseases are approaching
  - supporting monitoring and evaluation of a general surveillance program, for example to understand the geographical coverage of reports and to inform subsequent activities, such as community outreaches
  - other benefits, such as delivering biodiversity data that are of benefit to participating organisations.

FIGURE 1: The general surveillance program continuum with indicative subdivisions



1.2 The Guidelines

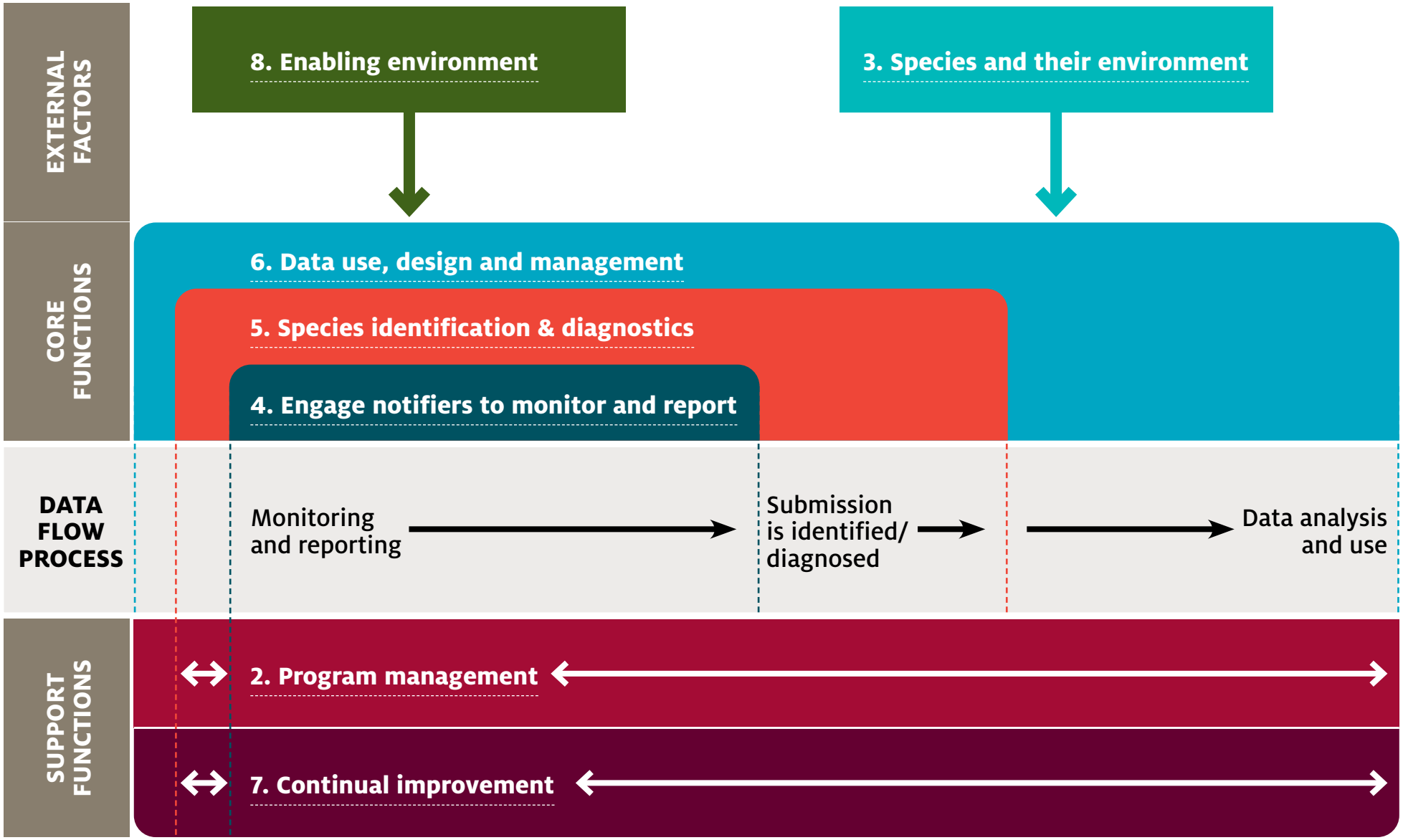
- The Guidelines for General Surveillance Programs (the Guidelines) provide high level key considerations for program coordinators, people who make funding and policy decisions related to general surveillance programs and those responsible for monitoring and evaluating such programs. Based on nine case studies of general surveillance programs across sectors the Guidelines provide practical insights into how to make general surveillance programs work.
- The purpose of the Guidelines is to provide a bird's eye view of the different components of general surveillance programs that require consideration, including some of the key interactions between them, rather than in-depth guidance on any particular aspect.
- The Guidelines provide considerations for all stages of invasion, including early detection of exotic, new and emerging species through to monitoring established species.
- The subsequent sections deliver key considerations for the key functions of general surveillance programs. These functions comprise **program management, reporting and monitoring, pest and weed identification and disease diagnostics, data management and analysis, and data use**.
- The Guidelines have been designed to allow people new to general surveillance programs to read the document from cover to cover. The structure and table of contents allow others who would like to read up on the considerations for a particular aspect of a program to readily find and access the information.
- As general surveillance programs are diverse, not all considerations presented in this document will be applicable to all programs, neither does it contain all considerations required for any particular program. The intent is to highlight common issues that were found in multiple diverse case studies and the literature to sensitise readers that these issues exist.
- The content of the Guidelines is not in any particular order. Most general surveillance programs develop and evolve through iterative processes, often through learning by doing and adjusting to the needs of various key stakeholders. Most of the Guidelines assists in navigating the evolution process.
- As the definition of general surveillance and some related terminology vary between sectors, the way some terms are used in this document may differ to what some readers are used to.
- Note that in this document people undertaking monitoring and reporting of pests, weeds and diseases are referred to as notifiers.

The Making General Surveillance Work project

The Making General Surveillance Work project explored general surveillance programs through a systems thinking lens to deepen understanding of the different components involved and the interactions between them. It brings together lessons learned from across sectors (plant, animal, weed, marine and environmental biosecurity) based on literature and the lived experience of the people involved in nine general surveillance programs.

It provides an integrated view of general surveillance programs acknowledging that they are dynamic systems with interactions between the different aspects of these programs and with the broader context. It shows how weaknesses or changes in one part of the program are likely to have implications elsewhere that could be sources of considerable transaction costs in terms of time, effort and expenditure.

FIGURE 2: An overview of the chapters and how they relate to the data flow process



1.3 Research approach

- The exploration of the nine case studies involved:
  - a desktop review of available written material
  - interviewees with key informants representing the various functions of the program
  - analysis of interview findings
  - a findings summary was presented to a focus group for verification and to fill gaps. The focus groups also comprised of representatives of various functions of the program
  - for five case studies an online survey was used to capture notifiers' views.
- Several people beyond the case studies were interviewed to verify findings, fill gaps and broaden perspectives.
- In total the research activities involved 93 interviews; 8 focus groups; 5 notifier surveys.
- See the Findings Report for more about the research approach and methods used.

The case studies

FishWatch South Australia
FishWatch provides an 'one-stop-shop' for the general public, commercial fishers and professionals (e.g. airport customs staff and police) to access information and report potential marine pest sightings or suspect fishing activities to the Department of Primary Industries and Regions, South Australia (PIRSA) experts via the Fishwatch SA hotline. Fishcare volunteers are a key component of the program. Fishcare volunteers provide face-to-face support to fishers and the general public at key fishing locations across the state.

Indigenous community engagement about surveillance
This case study focused on effective engagement with Indigenous communities about general surveillance. It differs from the others in that it does not relate to a specific program. A range of people who have engaged with Indigenous communities about general surveillance have been interviewed. Most interviewees had a connection with the Northern Australia Quarantine Strategy (NAQS) and/or the Indigenous Ranger Program of the National Indigenous Australian Agency.

MyPestGuide – Pantry Blitz
Members of the public place sticky traps with a Khapra beetle lure combined with a generalist lure in their pantries. They make weekly reports for one month by submitting photos through the MyPestGuide™ Reporter app (MPG-RA). The Department of Primary Industries and Regional Development, Western Australia (DPIRD) developed the app. The data collected can provide supporting evidence of pest freedom if trading partners enquire about the status of Khapra beetle in Western Australia.

Northern Australia Biosecurity Surveillance Network (NABSnet)

This program utilises the coverage, expertise and goodwill of private vets working in northern Australia to improve animal pest and disease surveillance. It provides private vets with training, resources and subsidies to do quality significant disease investigations. The program offers networking opportunities between private vets and people in the government biosecurity sector (particularly government vets and laboratory staff).

New Zealand General Surveillance Program – Plant health component

This is a hotline-based system that allows all New Zealanders to report suspected sightings of pests, weeds and diseases. The program also involves targeted engagement of groups that have the motivation, capability, and access to report pests, weeds and diseases. It is funded by the New Zealand Ministry for Primary Industries (MPI).

Rural Practitioner Enhanced Disease Surveillance, South Australia

PIRSA provides subsidies for private veterinary investigations into livestock diseases involving laboratory tests to rule out notifiable diseases and where an infectious agent is a potential cause. Five PIRSA vets are appointed to oversee certain livestock species and certain regions. They build trust relationships with private vets to encourage and support them in their participation. The Program assists PIRSA to provide proof of freedom from certain diseases to international markets and to detect exotic or newly emerging diseases as early as possible.

State Wide Array Surveillance Program (SWASP)

Most Port Authorities and Industry Ports (referred to as ports) in Western Australia deploy and retrieve settlement arrays, sets of plates submerged in the marine environment on which the larvae of marine organisms and marine algae can settle. Arrays are placed in optimal locations around the ports in summer and winter each year. DPIRD administers the program and delivers support to the ports, including equipment, technical knowledge and sample analysis and interpretation to the ports. eDNA technology contributes to species identification.

Weed Spotters Network Queensland

A citizen science program that aims to detect and identify new incidents of state restricted and prohibited weeds early so that preventative measures can be taken. The Queensland Herbarium and Biosecurity Queensland co-fund the program and support it in various ways. Weed spotters are provided with training and a handbook to guide them in their weed spotting activities. Volunteer regional coordinators provide support to weed spotters and promote the program in their regions. Weed spotters submit a specimen to the Herbarium or send in photos via email or the Weed Spotter App to make a notification of sightings.

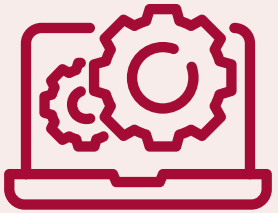
Weed Spotters Victoria

Agriculture Victoria (AgVic) coordinates the targeted recruitment and training of volunteers with the necessary skills, opportunity and motivation to report when they see any of a defined group of 8 to12 of state prohibited weeds. Monitoring and evaluation ensure a desirable state-wide coverage of weed spotters. AgVic funds and administers the program and undertakes most of the species identification through photo submissions, species descriptions and field visits.

2 Program management

Key points

- General surveillance programs require good program management that involves a program coordinator (team) to ensure clear ownership of the program.
- The in-depth involvement of more than one person helps with bouncing off ideas, sharing the load and maintaining momentum if someone leaves.
- General surveillance programs require sufficient resourcing. They need to continually demonstrate worth to maintain financial and stakeholder support.
- Ways to start general surveillance programs include conducting pilots or tapping into existing networks.
- Considerable investment may be required to ensure general surveillance programs dovetail with their prevailing policy, operational and social environment.
- Knowledge from various sources needs to be integrated to ensure general surveillance programs are fit for purpose, practical, well-supported and sustainable. Knowledge brokers can be helpful with knowledge integration.
- Define roles and responsibilities clearly to ensure no tasks get overlooked and to ensure quick responses to suspected detections and to minimise the impact of staff changes



- Establishing connections between people fulfilling the same function is beneficial, such as to establish mutual support and greater consistency in how tasks are performed.
- Connections between people fulfilling different functions assist with establishing trust, information flow and self-organisation throughout the program.
- Networks with external stakeholders, such as local governments, other government agencies, scientific organisations and industry bodies can offer various benefits to general surveillance programs.
- Program rules and procedures require careful consideration in terms of defining roles and responsibilities and understanding contextual factors.

2.1 Introduction

Successful programs need good program management related to various aspects and adequate funding. This chapter contains considerations for both the start of a general surveillance programs as well as over time as a program evolves.

2.2 Ensure effective program management

- Appoint the right people to ensure good program management, including a dedicated coordinator and/or a small team to oversee the running of the program as a whole.
- It is better to have more than one person involved so that team members can bounce ideas off each other knowing that the others understand the context well and the high workload over intense periods can be shared. It reduces the risk should someone heavily involved in the program leave at short notice.
- However, if the responsibility of a general surveillance program sits with a team—that have many other responsibilities—there is a risk that there is no clear ownership of the program, which may undermine the leadership and responsiveness that these programs need.
- A steering committee (or similar) can be helpful with problem solving and building connections. Considerations include the required skill set (scientific, policy, IT, communication, engagement, logistical, etc. expertise), the level of decision-making powers needed, and the level of understanding of the day-to-day practicalities that would be valuable.

Enablers

- Effective program planning and coordination require experience and access to a wide skill set, such as the biology of the species involved; technology (e.g. relating to apps and identification/diagnostics); processes; data management; and notifier and stakeholder engagement.

Challenges and barriers

- The time and effort needed for effective program administration can be easily underestimated.
- Getting all who need to contribute to the program engaged in a timely fashion can be difficult.
- Dealing with stakeholder and community expectations can be a balancing act, for example, successful programs are often under pressure to increase their scope.

What do good program coordinators look like?

Good interpersonal skills, including with different groups; good communicators and network builders; instil trust; passionate; helpful; responsive to issues and opportunities as they arise; committed to continual improvement; approachable, a champion for the cause; and ability to drive the program. Continuity in the person appointed is key to facilitate trust relationships.

2.3 Define the objectives and scope

- Define the objectives of a program, including the target pests, weeds and diseases (or their hosts or vectors) and the program's geographical reach. The objectives may be drawn from legislation, market access requirements or biosecurity processes for a particular jurisdiction. The objectives may change over time as the program evolves.
- The objective and scope informs the sampling design, which is discussed in section 6.3.
- Embedding the program scope within legislation and government reporting requirements makes it easier to attract government funding.
- It is beneficial to focus on a limited number of pests, weeds and/or diseases as it facilitates:
  - concentrating on those that will deliver the greatest return on investment
  - greater confidence in notifiers being able to identify the pests, weeds or diseases of concern
  - targeted messaging.

- Programs with a broad scope, such as hotlines for reporting any unusual sightings or symptoms, can run campaigns on pests, weeds and diseases of key concern.
- Expect resistance against limiting a program to priority species and manage it by reminding people of the benefits of a more targeted approach and by not completely excluding all other unusual finds.
- Some general surveillance programs balance the species scope with notifier participation as long as it is fit for purpose. There is little point in having a program that is scientifically highly rigorous, but that no one supports.
- Some programs may not pick up all species of concern, but the chosen scope is manageable and supports notifier participation.
- Some programs include more species in their scope to include species that are of interest to notifiers, because a focus on, for example, exotic or new and emerging species only may not be enough to keep them engaged.

2.4 Secure sufficient resourcing

- To assist a general surveillance program deliver results, it is critical that it is adequately funded and resourced to ensure future performance. Resources include financial costs for salaries and operating, and in-kind contributions from interested parties

2.4.1 Sources of resourcing

- Program resourcing may come from different sources, e.g. continued federal and state government funding, grants, industry bodies, other non-government organisations (NGOs), business and levies.
- Programs embedded in biosecurity legislation or organisations' strategic goals that continue to demonstrate results are often well placed to sustain ongoing funding.
- Some biosecurity programs attain resources by 'piggy-backing' on other programs (e.g. compliance reporting)

2.4.2 Start-up resourcing

- Starting a program on a small scale or as a pilot program requires less upfront funding.
- Pilot programs can assist with 'getting runs one the board' that could be valuable in attracting more funding from various sources.

2.4.3 Staffing resources

- Using paid staff time for administration, internal and external stakeholder engagement, capacity building and triaging submissions ensure continuity and strong accountability for these vital tasks.
- Program administration is usually funded and implemented by the lead government organisation, but some components (e.g. stakeholder engagement) can be outsourced.
- Sometimes pest and weed identification and disease diagnostics are absorbed within routine business of government but staffing capacity needs to be monitored during high reporting periods. Some NGOs contribute to disease diagnostics, such as for wildlife health. In some cases private companies might be best suited to identify ongoing routine notifications and large influxes.

2.4.4 Notifier costs

- Notifiers can contribute to general surveillance in a variety of ways depending on the context. These include participating voluntary, being paid (such as some Indigenous communities) and paying to contribute and be part of the program (e.g. SWASP). Some notifiers contribute in-kind as part of their participation.
- Financial compensation can be offered to notifiers to cover substantial travel and accommodation expenses (e.g. in remote areas). This may increase administration requirements, but also willingness to make notifications.

2.4.5 Other costs

- Other costs can include legal advice, tools and equipment, software packages, workshop costs (venue hire and catering), production of communication material and postage/delivery fees.

2.4.6 Understand the cost-effectiveness of a program

- While aspects of general surveillance programs can be delivered at low cost, these programs generally require considerable funding.
- They have costs that active surveillance may not have, such as those associated with:
  - effective notifier and stakeholder engagement
  - development and maintenance of reporting tools (e.g. apps)
  - intellectual property
  - OH&S and liability issues
  - data cleaning.

- However, general surveillance programs often deliver much more than generating data. For example, they may deliver:
  - networks to draw upon, e.g. for other surveillance activities
  - a more educated and engaged community who are better equipped to take up their shared responsibility in biosecurity
  - trust relationships with professionals, such as private vets, which will make it easier to engage them during an emergency biosecurity response
  - networks throughout remote areas that support the mental health of isolated practitioners
  - fee for service contracts with Indigenous rangers that create jobs in remote areas, and a sense of control over local surveillance.

2.4.7 Maintain funding

- Continually demonstrating worth is important to maintain funding and the support of key stakeholders.
- Demonstrating worth can be difficult if the program focuses on pests, weeds and diseases that are rarely present, but some strategies include:
  - telling a narrative of the potential impacts if a notification wasn't made, drawing on costs incurred by similar species or on overseas examples
  - emphasising the worth of the agricultural trade that a program supports
  - demonstrating the role the general surveillance program plays in meeting biosecurity legislation or organisationally strategic plans
  - highlighting outcomes with annual statistics on notifications, growth in memberships, training numbers, number of reads and hits on websites
  - highlighting the additional outcomes that general surveillance programs deliver.

'The cost of doing these sorts of things pales into insignificance relative to the clean-up costs if invasive species come in' ***[SWASP interviewee]***

2.4.8 Further reading

- Hester, S. M., & Cacho, O. J. (2017). The contribution of passive surveillance to invasive species management. Biological Invasions, 19(3), 737-748.
- Morfe, T. (2014). An Economic Evaluation of Enhanced Passive Surveillance Design: The Difference 'Weed Spotters Project'Make in Early Detection (The Discovery of Salvinia molesta incursion in 2010 in West Gippsland, Victoria). Department of Environment and Primary Industries (DEPI), Melbourne.

2.5 Ways to get a general surveillance program started

- There are various considerations involved when a program is initiated, many of which are discussed throughout the Guidelines as they may not be clearly defined at the start and change over time, such as the scope of the program (see 2.3) and the sampling design (see 6.3). Below are a few models of how different programs started by collaborating with potential notifiers and other key players.

2.5.1 Consider starting as a pilot program

- A common way to start a general surveillance program is through the use of a pilot program.
- Starting small enables easier in-depth engagement, ironing out of 'teething problems' and building trust to later grow the program.
- Where pilot participants have a positive experience they often become advocates for the program thereby attracting more support.

I think you can't say enough about ... work with those who want to work with you to start with. Don't give yourselves early roadblocks. I think that's so important for a program like this. Yes, get it up and working, because that allows you to iron out the creases with people that you trust, with that mutual trust, it helps you. ***[SWASP coordinator]***

- Here are some considerations for pilots that proved helpful for other general surveillance pilot programs:
  - begin with stakeholders and notifiers who are willing, rather than focusing on areas or groups that represent the highest risk
  - be flexible, expect and work through 'teething problems'
  - work closely with notifiers and others in the system to see how the program can better meet their needs
  - build networks with others who have been through a similar process to learn from their experience
  - engage with important stakeholders who are 'nay sayers', bring them on the journey by showing that their objections are considered and demonstrate how related issues are being addressed
  - have a staged approach as part of the pilot so each stage can learn from the previous stages.
  - Allow enough time and resources for engagement and to address unforeseen issues.

2.5.2 Consider what networks and programs can be tapped into

- There may be existing networks and programs that general surveillance may be integrated with.

Existing networks

- Identify and get to know existing networks that could be engaged to support a new general surveillance program, such as farmer, volunteer or community groups, or private vet or on-farm consultancy networks. This includes knowing
  - the capacity, willingness, motivations and barriers of the people in the network(s) to participate and contribute to surveillance
  - how different groups interact.
- Once networks are engaged they can be built upon (see 2.9 and 2.10 for building internal and external networks)

So just who is filling 'the zoo' here, who are the players, who's got some skin in the game, who's got an interest, who's got an influence, and what do they see as being needed. What's in it for them? How much they contribute. What are the narrow paths of the pipe for them?
[NABSnet interviewee]

Existing programs

- Benefits of integrating a general surveillance with an existing program (such a program with other biosecurity purposes, or a well-known hotline for reporting compliance issues) include utilising resources from the program, such as funding, staff, volunteers and networks.
- Challenges may include:
  - sample design of the existing program (e.g. distribution, type and frequency of monitoring by notifiers) may not match the goals of the general surveillance initiative
  - limited control over the administration of the larger program
  - baring the risk of being tainted by the performance of the larger program (e.g. if the larger program is poorly received by the public, then the biosecurity program is likely to suffer if there is not a clear distinction between the two programs)
- Challenges can be managed with clear communication and an effort to build the internal networks between the programs (see 2.9)

I think it will get funded because it's not a surveillance tool for us, it's a compliance tool mainly for fisheries and aquaculture. ... there is no discussion of ever being wound down. I think it's too important for the fisheries compliance aspect of it and I guess there is a benefit as a surveillance tool for Biosecurity SA because we obviously get benefit from it.
[FishWatch interviewee]

2.6 Align a program with its context

- Ensure a new general surveillance program (or an existing programs with major changes) fits in with the prevailing policy, operational and social environment. This requires knowledge integration (see section 2.7).
- This may take considerable time, effort and cost on behalf of the program itself as well as for the various groups and organisations who are expected to contribute to the program. This means program planning and design may need to:
  - ensure the general surveillance program complements existing arrangements for specific pests, weeds and diseases - such as for active surveillance, and plans and activities relating to response, eradication, management and preparedness
  - comply with existing processes and requirements, such as for pest and weed identification and disease diagnostics, data management, and legal considerations. Sometimes the needed processes and guidance do not exist, for example, some general surveillance programs had to develop the privacy guidelines from scratch as there were no precedents in the mother organisation
  - allow time and potentially allocate resources to support partner teams and organisations to make changes – for example a lab or herbarium to put in place processes and procedures to accommodate a surge in notifications; or servers to deal if an increased data load
  - allow for establishing effective working relationships between organisations, for example, it can take three months to achieve smooth operation when a government organisation enlists the services of a new private call centre.

- Other considerations include:
  - other teams in a large organisation may not always appreciate the relevance of a general surveillance program to them, and may lack the sense of urgency that general surveillance program managers expect
  - there could be resistance from some teams to accommodate a general surveillance program, especially if the program requirements add to already hefty workloads
  - proactively identifying these issues including finding ways to deal with them may save time, effort and frustration. For example, rather than the program management team engaging with other teams, it might be more effective for their senior managers to first engage with another team's senior manager(s) to facilitate the importance of the general surveillance program requirements being prioritised from the top down.

Context alignment for MyPestGuide™ Reporter and the Pantry Blitz

The MyPestGuide™ team worked with various other teams in WA Department of Primary Industries and Regional Development (DPIRD) to ensure the department supports the reporting tool and the Pantry Blitz activities. It took time and effort to convince different biosecurity managers that the data collected using the app could support future biosecurity work. The project team worked with their developer and IT team to ensure the server could handle the added load of reports including multiple photos. Liaison with the legal team was needed to deal with privacy issues and any public complaints. However, as the program was new to the department there were no precedents or policies/procedures in place for some issues including how to deal with OH&S issues, such as if someone had an allergic reaction to a substance on the trap or the trap accidentally got stuck to a child or pet. The MyPestGuide™ team thus developed new procedures. At the time the Pantry Blitz's friendly, personal engagement style with the community was at odds with the department's communication style that tended to be more formal and risk averse. Some pathways did not exist, e.g. the program team had to work with various DPIRD teams to instigate a pathway for Pantry Blitz specimens to reliably reach the department's identification team in a timely manner. The MyPestGuide™ team was able to continue supporting public surveillance, representing teams and some internal functions within the department as the department goes through a restructuring process.

2.7 Integrate knowledge

- Good program management enables the integration of knowledge from a wide and diverse range of sources both at the start and throughout the lifetime of a general surveillance program. Knowledge integration delivers new nuanced knowledge about how to best design a program that is sustainable, practical for all involved and effective in achieving its goals.
- Usually no one has intimate knowledge of all aspects of a general surveillance program as knowledge tends to sit within groups or with certain individuals.
- When programs are planned or when changes are introduced it could be easy to assume that certain people or systems will contribute to the program in certain ways with little understanding of the pressures that affect them.
- Knowledge is needed from different areas (e.g. scientific, policy, trade, social sciences, data management, data analysis, IT) and from the practical experience of people across the program.
- Be mindful of 'knowledge hierarchies' that influence whose knowledge counts most. Scientific or technological knowledge could easily be privileged at the expense of local knowledge, which is key to ensuring notifiers participate in a program
- Key ways to achieve knowledge integration are through:
  - establishing communication and interactions between key people
  - using knowledge brokers
  - documenting the integrated knowledge, for example in the surveillance plan and standard operating procedures.

2.7.1 Use knowledge brokers

- Knowledge brokers are well-connected individuals who have an in-depth understanding of different groups contributing to a general surveillance program. They facilitate connection and information flow between these groups. They are well placed to:
  - understand how a change in one group can impact another group
  - 'translate' information between diverse groups, such as government officials and farmers, or app developers and community groups, as they know what language, concepts and examples will resonate with a particular group
  - connect individuals with others that can be of value to them
  - help identify solutions to issues that will be acceptable to both parties.

Examples of knowledge brokers

Indigenous liaison officers are conduits between scientists, administrators and the Indigenous rangers who work on country. Successful officers usually have a deep understanding of cultural issues affecting Indigenous people's participation in surveillance; and of government processes and requirements.

Various general surveillance programs have a 'trusted friendly face' role who notifiers can turn to if they have questions These could be carefully selected volunteers, or government staff not employed by a general surveillance program, but who interact with notifiers in other capacities. They often have a good understanding of both notifiers' and program administrators' perspectives.

Government vets sometimes support private vets to encourage them to contribute to significant disease investigations. Several government vets have been private vets in the past so they understand the pressures private vets are under. They understand internal workings and pressures of their government department.

2.8 Define roles and responsibilities

- Clearly define the roles and responsibilities of all involved to ensure nothing falls through the cracks, to facilitate quick responses to suspected detections where needed and to minimise the impact of staff changes. Key areas for consideration include:
  - task allocation throughout the system. For example, a well-designed reporting tool is of little use if no clear policies and procedures with allocated people are in place to ensure notifications coming through are checked regularly; are verified; and systems are in place to ensure the data reach the appropriate people who are authorised to initiate the appropriate response
  - monitor task allocation over time. For example, a person might initially be responsible for all interactions with notifiers, but over time it becomes apparent that it is better to have one person focusing on providing notifiers with technical support and training, and having another person who addresses any compliments, concerns and complaints from notifiers
  - clear guidance and procedures for people's expected roles that are regularly reviewed and updated. These are particularly valuable in relation to escalation processes when a priority pest, weed or disease has been identified, when time is precious and specific contact pathways and reports are required. Diagrams can be helpful when staff are under pressure. Agreements can assist with clearly spelling out expectations
  - handover points of responsibilities. For example, between people responsible for investigating a notification and those responding to a confirmed detection, even if those who have been part of the investigation are still asked to provide forms of support
  - responsibility for different pests, weeds and diseases for programs with a wide scope especially if highly specialised skills are required to identify/diagnose them

- clearly specified contact people for key communications, such as when a priority pest, weed or disease have been detected; or for communication between two organisations or large groups, to prevent mixed messages and coordination of requests
- needs for capacity building. For example, where lab staff need to provide feedback to notifiers, and they have not done it often before, they may benefit from guidance on interacting constructively with community members to ensure a positive reporting experience. Other staff interacting with the public following a suspected detection, such as incident investigators or biosecurity officers, may benefit from training in conflict resolution and other skills to enable smooth and productive interactions with people on whose property the suspected detections have been made.

So my [lab] team … were also involved in actioning field visits … from doing, going out into the field and working out what the risk was … So that big change of recognising the enormous workload that generated and being able to setup and have a team that was dedicated to doing the investigation component, that made a huge difference. It allowed expertise to be developed in that space … but it also allowed the laboratory diagnostics component to focus more directly on some of the technical difficulties around doing the diagnostics and less on case management. ***[NZ lab representative]***

2.9 Maintain connectivity throughout the program

- Establish connections between people fulfilling different functions within a general surveillance program.
- These functions include data collection, identification/diagnostic, data management, etc. with representatives often spread across geographical locations, scales, departments and/or networks.

2.9.1 Connect individuals fulfilling the same function

- Such connections lead to learning from each other, mutual support, trouble shooting, sharing ideas, discussing common challenges and achieving greater consistency in how tasks are done. It provides people with a sense that they are part of something bigger that delivers positive outcomes.
- Where individuals are working at different locations, connect them through face-to-face and/or online meetings, online chat forums or get-togethers, for example, in conjunction with other events that most are likely to attend.

And then we [program coordinator and government vets supporting notifiers] would get together and we'd share aspects of the program and what we've been doing, trying to get our messages consistent. I really had excellent feedback from them [government vets] on that, because it was such a good opportunity for everyone to talk about their jobs together and get a sense of being a team. ***[Livestock general surveillance program coordinator]***

2.9.2 Connect teams/individuals representing different functions

- Such connections can be beneficial for:
  - people better understanding how their actions are affecting others and/or how they can support others in the system. For example, for notifiers to appreciate the additional time and effort that is required from lab staff when they submit incomplete reports; or for program administrators to appreciate the practical implications of the program requirements to notifiers; or for data users to appreciate the effort required from data managers to format data to their specifications
  - building trust, facilitating mutual understanding and self-organisation, such as the people representing different functions identifying ways to overcome an issue that involve them all, rather than relying on program managers to solve it
  - the identification of blind spots
  - speeding up processes and improvements, and preventing costly delays and dealing with issues in retrospect
  - enabling information flow and learning

They [potential notifiers] give us the most practical advice, it's incredible. They say things like 'Stop telling me to take a photo of the bug... We have our gear, our belts, our tools. Phones are not allowed...' You're kind of going wow, we never, ever thought of that. ***[Biosecurity comms manager]***

You're really talking about a triangle of private vets, PIRSA and the lab. And the communication in that triangle has to be very good. Because, otherwise we can end up having to retrospectively deal with issues of tests that may or may not have been requested. Or were or weren't appropriate for government subsidy testing. ***[PIRSA staff member]***

I find it's very important to involve the laboratory people in what's going on. I go and talk to them in the micro lab so that they're not doing unnecessary tests I think it gives them much more interest if they hear the whole story behind things ...And the importance of, we urgently need this ... test done. Or no, it's probably not so essential to do it [a particular test] right now. ***[Government vet]***

2.9.3 Ways to strengthen internal connections and information flow between teams/ individuals representing different functions

- Appointing a good coordinator – will ensure connections are being made and maintained throughout the program, including with notifiers and their representatives.
- Instigating direct face-to-face contact and meetings – with the deliberate goal of encouraging interaction. This could be regular forums that bring together people from across the different functions of a general surveillance program to interact.
- Arranging visits to other teams – such as lab staff visiting the call centre to explain to call centre staff what happens to the calls that they put through to the lab and to better understand call centre staff's perspectives.
- Encouraging long standing trust relationships that maintain corporate knowledge – to support a shared understanding about a program, its challenges and opportunities.
- Having different teams closely located, such as in the same floor, to allow for direct and impromptu information exchanges.
- Setting agreed communication arrangements, such as the engagement team liaising with lab staff on when to run a particular campaign that will promote reporting, to ensure it fits within the capacity of the lab staff.
- Appointing clear 'go to' people – to make it easier to connect with people representing another function, and have clear communication lines to prevent mixed messages from one group to another.
- Including in the training and briefings for people representing one part of a program to be responsive to the needs and requests from other parts of the program.
- Engaging 'up' – to ensure senior managers are made regularly aware of the successes and importance of a general surveillance program so they understand the needs and realities of the program.
- Initiate frank discussions about the needs and limitations of different teams when necessary, but manage it well to prevent tension from lingering.

> … the first event was a master class to get them together to go through all the business of doing disease investigations, and meet the others in the network, and meet the pathologists who they might be sending those samples to. … "And if I've [vet] got a query about this I [vet] can ring that pathologist up or I [vet] know that person and build those cross-connections" … at the end of a couple of days, people were eager to be part of a more collective something. ***[Consultants supporting NABSNet]***

2.10 Build external networks

- Networks with external stakeholders can offer various benefits to general surveillance programs. These stakeholders may include local governments, other government agencies, scientific organisations, industry bodies, community groups, NGOs and those related to a particular industry (such as livestock transports, knackeries, abattoirs and fencing contractors). External networks can contribute to things such as:
  - meeting notifier expectations – for example, notifiers may have questions that are outside the scope of the program, such as the management of endemic pests, weeds or diseases. It is valuable if the program team can refer such enquiries to others who can help
  - knowledge brokering – for example, where industry body staff have trusted relationships with farmers, they could relay monitoring and reporting messages to them in language that resonates with them. These staff members are also well placed to explain to the general surveillance program management team what farmers' perspectives can assist with finetuning messaging and addressing barriers
  - learning – for example, networks with other general surveillance program staff can offer insights into what works and what does not work. Networks with scientists can assist with staying abreast of the latest scientific developments that could be of value to a general surveillance program
  - having more 'eyes and ears' - for example, when something significant has been detected, wide networks mean more people to keep an eye and ear out for further occurrences
  - specimen collection or checking-in on notifications – for example, remote areas may not be well serviced by courier services, or it might be difficult for vets to reach at short notice. Having relationships with suitably skilled people could assist with the timely attendance to these cases
  - Identification/diagnosis of usual specimens/samples – such as lab or herbarium staff that are well connected with other experts that they can turn too when unsure
  - program promotion – for example, connecting a program in with other large events, such as a science festival can increase awareness
  - program legitimacy - when people hear positive comments about a general surveillance program from entities other than from the agencies responsible for the program it increases the credibility and legitimacy of the program.

2.10.1 Ways to build and maintain external networks

- Many of the ways to facilitate effective connection within a program, discussed earlier, also apply to cultivating external networks. These include the importance of a good coordinator, personal contact and face-to-face meetings, long standing trusted relationships and being responsive to the needs and requests of key stakeholders.
- Other strategies to support building external networks include:
  - conducting a stakeholder analysis to better understand who are potential sources of support, including their motivation, capability and capacity
  - building relationships with people who are well-connected – for example, people in volunteer roles who are well connected (such as working for organisations where people work outdoors), offer access to more 'eyes and ears' when something significant is detected
  - attending events, such as conferences and seminars to build networks
  - organise meetings that will draw the people you would like to network with.
- Principles that are helpful in cultivating enduring external networks include:
  - aiming for mutually beneficial relationships – so there is a sense of reciprocity
  - maintaining a positive program profile – by reminding stakeholders of the benefits, goals and achievements of a general surveillance program so that they feel part of something bigger that is making a difference
  - being sensitive to the pressures others are under – even when a individual, group or organisation is well placed to assist with a particular tasks, if they are under considerable strain due to their current roles and responsibilities, requests from a general surveillance program for support can exacerbate an already challenging situation

2.11 Remain responsive to contextual factors

- Key contextual issues should be considered when designing and reviewing general surveillance program rules and activities, including tailoring messaging to prevailing trends or behaviours in the community.
- Contextual factors may include things such as:
  - community fads – for example, the popularity of houseplants on social media, including prohibited plants, may cause a surge in notifications of suspected illegal plants and seeds that a program needs to deal with. Certain invasive plant species, such as cactus species, may go through a phase of popularity that may require a campaign about their invasiveness and a call to report any sightings
  - diverse community values – some may see certain weed species as providing food and habitat for native fauna. This may have implications for how to best engage different groups about these species, including for general surveillance. Some culturally and linguistic diverse groups may value certain weed species as they are (or are related to) traditional foods from their home countries. This may require targeted communication, including written materials in relevant languages
  - risky behaviours – for example the time and cost involved in traveling over long distances may prohibit vets from visiting farms, and livestock producers may choose to drive sick animals with unusual symptoms to the vet. This may contribute to disease spread
  - economic circumstances – may influence how likely it is that a producer will call a vet. During a drought when producers are under financial strain they are less likely to contact a vet. When livestock prices are high producers may be more likely to call a vet to save sick animals.

…so obviously the growing sort of social media trends … Every other day we're finding a new Facebook group selling or trading in plants and seeds … Those are the people you really want to engage with because they're sort of a higher risk population or group of people, I'd say. ***[NZ Plant Health Incursion Investigator]***

2.12 Further reading

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3 Pests, weeds and diseases and their environment

Key points

- The characteristics of pests, weeds and diseases and their hosts, affect how general surveillance programs are best designed.
- Their detectability depends on their density, mobility, spread, recognisability and concealment.
- Their geographical spread depends on risk pathways, which influence who is best placed to detect and report them.
- Some species offer only a window in time when they are detectable, such as during certain seasons and parts of their lifecycle.
- People may be prohibited from monitoring certain areas due to environmental factors, such as storms, cold climate or the presence of predators (e.g. crocodiles).
- Many programs experience a surge in reporting during the warmer months when more people are out and about.
- People's attitudes vary to different species, which may influence their willingness to report certain species.

3.1 Introduction

The traits of pests, weeds and diseases, their environments and the way people perceive them have a key influence on designing general surveillance programs.

3.2 Characteristics of pests weeds and diseases

The characteristics of pests, weeds and diseases and their hosts, affect how general surveillance programs are best designed. It is important that people who are experts in the relevant pests, weeds or diseases provide input into a program.

Species characteristics affect things such as:

- how they spread, their potential range and vectors
- where and when general surveillance efforts would be most effective
- what are the responsible government agencies or groups based on legislation
- who would be best placed to be notifiers
- the best tools to make detections
- the skill and tools needed to make identification/diagnostics
- the associated cost.

Some species are a higher priority for surveillance due to characteristics such as their capacity to adapt and colonise new places, generate fertile offspring, and to alter the environment that they invade.

I think the key is to have that ... science person driving it. ... Because it's very easy to turn into a comms and engagement type project. You forget the whole reason why you're collecting that data in the first place. So things like temperature for the bug. If you run it at the wrong time of the year, that kind of stuff that I think is invaluable. ***[MyPestGuideTM interviewee]***

3.3 Consider the detectability of a pest, weed or disease

- People's ability to recognise particular pests, weeds or diseases varies.
- Pests, weeds and diseases of concern that are difficult to distinguish from endemic ones, can considerably increase the number of false positives reported.
- Consider the tools and technologies available to detect certain species, such as traps and lures.
- Consider the host species. For example, looking for a disease is not worthwhile in locations where there are no suitable hosts or vectors.

3.3.1 Density, mobility and spread

- Density depends on a range of factors, including the extent to which the pest, weed or disease is present, reproduction rates, transmission rates and the time it had to spread
- The higher the density and spread the more easy a pest, weed or disease is to detect, but the lower the chance that eradication or containment is still feasible
- Mobility depends on an organism's ability to move itself, spread through wind, waterways or rain, or be carried by vectors. Some may 'hitch hike' on vehicles or boats resulting in long-distance dispersal
- People may forget or lose interest in looking for new and emerging pests, weeds or diseases because they are so rare and they show no impacts yet. A key strategy to overcome this issue is to add species that are present so people find things to report. For example,
  - where people who are asked to monitor traps to detect an exotic species, adding a generalist lure to the exotic species specific lure so catching something is more likely
  - combining surveillance of exotic and native species, so the program has biosecurity and biodiversity value.

3.3.2 Recognisability of species

- Recognisability of species of concern depends on things such as size and appearance and how similar they are to more common species, or other conditions such as nutritional deficiencies
- Expect more notifications of species and symptoms that are more noticeable
- Some species have native 'look alikes'. It may be valuable for lab and herbarium staff to learn more about such native species, especially if they are used to dealing mainly with pests, weeds and diseases.
- People who have reported a native 'look alike' need to be encouraged to report subsequent similar detections, and not disregard them as another 'look alike'.
- Inconspicuous species, signs or symptoms are more likely to be reported by experts.

3.3.3 Level of concealment

- Detection of species, signs or symptoms can be difficult when they are concealed, such as in aquatic environments when visibility is low; if plant disease signs first appear on roots systems; and larval nests of insects of concern reside at the top of trees.

Asian Paddle crab can be pale, olive green, brown or purple.'

3.4 Consider the source and spread pathways

- A good understanding of the risk pathway(s) of exotic, new and emerging species will assist in identifying where a pest, weed or disease is most likely to be first detected and therefore who to engage as notifiers.
- Some pests, weeds and diseases have multiple risk pathways.
- When programs cover large areas such as a state or territory, priority species or diseases in one area might be different from another area. This may have implications for engagement activities.
- The chances of establishment and spread in a particular area depends on the probability of arrival and the area's suitability as a habitat. Different risk zones for certain organisms can be identified with tools such as Geographical Information Systems.

3.5 Consider temporal factors

- Some pests, weeds and diseases offer only a window in time where they can be observed and/or detected or when they are most abundant to allow easy detection, such as when:
  - some weed species are in flower
  - some insects are in a certain stage of their life cycle.

3.6 Consider environmental factors

- Environmental factors influence the accessibility of monitoring sites and may affect the sampling design. Examples include tendency for cyclones and storms, the presence of crocodiles, cold climate and wet seasons.
- Environmental conditions also influence people's monitoring behaviour. Surveillance programs may find a surge in notifications during the warmer months when people are out and about.

> Seasonality is everything up here … It's almost an on, off system. In the wet season, it's very hot and it's very wet. And the roads are closed and the paddocks are too wet to get anywhere or to do anything. And so any kind of disease investigation is difficult. ***[NABSNet interviewee]***

3.7 Consider people's attitudes towards certain species and diseases

- People's attitudes towards species are shaped by the perceived level of threat to themselves, ecosystems or other organisms that they value; and the aesthetic and cultural value placed on the organism. For example:
  - if they pose a direct threat, such as if they bite or sting, people are more likely to report
  - closer proximity of problems caused by an invasive animal increases people's negative attitudes towards the species
  - animals that could have been companion animals or those that are large, attractive mammals are viewed more favourably than non-mammalian species and rodents. Some people may be reluctant to report them in fear that they might be killed.
  - some species are of interest or value to certain groups or individuals. Revealing their location may attract unwanted attention from people trying to find and remove them, which may lead to further spread.
- Pests, weeds and diseases that are well recognised, present at higher densities or have impacts that are more visible, are likely to elicit more negative attitudes than those not present yet.

3.8 Further reading

- Caley, Peter, Marijke Welvaert, and Simon C. Barry. "Crowd surveillance: estimating citizen science reporting probabilities for insects of biosecurity concern." Journal of Pest Science 93, no. 1 (2020): 543-550.
- Selge, S, Fischer, A & van der Wal, R 2011, 'Public and professional views on invasive non-native species – A qualitative social scientific investigation', Biological Conservation, vol. 144, no. 12, pp. 3089-97 (10.1016/j.biocon.2011.09.014).
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4 Engaging notifiers to monitor and report

Key points

- Carefully consider who is best placed to be notifiers. Notifiers can come from diverse groups, including the general public, landholders and managers, Indigenous communities and private businesses (including private vets, crop consultants and some ports).
- Be familiar with the motivations, barriers, expectations and needs of notifiers and shape the program design accordingly. It is fundamental for effective notifier engagement and retaining notifier support. High retainment of notifiers leads to more educated notifiers who deliver quicker, more accurate reports, and it prevents spending scarce resources on finding and training new notifiers to replace those who have left the program. Effective notifier engagement minimises negative word of mouth that can be damaging to the reputation of and support for a program.
- Consider the needs of both notifiers and those dealing with the incoming data when reporting tools are chosen and designed. Poorly designed reporting tools can add considerably to workloads elsewhere in the program.

- Identify and put measures in place relating to various legislative requirements that a general surveillance program team may need to respond to. Key areas include requirements related to enlisting volunteers, health and safety, liability, privacy and intellectual property.

4.1 Introduction

A range of people may be asked to monitor and report certain pests, weeds or diseases based on their existing skill sets, their location, their interest or other reasons, depending on the needs of a particular program. Monitoring refers to people looking out for suspect species, signs and symptoms. Reporting refers to people notifying the relevant authorities or others about the presence of suspect species, signs or symptoms.

4.2 Understand the notifiers involved

- Notifiers are diverse, even within a group, such as farmers, or within a particular region.
- Raising awareness of a program is not enough to secure participation if there are considerable barriers preventing support. Often the barriers need to be addressed as well.
- Note that people's motivations and barriers can change over time and it is important that these are monitored.
- Below is a short profile, motivations and barriers encountered in other programs for some key groups. However, it is important to invest in understanding notifiers' perspectives in the context of any particular general surveillance program.

4.2.1 General community profile

- Diverse, including various interest groups, such as LandCare groups, community gardeners, bush generators, etc.

Motivations for participation may include

- concern for the environment or agriculture
- to contribute to science
- to protect areas people value
- to learn more about things that interest them
- because it is the right thing to do.

Barriers to participation may include

- lack of time
- lack of knowledge and skills
- forgetting about reporting
- concern about reporting things that are out of scope
- previous negative experiences.

4.2.2 Landholders and managers

- Diverse, including commercial farmers, hobby farmers and peri-urban landholders

Motivations for participation may include

- learning about the pests, weeds and diseases that affect their production

Barriers to participation may include

- fear of quarantine and social stigma if their notification causes a biosecurity response
- not being highly motivated by exotic pests, weeds and diseases
- not understanding the importance of pest freedom to maintain lucrative export markets, which also assist in keeping domestic prices strong
- for programs based on vets or on-farm consultants, not all farmers use their services, often due to cost involved being seen as too high.

- Other factors that may influence participation include their ability to identify relevant organisms, signs or symptoms; belief in self-efficacy or capability to take required action; level of engagement with their social networks (i.e. peers), and attitude towards the reporting itself

4.2.3 Indigenous communities

- Many Aboriginal and Torres Strait Islander people live in close association with their environment, relying on it for food, medicinal, cultural, spiritual and other needs.
- Their traditional knowledge may be valuable to detect and deliver notifications of unusual organisms and symptoms

Motivations for participation may include

- interest in caring for country, including deriving increased pride and self-worth from it
- avoiding impacts from pests, weeds and diseases
- supporting the health and wellbeing of their communities
- finding employment with connections to family, culture and country
- opportunities to be role models for younger people
- being recognised as traditional custodians of country by applying cultural knowledge.

Barriers to participation may include

- loss of traditional knowledge as elders pass away
- limited opportunity for women and young people to participate in ranger programs
- lack of resources, for example, rangers' vehicles may be worn-out.

4.2.4 Private businesses

- Examples include private vets, on-farm consultants, service providers (such as crop scouts, ship hull cleaners, etc.) and port authorities and industry ports.
- Key aims of a general surveillance program (e.g. proof of pest or disease freedom) seldom aligns well with the key goals of private businesses.

Motivations for participation may include

- strong value proposition by contributing to achieving business goals or fulfilling needs. This includes assisting business to deliver better services, such access to low cost identification or diagnostic services; or meeting legislative requirements
- maintaining social licence
- involvement is low-cost, simple, flexible or collaborative
- protecting species or areas they care about
- networking opportunities
- acquiring new skills or knowledge.

Barriers to participation may include

- distrust in government
- surveillance activities are not front of mind
- time pressures
- onerous requirements, such as much paperwork.

4.3 Consider appointing people to support notifiers

- Having people who represent 'trusted friendly faces' to notifiers are valuable in fostering trust and relationships.
- The role usually involves fielding questions, encouraging monitoring and reporting, providing support with preparing samples or specimens, and triage notifications by advising notifiers whether reporting is needed.
- They may have valuable local knowledge or species specific expertise, and/or helpful networks that can contribute to the program in various ways.
- They can relay valuable on-ground intel to the program administration.
- They can be trained volunteers, program staff, industry body staff, or independent people employed to fulfil this role.

Enablers

- Having flexibility in how the role is performed to adjust to the context at hand.

Challenges and barriers

- Other commitments may constrain how much they can contribute.
- Some people are more able to build a good rapport with notifiers than others.
- There can be variability in how the program rules are being interpreted

4.4 Establish effective engagement with notifiers

- Effective engagement encompasses gaining and maintaining the trust, respect and support of target group(s).
- Be realistic about the time and effort required as it can easily be underestimated. Effective engagement:
  - maintains the reputation and legitimacy of a program, which supports a high notifier retainment rate
  - facilitates high retainment of notifiers, which leads to more educated notifiers who deliver quicker, more accurate reports, thereby minimising the need for new recruits and investment in their training.
  - requires maintaining momentum.
- The consequences of poor engagement include:
  - a lack of people 'signing up' or supporting the program
  - a high rate of notifiers dropping out of the program. People who have been upset and who have lost trust in an organisation or a program can be difficult to re-engage
  - increased negative 'word of mouth', which can be damaging to the reputation of a general surveillance program, leading to a lack of people supporting the program, or people dropping out of the program.
- Key principles for effective notifier engagement are discussed below, regardless of the notifier group (i.e. general public, professional individuals or businesses).
- Undertake a stakeholder analysis of potential notifiers if diverse groups are involved, including rating their motivation, capability and capacity.
- Be mindful of any rules and regulations that may apply, such as compliance with advertising standards and codes for public campaigns when campaigns are launched about pests, weeds and diseases.

We found that some people had a negative experience with [the program] and never went back to it, or were sharing their opinions about it for many years, even though [the program] didn't do that. ***[Program coordinator]***

The importance of trust

- Trust is the belief in the reliability of people or systems, including their goodwill, abilities, capabilities and integrity. It is often associated with a sense of reciprocity.
- While intangible, trust offers many benefits, including:
- Lowering people's perception of risk which facilitates working relationships and voluntary collaboration and cooperation
- delivering greater patience when a general surveillance program is facing challenges, such as issues with technology
  - strengthening the legitimacy of a program and facilitating support from more notifiers
  - offers a platform where other biosecurity messages or initiatives can be introduced.
- A lack of trust increases costs, such as those associated with on-going negotiations, or developing and enforcing regulation.
- Sometimes distrust needs to be overcome.
- Trust can be built by demonstrating goodwill, regular and transparent communication, capabilities and integrity.
- Repeated positive interactions between program staff and notifiers are valuable. For example workshops, hands-on demonstrations or training sessions can deliver direct benefits to notifiers. It can be helpful for government staff to 'take off their regulator hat' and focus first on building trust relationships.
- Quick and reliable follow-up processes with notifiers is key to maintaining trust, including in response to enquiries and by providing prompt feedback about what notifiers have reported.

People know if they call that number, they're not going to be put on hold for five minutes waiting to talk to someone and they know that if they report it, something is going to be done.
[NZ General Surveillance Program interviewee]

4.4.1 Incorporate notifier perspectives in program design

- There are various levels of engagement to incorporate participants, including notifiers', perspectives. See table below.
- Giving notifiers (or their representatives) input in the design of a program (and aspects thereof) is highly recommended.
- The level of notifier input can vary between groups and over time. Some programs start with a co-designed pilot with a small group of willing notifiers and later move to consult or involve if changes are planned.

> ...the project [SWASP] is built on that collaboration. DPIRD has been very transparent, they've given us access to the books, they've shown how the numbers stack up, what they're using the money for. The areas which they've been pushing to research and refine the methodology over time, and they've supported that collaboration over the years and built on that trust. It's been a really fantastic project. ***[Port environment manager]***

More notifier input leads to ...

- increased trust
- requirements meeting notifier needs
- higher retention rates
- less need to address issues in retrospect
- quicker, more accurate reports.

More notifier input requires ...

- financial investment, time, skill and trust-building on behalf of the program
- balancing various needs, which can be difficult
- more time and effort from notifiers. Consideration is needed about how to make the best use of their time.

	INFORM (No input, completely 'top down' - We are letting you know about the program)	**CONSULT** (Input on 'top-down' defined matters - Will this work for you?)	**INVOLVE** (Openness to 'bottom-up' input - How can we make the program better?)	**COLLABORATE/CO-DESIGN** (Working together as equal partners)
TOOLS	• Fact sheets • Website • Identification guides • Handbook • Social media (responses not considered)	• Surveys • Public comment • Social media (responses somewhat considered)	• Focus groups • Workshops • Public meetings • Social media (responses key part of decision-making)	• Participatory decision-making • Consensus building

Adjusted from the National Biosecurity Engagement and Communication Framework, Australian Commonwealth Government, 2013, available at www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/animal-plant/pihc/bepwg/national-engagement-communication-framework.pdf

4.4.2 Ensure a clear value proposition for notifiers

- Sustaining support from notifiers is easier if they see clear direct benefits to them.
- Notions of shared responsibility or that notifications may contribute to claims of pest or disease freedom in trade negotiations may be too far removed for most farmers and even professionals, such as private vets.
- Balance the value proposition with the effort, skill and time required from notifiers. A stronger value proposition is needed when more time and effort are requested.

Examples of value propositions for notifiers

- Tap into people's passion for an issue and demonstrate that the program is contributing to support it, such as environmental sustainability.
- Enable professionals to deliver a better service to their clients, such as helping vets and on-farm consultants, through financial and other support, to provide better services to farmers.
- Assist to maintain a social licence for private businesses, such as participation in the program help them demonstrate their stewardship for the environment.
- Provide a sense of fun and an opportunity to engage with science, such as through well-designed citizen science programs.
- Tap into people's needs and wants, such as for work experience for young people, a way to remain active and contributing to society for early retirees, professional networks for experts, learning opportunities for outdoor enthusiast, or the opportunity to spend time with experts.

If somebody's doing something for you, you have to give something back to them, otherwise they'll walk away from it. ***[MyPestGuide™ staff member]***

4.4.3 Make participation simple, user-friendly and low cost

- Ensure requested tasks and finding the required information is as easy and quick as possible for target groups, including at the least cost in terms of time, effort and finances. This relates to a range of tasks:
  - easy sign-up process – such as at events without needing to do anything else at home
  - practical monitoring and reporting – understand if there are cumbersome aspects and how they can be improved
  - different notification avenues – cater for different preferences
  - low administrative burden – minimise the information and levels of sign-off requested
  - limited number of target pests, weeds and/or diseases - if people feel overwhelmed they may stop looking, or be unable to recall them
  - conveniently timed activities – such as training events during a quieter time of the year, or days/times of day that suit target groups
  - easily accessible information – clear, succinct program requirements, test draft documents with target groups. Photos and videos are helpful.
  - communicate through various channels – so people hear messages repeatedly
  - tell narratives about interesting finds and responses – translate scientific information into everyday English
  - accessible websites – consider having a landing page in simple and plain English with links to more detailed or technical information
  - easy-going interactions with notifiers – aim for interactions with notifiers to have a sense of the program being 'fuss free'
  - remind people about the program - particularly if the scope involves exotic and new and emerging species where the likelihood of an encounter is slim.
- People appreciate flexibility - consider what aspects of the program need to be done consistently and where there is room for flexibility.

We don't want to burn people [weed spotters] out. We want to give people a sense that they are achieving something. So a good target [limited number of species] and people can feel that they have made a difference. If you're just getting too many false positives people will just give up looking... It doesn't make a change... We don't want to dilute their enthusiasm. ***[Weed Spotters Program Representative]***

The key driver for us to continue with SWASP is that it's a low-cost, collaborative and robust marine biosecurity program that demonstrates a genuine care and stewardship over the ports that we operate in. It isn't encumbered by a raft of paperwork or other formal arrangements that require signoff at the highest level. ***[Port representative]***

Pantry Blitz trap

4.4.4 Target groups well placed to support surveillance

- Targeting certain groups to strengthen the quality of notifications tends to deliver cost-effective outcomes, even if the program is open for anyone to participate.
- The quality of notifications depends on the timeliness, accuracy and completeness of what is being reported.
- People could be targeted on traits such as:
  - Motivation
  - Skill
  - Geographical location
  - Exposure to the outdoors
- It may be easier to maintain the involvement of a small core group of notifiers who have a keen interest, especially if the program staff have many other responsibilities that limit the time they can spend on notifier engagement. However, the potential for notifier burnout associated with greater involvement should also be considered.
- The best group to target may change through time. Engagement at the start of a program, such as part of a pilot, may be with those who are 'willing and able' to participate. Once the program is more established, others could be engaged, including those in higher risk areas.

Tailor engagement

- Get to know your target group, for example by:
  - interacting with them directly, especially when small groups are involved
  - working closely with people who know the target group well, such as vets or agronomists who may know producers well
  - undertaking social research, such as surveys or focus groups.
- Understand your target group' perspectives and adjust the program accordingly, including:
  - timing and choice of engagement channels
  - choice and design of reporting tools
  - tailor messages based on 'What is in it for me?'. Focus on direct benefits
  - being aware of things that might be counter-intuitive such as requests to submit photos of empty traps. Remind notifiers regularly and clearly of the importance of doing so.

> When the program started … I got the impression that we tried to train up as many people as we could… A lot of people did it because they are interested in gardening but they are not actively going out for things or they are not working in the industry. … most reports came from Parks Victoria, local government, contractors, or people working in the field. So we reined back and be more strategic with the training and offered it more to groups who are likely to come in contact with weeds.
> ***[Weed Spotters Victoria interviewee]***

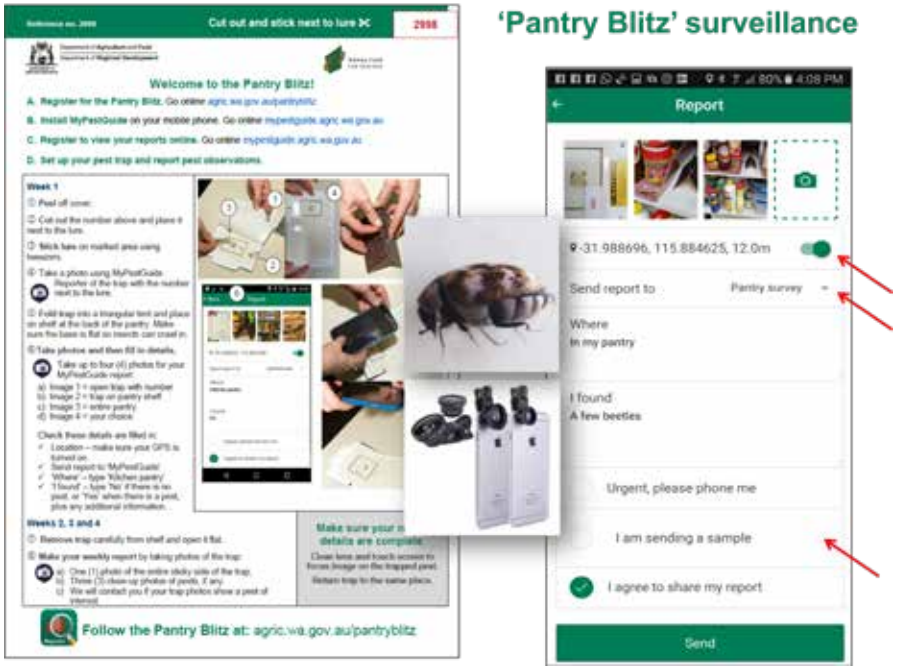
4.4.5 Deal with expectations

- Notifiers usually expect various things from a general surveillance program. Be aware of what the expectations to know how to keep notifiers satisfied.
- Take care to not overstate what notifiers' support will contribute to. For example, stating that participation will contribute to protecting the environment, may create expectations that people will turn up to check out suspected detections and undertake treatment measures.
- Not all expectations can be met, but knowing what they are assists in communicating about them, clarifying situations, or to potentially find alternative avenues to have them met.
- Basic expectations include:
  - having a positive reporting experience (see 4.4.7)
  - evidence that the program is making a positive difference
  - legal requirements have been considered and are in place, such as in relation to privacy, intellectual property and health and safety (see 4.6).
- Others notifier expectations could include:
  - that an official person will turn up promptly to investigate the report. This is particularly associated with hotlines
  - wanting to make the report only and being reluctant to participate in follow-up activities such as collecting a sample or submitting a photo
  - assuming they will receive a quick and definite identification/diagnosis, but sometimes this involves lengthy procedures and only exclusion of certain diseases may be possible
  - being keen to connect with others contributing to the program
  - wanting to do more towards the cause, such as management related activities
  - wanting to know what has been found in their local area.
- Communicate to notifiers what they can expect after they have made a report. Not knowing what to expect when making a notification can cause uncertainty, and deter people from doing so. For example:
  - develop materials about what happens once a notification has been received
  - share stories about unusual detections, including what happened afterwards. For farmers, this may be valuable to see that in most cases reports do not lead to quarantine measures.

4.4.6 Support notifiers in their tasks

- Supporting notifiers helps them and the rest of the general surveillance program:
  - notifiers develop deeper trust in the program and are better equipped to deliver quality notifications
  - quality notifications prevent delays and minimise the need for follow-up with notifiers to obtain missing information or clarify things.
- Support may include:
  - clear and simple instructions – for example, clear written instructions with photos
  - training – face-to-face training facilitates two-way conversations and trust, particularly if it is tailored to the group involved. Online training can be delivered at low cost and people can do it when convenient for them
  - support staff – who notifiers can call with questions, feedback or issues. These could be paid staff, people in other positions who are willing to take on this role, or volunteers who have the right skill set and time available

Example of clear instructions from the Pantry Blitz



- some mentoring – to ensure people are doing tasks correctly, for example:
  - ✓ experienced government vets helping less experienced vets to take unusual samples
  - ✓ visits from program staff to monitoring sites to ensure sample are collected correctly
  - ✓ sending reminders when monitoring is requested certain times of the year.
  - ✓ where notifiers are asked to set up some kinds of traps, asking them to send in a photo of the trap before monitoring begins to check that it has been set up correctly
  - ✓ exposure to real-life examples of target species – to know what they look, feel, smell and/or behave like in real life. Make them available at face-to-face workshops or at a location where people can look at them. Vets could participate in overseas study tours to see animals infected with exotic diseases.

More information is not always going to make it easier for people to understand.
[MyPestGuide™ communication person]

4.4.7 Deliver a positive reporting experience

- A positive reporting experience is vital to maintaining notifier support and it facilitates positive 'word of mouth' communication about the program.
- At the most basic level this includes being respectful to notifiers and ensuring the confidentiality of notifications.
- Other ways to deliver a positive reporting experience include:
  - prompt response to notifications, including feedback about what was found – consider having set timeframes to respond to notifiers
  - provide individual feedback – and consider adding interesting information about what was found for members of the community
  - being helpful and of value to those reaching out to the program and make them feel heard and valued for their effort and interest For example, if they are concerned about a particular established pest, weed or disease assist them in getting information about managing it
  - be transparent about what is happening in response to their notification where possible, such as whether plants were seized
  - maintain a sense of achievement by reminding people that they are part of something bigger that is leading to positive outcomes
  - for programs that involve subsidies, ensure smooth government processes that will enable timely payment of claims

For the NZ General Surveillance Program, prompt responses to notifications starts with the call centre picking-up 95% of calls within 20 seconds and clear and strict protocols to ensure the notification reaches the appropriate people in MPI promptly. Callers with a potentially significant detection often hear back from an MPI expert within the hour requesting further information.

4.4.8 Be agile and responsive

- Maintain momentum with engagement, respond to opportunities and issues as they arise.
- Design programs to minimise delays due to bureaucratic processes, such as by providing staff with some level of independence to enable them to capitalise on organic opportunities as they arise.

4.4.9 Engage with the broader context in mind

- Ensure where possible that the general surveillance program messaging is in line with broader biosecurity messaging.
- Consider including broader biosecurity messages where groups are well engaged, but take care not to overload notifiers

4.5 Use well-considered reporting tools

- Choose tool(s) to best meet your and your notifiers' needs. Providing multiple reporting tools can enable the weaknesses of some tools to be overcome by the strengths of others.
- Poorly designed reporting tools can add considerably to workloads elsewhere in the program, such as the need to follow up with notifiers, manual data entry and data cleaning.
- The information requested accompanying a report could include:
  - date
  - contact details of the notifier
  - suspected pest/weed/disease
  - the location of the detection or where the sample or specimen was removed from. For reports of weed sightings, key landmarks, roads/streets may be requested to help finding it again
  - the species affected (by disease) and/or host, if applicable
  - indication of prevalence, e.g. how many animals show similar signs
  - support for identification and diagnosis, such as differential diagnoses in the livestock case studies that may inform which tests need to be prioritised
- Be mindful that if reporting is too onerous it will likely discourage notifiers from reporting. Consider carefully what requested information is essential and word requests clearly in plain English. Try to minimise requests for additional information and the time and effort required to make a report. For example, consider collecting minimum information on the initial report, and then if needed staff can follow up with more questions for notifications that appear to be high-risk or need investigating.
- Consider what reporting tools are already in use that could be tapped into, even as an additional reporting avenue, such as existing hotlines for unusual pests and diseases.
- Below is an overview of considerations relate to the main reporting tools and key associated components, i.e. photos or samples/specimens. Some of the advantages and disadvantages of each are listed in Table 1.

the challenge I find … [is] trying to engage with senior management or managers or decision makers who are wowed by these pretty, glistening, shiny things. They think that suddenly by adopting an app or engaging with a new platform that's going to solve everything. The reality is that there is often a big gap between what that technology can deliver and what's required from a biosecurity decision-making process. ***[Lab representative]***

If you know you're going to have to sit down, go through a real bureaucratic process, filling out endless forms … in a busy vet's life it can be hard to find that time. Therefore, you can think, "Oh, I'll just manage this disease by myself, I won't even mention it [the subsidy] to the farmer". ***[Private vet]***

4.5.1 Hotline/Dedicated phonelines

- Key considerations include:
  - If a large number of calls are expected, then engaging the services of a call centre is recommended. A dedicated personal phone number is best used when a small number of calls are expected
  - developing and resourcing procedures to support correct and timely direction of calls to appropriate team/experts, including arrangements for after office hours
  - training and support for the staff responsible for answering calls, particularly if call centres are involved. This is to assist them with knowing how to direct calls and may include support tools such as call flows, an intuitive computer-based system that staff interact with, including key pests, weeds and diseases. It can take up to three months for a call centre to function well
  - an effective hotline is well-known and it is easy to find the number, for example with an internet search.

4.5.2 Sample and specimen submissions

- The needs of a program determine whether sample and specimen submissions are needed. For example:
  - in some programs the submission of a sample or specimen is always required, such as for livestock significant disease investigations
  - in some programs samples or specimens may only be required under certain circumstances, typically to allow for accurate identification
  - sometimes specimen and sample submissions are discouraged for less intrusive methods, due to the risks that transporting species of concern may contribute to their spread, such as for new and emerging weeds.
- Consider if notifiers may benefit from training to ensure samples and specimen are taken and transported appropriately to reach the lab or herbarium in a good condition.

4.5.3 Photos

- Requesting photos is a popular approach, particularly for initial pest or weed identification to assist with triaging. If it seems that the notification might be a species of concern, a specimen can be requested to enable a more accurate identification.
- Provide guidelines on to how to take quality photos, including what to photograph (such as what parts of a plant), and how to maximise the clarity such as focusing the shot and the best time of day to take it.

4.5.4 Dedicated email addresses

- Notifiers can be directed to a dedicated email address from a program website and/or on print material, such as pamphlets and handbooks.

4.5.5 Applications (apps)

- Can be used for reporting and information provision, for example it may include functions that can help with pest, weed or disease identification.
- Wide consultation is needed to develop an effective app to meet various people's needs.

Mobile device interface

- Make completing a report easy and minimise the number of steps required.
- Co-design early-on with representatives of intended users, including the demands of the environment that they operate in.
- Design includes tailoring its 'look and feel' (colours, font sizes, screen orientation, etc.) and the language used.
- Remain open-minded, avoid assumptions, ask many questions and be willing to learn.
- If diverse groups are asked to use it, consider developing multiple interfaces.

Storage of data layers

- The capacity and appropriate protection needs to be assigned to data layers required to analyse the input data from notifiers, such as spatial layers that are important when reporting the location of detections.

Back-end

- It supports the processing of reports and other data layers and providing that information to end-users.
- Consultation closely with intended users to meet their needs, such as being able to easily integrate the data with active surveillance data; and minimise inefficiencies such as the need for cleaning data.

...it's really important to prototype and test functions so that they [lab staff, scientists and others] get to see and try it first... there might be a lot of resistance to a feature or extra functionality ... because they think it will create more work for them. ...So being able to balance the different wants of those groups can be difficult, so that you have a system which works for everyone. In designing this [the administrator interface] I wanted to make it as easy as possible to quickly enter that ID information, but actually have it in a valuable structure so it could be used for various purposes. ***[MyPestGuide™ communication person]***

TABLE 1: Some of the advantages and challenges associated with various reporting tools and key associated components

	HOTLINES/DEDICATED PHONE NUMBERS	SAMPLES & SPECIMENS	PHOTOS	DEDICATED EMAIL ADDRESSES	APPLICATIONS
ADVANTAGES	• Rapid and convenient if well resourced • Can help triage reports • Call centres can be cost-effective, available 24/7 and provide surge capacity • Could be 'one-stop-shop' if combined with other functions, e.g. compliance reporting or information provision • Dedicated phone numbers, can support two-way communication and give personal touch	• Allows for highly accurate identification and diagnostics • Samples can be preserved and added to collections • May allow for future re-identification if initial identification is in doubt	• Reduce need for field visits • Most people are comfortable with submitting photos • Triaging – photo indicates if a sample/specimen is needed • Could include location information	• Provides a direct report to the people who will address it (i.e. not reliant upon call centre flows) • Can include photos and maps • Provides a personal touch	• Easily accessible to smart phones users • Can prompt for information needed • Date, time and location can be automatically collected • Geocoding of location can assist in later identification and management • Can minimise need for data cleaning • Feedback through the app can give a personal touch • Can feature data standards to reduce need for data cleaning • Can feature automated data transfer to minimise human error
CHALLENGES	• Some misdirection of calls is common • Mobile reception in rural areas may be poor • Can be burdened by irrelevant calls • Association with the term hotline may create community expectation that someone will soon turn-up to check out the species/signs/symptoms • Call centre specific challenges: • Takes about three months to function well • May have high staff turnover and variable staff capabilities • Strong accents may put callers off • Staff unfamiliar with commonly known local locations could frustrate callers • Requires manual entry of data	• Risk of spreading a priority weed or disease if not collected and transported properly • Often requires skill to obtain quality specimen/sample • Poor quality hinder identification or diagnosis • May need to be accompanied with report or be associated with information collected previously • Manual entry of data	• Unsuitable for inconspicuous species • Poor quality photos hinder identification and burden identification team as it requires follow-up with notifier	• Can be difficult to find location of sighting if the description is not adequate • Emails can be laborious to compile in the field on small devices • Poor internet connection in remote areas may inhibit reporting • Requires manual entry of data • Puts pressure on staff to be alert and responsive to incoming emails, often as part of other responsibilities	• Older people may not be comfortable with using smart phones • Can be expensive and labour intensive to develop and maintain • Too many apps available may be confusing to target groups • People might 'over report' because the process is easy • Mobile reception in rural areas may be low • GPS location can be interrupted by poor satellite coverage

4.6 Incorporate legislative and other duty of care requirements

- Several external rules and regulations assist organisations to fulfil their duty of care to those who support general surveillance programs, such as notifiers.
- The information below does not constitute legal advice. It is meant to sensitise the reader to some of the key considerations. It is highly recommended to find legal advice for each general surveillance program.

4.6.1 Enlisting formal volunteers

- Formal guidance for enlisting people in a formal volunteer capacity include the National Standards for Volunteer Involvement, a best practice framework, covering a range of issues.
- Consider if certain rules need to be in place for volunteers depending on the requested tasks, such as the need to undergo a police check, complete a driving course, and follow a code of conduct.
- Some programs avoid enlisting people as formal volunteers and rather recruit them as 'notifiers' or 'collectors', while still fulfilling their duty of care.

4.6.2 Health and safety

- Consider if notifiers may be at risk of injuring themselves while supporting a general surveillance program. Lead organisations can adhere to their duty of care and avoid legal risk by:
  - being clear on their responsibilities under the applicable jurisdiction's work health and safety legislation
  - providing recommendations against hazardous activities (e.g. submit a photo rather than collecting dangerous species or touching dead animals, where protective clothing when out and about)
  - providing training and guidance and initial in-field supervision
  - providing protective equipment if required
  - considering how to accommodate insurance, either through providing it in certain circumstances, having it covered by other organisations or insisting that notifiers have access to their own insurance
  - when potentially hazardous samples are involved, such as submitting dead birds, remind notifiers to package and label them appropriately to warn lab staff of the potential hazard.

4.6.3 Liability

- Consider if the lead or other organisations may be held liable if someone incurs costs while supporting a general surveillance program (e.g. when they incur damage to cars and equipment, medical costs due to injury or allergic reactions, or legal costs due to trespassing).
- Strategies to prevent unwanted claims include:
  - being transparent about insurance. Some programs require volunteers to use personal insurance first, while additional insurance is available once an individual has exhausted all other avenues. Professionals, such as private vets, may be asked to hold public liability, professional indemnity and workers compensation insurance
  - obtaining acceptance from notifiers in relation to disclaimers or indemnity, such as when people sign up for the use of an app, or when professionals or businesses sign an agreement to participate in a program
  - being pre-emptive and include liability issues in training and guidance documents
  - covering liability issues in notifier reports, such as when specimens are submitted the accompanying form may enquire about whether the person had the needed permission(s) to take the specimen
  - avoiding liability, for example, by having another organisation host training workshops.

- Where a grant is awarded to conduct general surveillance activities, conditions can be specified in the formal grant agreement to protect the funding organisation. This could include specifying that the grant receiver must:
  - hold public liability insurance to cover injury, damage and death
  - indemnify the funding organisation of any claims.
  - Be mindful that this may be difficult if the grant receiver is a small group that struggles to have the needed insurance.

4.6.4 Privacy and confidentiality

- Typically privacy applies to the rights of an individual and confidentiality applies to data to be free of public attention.
- Sensitive data are data that can be used to identify an individual, species, object, process, or location that introduces a risk of discrimination, harm, or unwanted attention (Australian National Data Service, 2018[1]).
- Ensure that the personal details of notifiers are collected and stored in accordance with privacy legislation.
- Inform notifiers of what information is being collected, why, what it will be used for, how it will be used (such as making detection locations publicly available) and who it will be given to, before they give their consent.
- Many notifiers may wish to remain anonymous, particularly when they report something on someone else's land.
- Some of the ways that general surveillance programs deal with privacy and confidentiality issues include:
  - seeking the needed permissions from notifiers when they sign-up to participate in the program or at the time of notification
  - asking notifiers to agree to make their reports and photos publicly available. However, the program team may wish to not publicly share photos that contain sensitive information such as expensive home equipment, children or pets, or features in photos that reveal the location, despite the permissions given

1 Australian National Data Service. (2018). Publishing and sharing sensitive data. ANDS Guides. Available at: http://www.ands.org.au/__data/assets/pdf_file/0010/489187/Sensitive-Data-Guide-2018.pdf

- obscuring exact locations of detections when results are displayed on maps. However, this does not work well when large properties are involved as they may still be identifiable. Some programs liaise with all involved to find a compromise, such as grouping properties when displaying data to provide anonymity, but also enough detail for the information to be useful
- disconnect storing people's names and contact details from the database related to incoming app notifications, for example by storing the app related database on a separate server
- requiring senior management sign-off for any data to leave an organisation, such as from the Chief Veterinary Officer or Chief Plant Protection Officer.

4.6.5 Intellectual property

- Consider which items that notifiers provide involves intellectual property and obtain notifiers' permission to used these items for specified purposes.
- Intellectual property typically applies to items such as the photos, samples/specimens and data that notifiers provide.
- People often retain the ownership of photographs, but they permit the lead agency to use them for certain purposes.
- Ways to obtain permission include:
  - terms and conditions when people sign-up to support a program
  - conditions for an app's use
  - terms and conditions listed online that people agree to, for example, by signing an online form when specimens/samples are submitted
  - requesting that the notifier assign ownership of the item to the receiving agency.
- It is good practice to check with notifiers if they are comfortable with their photograph(s) or specimen/sample(s) being used in a way out of the ordinary, even if it is legally permitted to do so.

4.7 Further reading

- Kruger, H., Stenekes, N., Clarke, R., & Carr, A. (2010). Biosecurity engagement guidelines: practical advice for involving communities. science for decision makers. Barton, ACT: Australian Government Bureau of Rural Sciences.
- National Biosecurity Engagement and Communication Framework, Australian Commonwealth Government, 2013, available at www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/animal-plant/pihc/bepwg/national-engagement-communication-framework.pdf.
- The National Standards for Volunteer Involvement, available at www.volunteeringaustralia.org/resources/national-standards-and-supporting-material/#/
- The Our Knowledge Our Way in Caring for Country Best Practice Guidelines, available at https://www.csiro.au/en/research/indigenous-science/Indigenous-knowledge/Our-Knowledge-Our-Way

5 Pest and weed identification and disease diagnostics

Key points

- The way pest and weed identification and disease diagnostics are undertaken is a key contributing factor to the trust that data users place on the quality of the general surveillance data.
- Congruence between incoming notifications and identification/diagnostics capacity is needed, to prevent lab, herbarium and other staff being overwhelmed as a result of the number of notifications they need to deal with, as well as the time spent on follow-up processes with notifiers to get adequate information.
- Ways to minimise the pressure on identification and diagnostic staff include maximising the quality of incoming notifications (minimising 'false positives'), on-going communication between the program engagement and identification/diagnostics teams; putting triaging processes in place and maximising the capacity of the identification/diagnostics team.

- Consider how data accuracy and timeliness during the identification/diagnostic process will be maximised.

5.1 Introduction

The way species identification and disease diagnostics, are undertaken underpins the trust that data users place on general surveillance data. There is increasing investment in exploring, developing and using technologies such as artificial intelligence, eDNA, and others to automate all or part of the identification/ diagnostic process or to make them more convenient for lay people to use, such as pen-side testing.

5.2 Consider how identification/ diagnosis is best undertaken

- Consider who and what technologies are most cost-effective to do the identification/ diagnostics. Many programs use experts in government, universities or private facilities, such as labs or herbariums. Technological options, such as PCRs, eDNA and artificial intelligence, are playing an increasing role in this space. For example, some programs use technology, such as artificial intelligence or particular lures, to support the initial identifications and forward potential priority detections to experts for the conclusive identification.
- Consider how to maximise staff retainment in labs and herbariums as well experienced, long serving staff with strong support networks who are passionate about the cause are a great asset as they can undertake quick and accurate identifications.

Enablers

- Many experts love using and extending their identification/diagnostic skills.

Challenges

- Considerable adjustments may be required from identification/diagnostic teams to accommodate a general surveillance program, including updates to policies, procedures and/or equipment.

People get carried away with the excitement of developing an extension program, push it out there in the media or through an industry group but they don't stop to think about who will actually go through all the notifications and how that side of it will work. ***[Lab staff member]***

- General surveillance programs may significantly increase the workload of identification/diagnostic teams, and the complexity of the work. For example, rostered staff may need to keep track of follow-up processes with notifiers, or just know what to do with of each incoming notification when a great variety of notifications are involved.
- Be mindful that lab staff may have little understanding of the on-ground context, which may make it difficult for them to know what they can expect from notifiers or how to write reports that contain helpful practical insights, such as for vets. In some cases, lab staff are the ultimate decision-makers about what tests to undertake, such as for livestock diseases diagnosis. It is valuable if they understand disease trends and detections elsewhere in the relevant industry.
- Keep in mind that considerable training, mentoring and time may be needed to train new identification staff for a particular role as the number of professional identification experts (e.g. taxonomists, botanists, ecologists and zoologists) are declining.
- Many unknowns exist in pest and weed identification and disease diagnostics, particularly for environmental biosecurity space.
- Consider the challenges and controversies that exist relating to various identification/technologies tools.

5.3 Prevent labs from getting overwhelmed by notifications

- A risk for many programs is that the number of incoming notifications overwhelms the identification/diagnostic capacity or that lab or herbarium staff spend an extraordinary amount of time on follow-up processes with notifiers to get adequate information.
- Overwhelmed lab or herbarium staff are less able to fulfil functions such as providing timely feedback to notifiers or data users. This can affect the reputation of a program and contribute to notifiers or data users losing interest.
- Key ways to minimise this risk are discussed below.

5.3.1 Maximise the quality of incoming notifications

- Quality notifications refer to notifications that are within scope of a program, timely and contain all needed information.
- Offer sufficient training and support to notifiers – to know what to look for (see 4.4.6).
- Target individuals or groups – who are well placed to spot and report particular pests, weeds and diseases, regardless of whether the programs are open for anyone (see 4.4.4). Just signing up anyone doesn't necessarily translate into more quality notifications.
- Develop tools to support quality notifications – for example an app can provide users with specifications for photos that minimise the need for follow-up. For example, which parts of the plant to take photos of. Avoid tools that will deliver 'just more blurry photos'.
- Provide feedback to notifiers about their notifications – to assist with their future identification and educate them about whether it was in or out of scope. This leads to increased quality of reports over time. Ensure it is done tactfully to not reduce the positive reporting experience of notifiers.

5.3.2 Maintain on-going communication between program engagement and identification/ diagnostic teams

- To ensure that any promotions or campaigns that encourage reporting work in well with the needs of lab and herbarium teams.

5.3.3 Put triage processes in place

- Triaging can occur at various points and across various layers to filter out 'false positives' before they reach the identification/diagnostic team. Examples of triaging mechanisms include:
  - call centres – can ensure only valid calls are directed to the appropriate people within large government departments. Calls of potential priority pests, weeds or diseases can be directed to particular people as a matter of urgency
  - specially appointed people – can provide advice to notifiers on whether something is worth reporting, if they are in doubt. Some programs make use of volunteer regional coordinators who have the appropriate skills and local knowledge to know what pests, weeds or diseases are commonly found in a particular region. Others make government staff, such as biosecurity officers or government vets, available to notifiers in case they have questions. Some programs have triage staff who, for example, look through incoming photos, and only notifications of potential risk are forwarded to people with scarce, specialised skills to confirm their identification
  - other organisations – staff in other organisations who have the appropriate skills and connections can provide informal advice to potential notifiers. For example, some industry bodies have trust relationships with farmers and they are well placed to be a first point of call for farmers to check if something is worth reporting to a hotline
  - internal risk assessments – labs may have their own triage systems determining which incoming notifications get priority. For example, some reports have a low likelihood of being something serious, for example insects spotted in stored grains, such as in household flour and rice. Resources are better spent on higher risk notifications, such as insects in goods that recently arrived from overseas. Notifications from certain individuals who are known to have significant species identification expertise, can be prioritised over others
  - technology – some technologies, such as the submission of images through apps, can assist identification/diagnostic staff decide whether a specimen or sample is required. This is easier than managing larger numbers of samples and specimens. Technologies such as eDNA can assist with flagging potential detections that warrant further investigation.

5.3.4 Maximise the capacity of identification/ diagnostic team

- Minimise staff turnover – highly experienced staff are crucial to work through high notification volumes. Cultivate supportive and positive team environments, including professional development opportunities.
- Free staff up from other responsibilities – so they can focus on doing identifications/diagnostics to meet program needs.
- Invest in technology – PCRs and eDNA can be invaluable in speeding-up identifications and diagnostics.

5.4 Maintaining specimen and sample quality

- The handling of specimens and samples require careful consideration to prevent quality loss before they reach the people responsible for identification/diagnostics.
- This relates to how specimens and samples are obtained and/or chosen; how they are transported and stored; pathways to reach the identification/diagnostic teams; and processes for retaining specimens and samples.
- Considerations include:
  - guidance and/or hands-on training to take and/or prepare samples and specimens
  - temperature requirements for samples/specimens – sometime samples need to be kept cold or even be frozen
  - the availability of courier networks, especially in remote areas
  - travel distances
  - notifiers might need to carry the right equipment with them to store and transport samples or specimens
  - pathway(s) through large government departments to ensure samples/specimens reach the diagnostic lab in a reliable and timely fashion from the point where it is delivered.

5.5 Other considerations to maintain data accuracy and timeliness during the identification/diagnostic process

- Various policies and procedures can be put in place to support data accuracy and timeliness in labs and herbariums. In particular, establish clear processes and procedures for lab/herbarium staff when something of significance has been found. Sometimes formal reporting avenues are spelled out in legislation.
- Other examples of policy and procedures include:
  - having fast track processes for priority pests, weeds or diseases – for example, call centre staff are trained to forward such notifications to particular experts. Lodging of specimens/samples of suspected priority species are fast-tracked and key people in the lab/herbarium and those responsible for response are notified
  - putting special arrangements in place to accommodate a surge of reports may necessitate additional appropriately skilled staff to confirm detections
  - using specimens/samples for important identifications rather than relying on photos
  - designing databases and reporting tools to select species names rather than typing them in to minimise human error
  - making double checking of important identifications/diagnosis a standard procedure
  - preserving specimens/samples to allow re-identification later if needed.

5.6 Further reading

- Pawson, S, Sullivan, JJ & Grant, A 2020, 'Expanding general surveillance of invasive species by integrating citizens as both observers and identifiers', Journal of Pest Science, vol. 93, no. 4, pp. 1155-66.

6 Data use, design and management

Key points

Data use

- General surveillance data can be used for a range of purposes. Consider how the demand for the data can be strengthened as a greater demand is likely to assist with attracting more investment (financially and in-kind) in collecting the data.
- Ensure that notifiers witness positive outcomes from the data that they contributed to maintain their support.
- Incorporate the preferences and requirements of key data users early in program design to maximise the use and trust placed in general surveillance data, including their capacity and capability to interrogate the data.

Sampling design

- Identify the questions the surveillance data need to answer.
- Consider factors such as specificity and sensitivity; risk pathways; potential biases; notifier distribution and efforts; maximising notification quality; and balancing consistency with allowing for flexibility of obtaining notifications.

Data maintenance and analysis

- Consider data capture, flow and storage. Failure to do so can be a significant source of inefficiencies, errors and security breaches.
- Think through how to achieve the desired value from data, including integrating it with other data. This may include investing in powerful data analytic tools and involving people who have suitable data analytic skills to make sound inferences. This mean they need to understand the context in which data are collected (including biases) and the requirements relating to data use for specific purposes.
- Undertake a risk analysis of data flow to identify and manage risks.
- Consider data from the point where it is collected, the pathways different data take (often involving various spreadsheets or databases) through to where it is used, including identifying points of vulnerability, such as points of manual transfer.
- Prevent the need to clean or reformat data as it takes staff time away from other functions (e.g. feedback to notifiers, data analysis).

6.1 Introduction

General surveillance data must be designed, collected, stored and analysed to satisfy the purpose of the program and can therefore range from simple spreadsheets to highly sophisticated statistical analyses or modelling.

Data include information collected and provided by notifiers, including any personal information about notifiers themselves.

6.2 Ensure data use needs are well defined

- Data use needs must inform sampling design, data collection and analysis.
- Given that general surveillance program data can be used for a wide range of purposes (see 1.1.1) there are often diverse data users.
- Identify what data will be needed for the foreseen data analysis to deliver the needed information, in particular when sophisticated statistically analyses are planned such as those used to contribute to area freedom claims to ensure the needed specificity and sensitivity are achieved.
- Consider the preferences and requirements of data users early on in program design to maximise the use and trust placed in the data.
- Consider how the information derived from the data will be disseminated, such as regular newsletters, creating alerts, delivering presentation to key people.
- Ensure systems are in place to deliver timely action in response to the surveillance data and relating information obtained.
- Establish clear expectations with notifiers and others involved with the program about how (format and content) and when (timing, how often, how soon after notification) feedback/data will be provided to them.
- Consider how the demand for the data can be strengthened as a greater demand is likely to assist with attracting more investment (financially and in-kind) in collecting the data, and increase the positive outcomes achieved from the data.
- Where possible, share data to increase its value. For example, wildlife health surveillance can deliver information that could be of value to animal health, public health and conservation agencies.

6.3 Carefully consider the sampling design

- General surveillance program sample designs vary from unstructured opportunistic searching (such as people being vigilant while being out and about and reporting any unusual or suspected sightings) through to being highly structured and prescriptive. See Figure 1 in Chapter 1.
- The sampling design might need to be adjusted as a general surveillance program evolves, for example, due to new opportunities or changing objectives
- Clearly define the question(s) that the general surveillance data need to (help) answer to ensure the data collected will be adequate.
- Ensure the surveillance activities achieve the needed sensitivity and specificity.
- Identify potential biases and how to deal with them. For example, some target pests, weeds and diseases are more noticeable than others and are more likely to be reported, so care is needed on how species abundance is communicated. Or the distribution of notifiers do not correspond well with the areas in need of surveillance (see below).
- Identify the subsequent surveillance activities that will be required if a detection has been made and that the relevant arrangements are in place.
- More structured programs are best served by protocols that define the required on-ground surveillance activities, for example, to satisfy market access requirements. This is best developed between those involved, such as government and industry representatives.
- Other key considerations are discussed below.

Sensitivity refers to a program's ability to detect a pest, weed or disease when it is present. It can either refer to the program level sensitivity, or to the sensitivity of an individual observation. **Specificity** relates to the extent to which 'false positives' are an issue.

Consider risk pathways for exotic, new and emerging species

- Identify how target pests, weeds and diseases are likely to enter and spread through an area to assist with targeting surveillance efforts to the areas where the risk is likely to be the highest.
- Factors that increase risk include climatic and habitat conditions suitable for the target species, the presence of vectors and hosts, transport routes through which target species can hitchhike and natural means of dispersal (e.g. through wind, water or wild animals).

Consider the distribution of notifiers and their expected effort

- Notifier activity is not necessarily aligned well with where search effort is needed and may cause biases of where detections are made. For example:
  - professionals, such as vets, may not service all regions in need of surveillance and there may be a need to fill the gaps with, for example, government staff
  - the monitoring of certain pests, weeds or diseases require specialised skills that are scarce, for example, there is a shortage of poultry vets in various areas
  - a surveillance blitz may receive stronger support in metropolitan than rural areas
  - the reporting of fortuitous finds often correlates with human population densities
  - some people's willingness to do monitoring may relate only to areas or species that they value.
- Consider the search effort that is required to ensure the program has the sensitivity to detect the target organisms to fulfil its purpose. How many notifiers are required and how often do they have to look and report?
- Some programs use a tiered system and subsidies to target effort where most needed. For example, different investigation levels of livestock disease are used with maximum funding amounts based on the highest biosecurity risk.
- Put strategies in place to achieve a more desired distribution of notifiers. For example, run notifier recruitment drives in under-represented areas or incentivise notifiers to survey under-represented areas.

Maximise the quality of incoming notifications

- Considerations include:
  - encouraging early and accurate detections where the purpose is early detection – to maximise the chance that eradication or containment are feasible and cost-effective.
  - providing training and other forms of support to ensure notifiers are well-equipped to make quality notifications (see 4.4.6)
  - putting strategies in place to support specificity, such as pairing notifiers to support each other, or letting notifiers self-rate their expertise.

Balance flexibility with consistency between reports

- While flexibility can be important to keep notifiers engaged, it has to be balanced with the need for consistency in how data are collected and reported to ensure data quality and the needed level of scientific integrity. For example,
  - some programs allow for flexibility in where monitoring happens to ensure it is practical, such as the placement of arrays that collect biofouling in ports, or vets visiting their clients. Consistency comes from notifiers using the same methodology, i.e. deploying arrays happens at consistent times and seasons; or vets have been trained to use the same methods to take the samples that are analysed using consistent methods in the lab
  - some programs have one person who supports and advises notifiers, which contributes to achieving consistency between cases and sometimes across jurisdictions.
- Balancing consistency and flexibility is often achieved through greater interaction between notifiers and support from the program staff, such as group meetings that allow for the discussion of certain scenarios, or program staff visiting notifiers.

6.4 Understand data managers' and analysts' needs

- Most general surveillance programs involve several databases across organisations/divisions and which are managed by different administrators/teams.
- Ensure that the data analysts have a thorough understanding of the data, potential biases involved and the relating context to make sound inferences.
- Ensure the appropriate data analytics software is in place to empower data analysts to interrogate data and clearly present data. User-friendly data analytics software may enable less skilled stakeholders to explore the data.
- Database design influences the skill set needed for database managers and analysts. Technically complex databases require persons with specialist expertise to administer and query the database.

Enablers

- Data analytics software, such as PowerBI and Tableau, are increasing the value derived from data collected.

Challenges

- Manage vulnerabilities such as only one or two people having in-depth knowledge of an important database, in case they suddenly leave an organisation.
- Consider the staff capacity and capability needed to get the desired value from existing data, as this is a challenge for many general surveillance programs.

6.5 Consider data capture, flow, storage and value

- The costs of poor data management systems is invisible to many, but the consequences may include time wastage to clean or collect better data, dealing with errors, confused and upset notifiers and poor reputation.
- Achieving investment in better systems, from more automated functions through to replacement, may require making a well considered and strong case to managers.
- Often a program's IT needs have to adjust to what is already there, such as an organisation's existing IT capacity and capability. However, early consideration of data can minimise inefficiencies and maximise the value derived from the data.

6.5.1 Data capture

- Optimise data capture through effective notifier engagement (see 4.4) to ensure quality data enters the system. As well, carefully design reporting tools to minimise the need for manual data entry and reformatting (see 4.5); and put triage systems in place that can filter out notifications that are out of scope or of lesser significance.
- Consider carefully what needs to be captured, keeping in mind that requesting too much information from notifiers is a key disincentive for participation. Considerations include:
  - zeros - is there a need to capture and store nil detections, such as for market access requirements?
  - search effort – such as to be able to demonstrate the sensitivity of the program
  - the location - does it require a GPS location, a paddock, postcode, etc.?

6.5.2 Data flow

- General surveillance data usually flow through various persons/teams and databases and are stored at various points.
- Consider how different kinds of data will be stored (i.e. notifiers' personal data, contextual data for reports, photos and the detections).

- Undertake a risk analysis relating to data flow to ensure risks, such as human, process or technological related issues affecting data quality or flow efficiencies, are identified and managed.
  - Consider how and where data flow to identify opportunities for increased efficiencies and/or vulnerabilities and to ensure data reaches the desired database or audience(s) in a timely and useful form. Consider using technologies such as application programming interfaces (APIs)
  - Drawing flow diagrams showing data flows can help understand and communicate weak points, improvement opportunities and the people/teams involved.
  - Identify areas of vulnerability, such as where there is manual transfer of data, and ensure systems are in place to minimise the risk of error, such as some data not transferred or entered incorrectly.
  - Ensure several people have an in-depth understanding of sizeable and complex databases. Clear documented instructions for database use and adequate handovers when staff leave are vital.
  - Consider the timing of data coming in versus reporting requirements – there is often pressure for prompt reporting to key stakeholders, but sometimes there may be a lag in when some reports are being received.
- Carefully manage data migrations to new platforms – ensure IT staff understand the complexity of general surveillance data and the connections between different databases.

6.5.3 Data storage

- General surveillance programs can rapidly generate large data sets and data is often stored over long periods of time.

Carefully consider database design

- Considerations for database design include:
  - the needs of those providing data to ensure they have a positive user experience
  - appropriate mandatory and optional fields for users to complete
  - the ability to update over time, such as including the different requirements for different pests, weeds and diseases
  - the ability to label data based on its trustworthiness
  - appropriate user access and administrator rights – who can view which fields, or make changes to fields or rules and under which circumstances. For example, the database could have participant administrators who can manage memberships of certain groups contributing to it
  - links with other databases, such as taxa lists, to ensure correct scientific names are used
  - alerts if a certain species have been found in certain areas
  - ease of downloading data that is in an accessible format that can be used in other applications
  - the training needs for those who will be expected to use the database
  - the use of APIs to enable sharing data between databases or apps.

Accommodate the data load

- Consider if existing systems can accommodate the general surveillance data and what alternatives are available:
  - space – if an IT system does not have the capacity for a high load of photos, consider using a separate system or triage the load
  - sudden influxes – such as during peak reporting periods or during a blitz. Again, triaging might help manage the load.
- Ensure data back-up systems are in place if servers fail. Programs collecting a large amount of data in short period of times, such as a blitz, may wish to back-up data in shorter intervals than usual during these periods.

Consider how data will be analysed and used

- Ensure data is readily available, and able to be easily integrated with other data for analysis and other purposes (e.g. modelling).

Minimise the need for data cleaning

- Data cleaning can drain resources (e.g. staff time reformatting data for analysis) from other program functions (e.g. notifier feedback or data analysis).
- Ways to minimise the need for data cleaning include:
  - using data standards
  - offering specific training on data entry (including for notifiers)
  - using software for automatic checks (e.g. email address formats, detections are within geographic boundaries)
  - minimise the use of free-text fields by including online forms and drop-down menus to ensure standardised entries.

Consider the location of where the data is stored

- Data stored within Australia are under Australian legislation that has been developed in the national interest of Australia. There might be less protections and control if data is stored outside of Australia. This can result in situations where overseas authorities become aware of a potential sensitive detection in Australia before Australia authorities do.

Avoid 'cluttered' databases

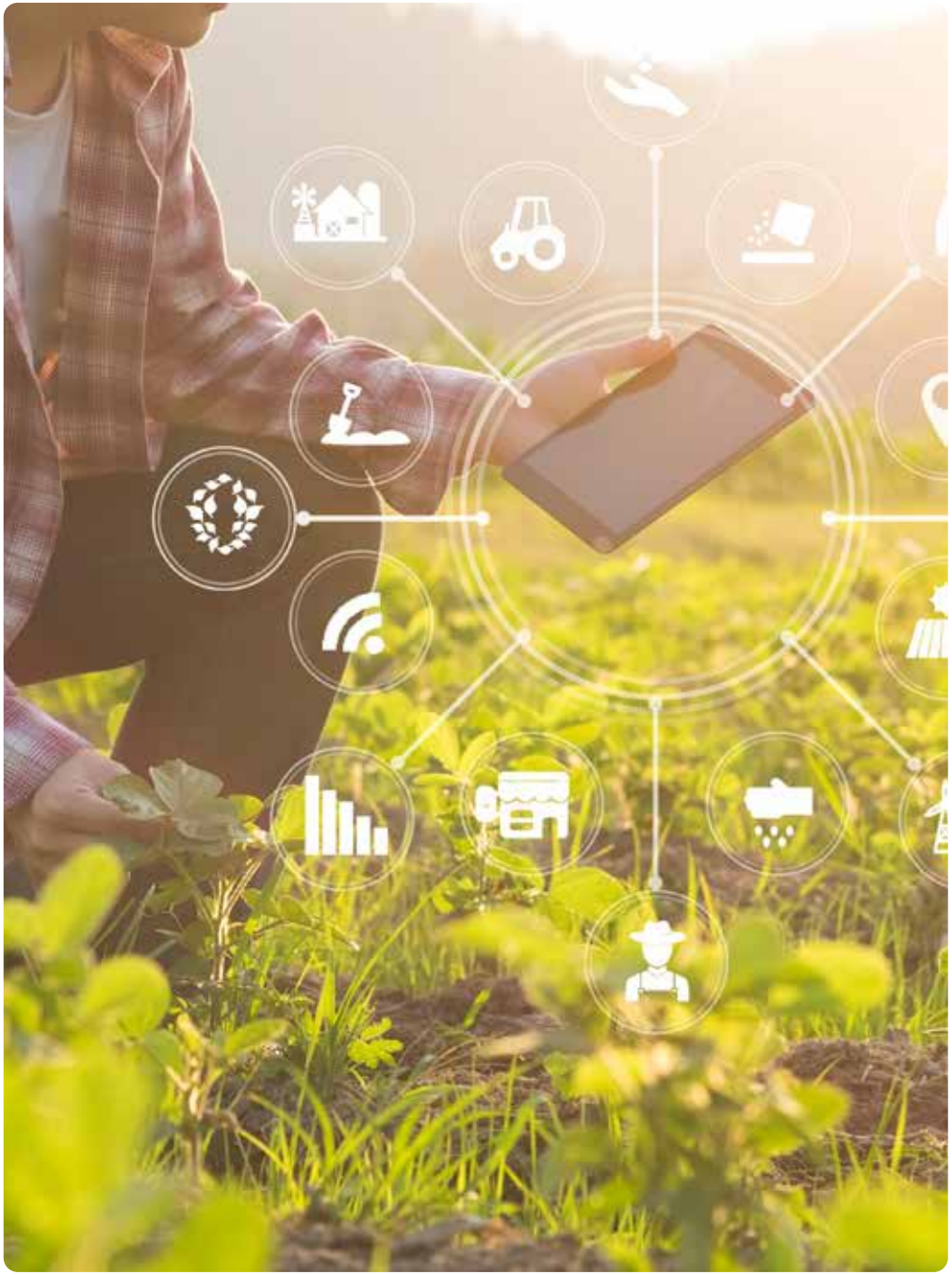
- Such as names and contact details of notifiers who no longer actively support the program – it may give a false impression of the number of people participating in the program and may waste resources if mailouts are involved.

6.5.4 Data analysis and value

- The more unstructured a general surveillance program, the more likely that the data will have biases, gaps and redundancies, both geographically, over time and between species. For example, fortuitous find notifications are likely to be higher in popular national parks, during the warmer months (when more people are out and about) and/or for obvious species.
- In some cases trade-offs are possible in data analyses. For example, concerns about the sensitivity of a sampling design due to a low probability of detecting a pest, weed or disease can be overcome by sufficiently high numbers of people looking for it regularly. Or compromises might be made in the frequency or density of monitoring to better support notifiers participation.
- Adequately resource data analysis capability to ensure the appropriate sophisticated methods and models are used to make sound inferences. Particular statistical techniques exist to deal with certain biases. Discussing them falls outside the scope of these Guidelines.
- Consider integrating surveillance and supplementary data (e.g. climate, soil types, the spread of vectors, human population densities) to, for example, model pest, weed and disease spread, or inform the correlation between the location of notifiers and likely detections and subsequent engagement activities.
- Consider making data publicly available (e.g. on the internet) with user-friendly interfaces that enable data queries and outputs such as maps.

Data analysis tools

- Invest in user-friendly data analysis tools to support interactive visualisations, reports and dashboards.
- When choosing software to access and analyse data consider:
  - the information needs of different data users – including the potential for displaying data on maps and the development of graphs and diagrams
  - licence cost and conditions – some data analysis packages require individual user licences, which can complicate data sharing if others do not have licences
  - the technical support and adequate documentation that is available as part of the licence
  - skills and capabilities – some products require more skills and specialised training to use and can therefore hinder wide uptake and use.



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Useful websites

- The open data toolkit https://toolkit.data.gov.au/
- Department of the Prime Minister and Cabinet's 'Best practice guide to applying data sharing principles' https://pmc.gov.au/resource-centre/public-data/data-sharing-principles

7 Continual improvement

Key points

- Design general surveillance programs to be responsive to challenges and opportunities. Monitoring and evaluation processes assist with identifying how to spend scarce resources.
- Undertake contingency planning to be prepared for the most likely and/or severe adverse events.
- Identify and monitor the key feedback loops (including potential delayed feedback loops) within a general surveillance programs in order to understand how weaknesses or events in one part of the program is likely to affect other parts of the system.
- Identify and monitor the most limiting factors in a general surveillance program to inform management and investment decisions.
- Identify leverage points as they can be catalysts for increased success and sustainability, such as investment in technology, revised legislation, and making the program mutually beneficial for key contributors.

7.1 Introduction

General surveillance programs will inevitably encounter challenges and inefficiencies, or new opportunities may arise. Monitor program performance to ensure the program adapts and evolves as needed to ensure its longevity.

> ...we really try to push the science through in terms of the diagnostic approach that we took in taking a leap to doing molecular diagnostics. That was a big jump. Because we had that collaboration and support from the ports, they were willing to take that leap with us and maintaining a level of transparency and openness about what we were doing and how we worked, I think it really helped with that transition. ***[SWASP representative]***

Principles supporting continual improvement

- Appoint an effective coordinator (or team) – to remain in contact with key stakeholders and stay abreast and responsive to issues and opportunities, including new scientific developments that may be beneficial to the program.
- Have a 'growth mindset' – ask continually how the program can be improved and welcome discussions about program improvements.
- Allow for flexibility in how programs are run to allow for adjustments.
- Allow for some risk-taking and if something does not work out as hoped, see it as a lesson learned rather than a failure.
- Be agile, that is, allow the program team a level of autonomy so they can quickly respond to opportunities or issues without being tied down by bureaucratic requirements, such as lengthy approval processes.
- Allow enough time to build and maintain relationships and to have time available to monitor aspects of the program. Enlisting suitably skilled consultants to undertake surveys and interviews can be valuable.
- Allow enough time and resources for implementing changes, such as to test changes to an app, or test whether target groups interpret new communication or training materials as intended.
- Enable on-ground information to reach the program team and other stakeholders, such as scientists and policy-makers. For example, remain in contact with people who are in touch with notifiers; organise forums for notifiers to meet with other stakeholders; or arrange visits for program team members to do on-ground visits.

7.2 Undertake program monitoring and evaluation

- Monitoring and evaluation assists with informing how to best allocate scarce resources
- Develop a monitoring and evaluation plan. Examples of approaches are provided in the Further reading section (see section 7.5).
- Other considerations for strengthening monitoring and evaluation include:
  - set milestones and targets to guide and measure performance, such as for timely responses to notifiers, targets for notifier numbers and distribution, and number of reports
  - invest in monitoring notifier performance, such as surveys or interviews about their confidence to recognise priority pests, weeds or diseases (this may differ between species) and how valuable they find certain forms of support, such as training sessions or materials
  - meet regularly with people representing the different functions throughout the program – to stay abreast of the issues and opportunities that they face
  - invest in program reviews – to enable an in-depth exploration of the program to identify opportunities for improvement
  - enlist support from suitably skilled consultants – for example to do a stakeholder needs analysis or seeking feedback from key stakeholders about how the program can be best improved
  - undertake regular team reflections on program performance and be willing to make changes as needed.

7.3 Undertake contingency planning

- Undertake contingency planning to be prepared for the most likely and severe adverse events. While not all risks can be foreseen, a risk analysis can assist with being better equipped to address adverse circumstances.
- Do a risk assessments at the start of the program and at various times throughout. Identifying what could go wrong and how to respond will assist staff to provide a rapid and appropriate response to adverse or challenging events.

7.4 Interactions to look out for

- Three systems thinking concepts are helpful for continual improvement, i.e. feedback loops, the most limiting factor and leverage points.

7.4.1 Identify feedback loops

- Feedback effects happen in general surveillance programs when change in one part of the program impact another. Examples include:
  - an increase in notifiers causes an increase in the number of notifications a lab needs to service
  - a decrease in data analysers causes a decrease in data value to various stakeholders
  - an increase in temperature may decrease the prevalence of certain pests, weeds and diseases
  - an increase in notifier training decreases the number of 'false positives' reaching the lab or herbarium.

A delayed feedback

Some feedback effects may take time to realise, called delayed feedback. For example, the effects of introducing more demanding notifier requirements, such as onerous paperwork, are not likely to show immediately. The notifier database may suggest for a long time that the program has much support. If it leads to a drop in notifications, the reason may not be evident. Notifiers may be looking but are not spotting anything; or they may not report as readily to avoid the required paperwork.

7.4.2 Identify the most limiting factor(s)

- The variable that is most limiting in a program is the most important to bring about progress. Understanding the most limiting factor assists with identifying where to best invest to strengthen a program and what to maintain to prevent deterioration. Examples include:
  - staff resources – other than appointing more staff, existing staff can be freed up, such as by enabling them to focus on key tasks only, investing in technology (e.g. in labs to speed-up identification/diagnostics); or designing better processes or reporting tools, such as data standards and well designed apps to minimise the need for data cleaning
  - notifications – it could be easy to think that a need for more notifications requires more awareness-raising. However, interviews with notifiers many reveal that the process of reporting is too onerous. Simplifying the reporting process will deliver more progress than increased awareness-raising
  - data – investing in more data collection to answer certain questions may fall short if the data management system is plagued with a database that is difficult to interrogate or if there is limited staff capacity and data analysis tools to undertake in-depth data analysis.

7.4.3 Identify leverage points

- Leverage points involve a small shift in one area delivering considerable beneficial change in another area(s) or to a general surveillance program as a whole.
- A key leverage point is a shift in the mindset in which a general surveillance program is embedded, such as allowing for a greater focus on prevention than management of pests, weeds and diseases, or being open to doing things differently than have been done traditionally. Other examples of leverage points are listed below.

Invest in technology

- Technology that delivers more and/or quicker identifications/diagnostics, such as PCRs and eDNA, can offer benefits:
  - lab or herbarium staff are better able to cope with influxes
  - experts such as entomologists, taxonomists, etc. can be freed-up from routine work to focus more on rare identifications
  - quicker response times to notifiers about what they have found contributes to providing a positive reporting experience
  - stronger evidence in a market access context if identification/diagnostics are more accurate.

Changing information flow

- Designing data flow and analysis so that data becomes more valuable to various groups, can shift who and how much people invest in the data collection and the program as a whole.

Enabling legislation

- Sometimes the revision of biosecurity legislation can strengthen the legitimacy and importance of the general surveillance programs in various ways, for example by:
  - strengthening communication requirements between key stakeholder groups when there has been a significant detection
  - increasing demand for the program's services, such as weed identification training, to key players such as local governments if they have related responsibilities under legislation. This can strengthen the relationships between the program and key stakeholders
  - increased funding for general surveillance programs.

Make the program mutually beneficial for key stakeholders

- It is not unusual for government teams and others to be plagued by siloed thinking, stemming from resource pressures that force them to only focus on their own priorities and core business.
- However, stakeholders' primary aims and needs seldom completely line-up with government goals, for example:
  - farmers may be less interested in exotic pests, weeds and diseases that are not affecting their production as opposed to established species that are causing damage or require cost to control
  - gardening groups are more interested in learning about how to grow flourishing vegetables and ornamental plants rather than monitoring for new and emerging pests and diseases
  - private businesses, such as vets and on-farm consultants, primarily must run profitable and successful enterprises. Spending considerable time and money collecting samples to support evidence of disease freedom may not obviously contribute to these goals.
- When general surveillance programs can assist key stakeholders to achieve their goals or fulfil key needs (such as meeting legislative obligations) it can be transformational in getting support and achieving program resilience, for example:
  - some private businesses and government entities, such as port authorities and industry ports, have legislative requirements to show environmental stewardship. When technologies such as eDNA are used to analyse samples from marine environments, biodiversity data can be obtained relatively easily and at low cost and assist them to demonstrate environmental stewardship
  - several livestock general surveillance programs instigated to collect data to support claims of freedom of priority diseases, have funding conditions that allow for the diagnosis of other significant diseases. Due to the high cost of lab fees, vets and producers often do not pursue finding a diagnosis, especially if an animal has already died or is likely to die. However, being able to pursue a diagnosis at a subsidised cost helps private vets to deliver a better service to their clients, and producers have a better chance of finding out what disease is affecting their animals. If these programs insisted on paying only for ruling out notifiable diseases, private vets and producers would be less likely to participate.

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8 An enabling environment

Key points

- Design broader legislation, rules and regulations, such that they provide pull factors for general surveillance programs. For example, by pursuing the increased acceptance of general surveillance data (under specified conditions) to support international and nation trade arrangements.
- Design broader legislation, rules and regulations such that they provide more legitimacy to general surveillance programs, such as stronger communication requirements between key stakeholders when a suspicious species, sign or symptom has been found; or by increasing the need for the services a general surveillance program offers, such as pest, weed and diseases identification training.
- Design general surveillance programs such that they assist organisations, businesses or individuals fulfilling rules and regulations. For example, a general surveillance program can be the easiest way for individuals or private businesses to fulfil legislative requirements to report suspect species, signs and symptoms.
- Maintain productive relationships and co-designed arrangements between government and other sectors, such as industry. Trust is fundamental to ensure effective engagement.

- Maintain a carefully considered balance between education and enforcement when suspect species, signs or symptoms have been detected. Overly quick and harsh responses are likely to result in adverse effects such as people becoming to scared to report, or the dumping of organisms that could contribute to their spread.

8.1 Introduction

General surveillance programs are embedded in various rules and regulations that define their context. They may benefit the program, be sources of costs, and/or cause needs for adjustment(s).

8.2 Understand international rules and regulations

- International trade rules are a key driver for several general surveillance programs, including those stipulated by the International Plant Protection Convention (IPPC) and the World Organisation for Animal Health (OIE). The World Trade Organisation accepts these rules to support international trade. For example, the IPPC 's International Standard Phytosanitary Measure (ISPM) 6 supports the use of general surveillance.
- Greater allowance for general surveillance programs to support national and international trade can provide a key pull factor for government and industry to instigate and support such programs.

8.3 Understand biosecurity related legislation

- Biosecurity legislation often lays the foundation for general surveillance programs, such as through promoting a whole-of-community approach to biosecurity.
- Consider designing a general surveillance program such that it provides the easiest and most cost-effective way for people to fulfil their responsibilities under legislation, such as the requirement to report suspect sightings within a limited period.
- When biosecurity legislation is reviewed, consider how it can strengthen the legitimacy of general surveillance programs, for example by:
  - providing powers to government staff to enter private property to investigate or if needed, confiscate material
  - setting the program scope based on the list of prohibited and/or restricted species or notifiable diseases
  - reporting requirements and requirements for records and data sharing for various stakeholders
  - assisting parties such as local governments to fulfill their requirements under legislation, such as training in weed identification, which fosters beneficial networks with them

- Consider the implications that biosecurity related legislation and regulations may have for a general surveillance program, including:
  - permits may be needed for keeping restricted or prohibited species for training purposes
  - compliance with hygiene protocols, for example to transport state prohibited weeds
  - only certain labs are accredited to handle suspected notifiable animal diseases.

8.4 Identify other relevant biosecurity rules

- Consider how arrangements between government and industry can support general surveillance programs, for example:
  - strengthened relationships as a result of co-designed agreements, such as the Government Industry Agreement in New Zealand that gives industry stronger influence during biosecurity responses
  - clearly specified arrangements in case of an outbreak of a priority pest, weed or disease. There are deeds or agreements in various sectors between the Australian Government, state and territory governments, and other signatories, such as industries, that outline the arrangements for nationally coordinated responses and cost sharing
  - joint biosecurity campaigns, such as Ko Tātou This Is Us in New Zealand.
- It is important that those responsible for implementing biosecurity and other functions understand that their actions have implications for subsequent engagement with those groups. For example, if government performed poorly during a response (e.g. being too heavy-handed or too slow to deliver compensation) it will likely impact subsequent engagement with the groups involved, including about general surveillance.

Ko Tātou This Is Us

New Zealand used a scaffolding approach in supporting biosecurity awareness and education of the broader public. They launched a campaign called Ko Tātou This Is Us of which the first phase aimed to build baseline awareness by explaining to the public what biosecurity is and why it is important. Ko Tātou This Is Us recognises that it takes all New Zealanders to play their part in protecting New Zealand's outdoor environment. Subsequent campaigns, including those relating to general surveillance, build on the original campaign.

8.5 Understand the relevant organisational rules

- Consider how a general surveillance program contributes to the strategic plans of the lead organisation as lead organisations tend to sustain support for programs that contribute significantly to fulfilling their strategic plans.

8.6 Respond to other relevant rules and regulations

- Consider how any other rules and regulations may impact on aspects of a general surveillance program, such as aviation rules impacting the use of drones, or the safety and security rules on certain premises impacting requirements for general surveillance staff, such as at ports.

8.7 Strike a balance between education and enforcement

- Overly quick use of enforcement can have adverse effects, including:
  - creating fear of biosecurity authorities, which will deter further notifications
  - dumping of pests or weeds, which may contribute to their spread.
- People may not be aware that they are in possession of a prohibited or restricted species, or they may underestimate the risk that these species pose.
- However, it is important that people see decisive action when biosecurity laws are violated to maintain the legitimacy of the relevant rules.
- General surveillance programs have more 'teeth' when legislation enables powers to enter property, seize, quarantine, implement movement controls, etc., but they should be used judiciously.

The Voluntary, Assisted, Directed and Enforced compliance model

In New Zealand, the Compliance and Governance branch of the Ministry for Primary Industries applies the Voluntary, Assisted, Directed and Enforced compliance model (VADE model). The model recognises varying levels of behaviours which guide the approach to deliver interventions. The voluntary approach (V) recognises that most people comply voluntarily with rules and aims to ensure that the public is aware of certain rules and regulations. This is done through education programs and communication. In instances when the public are uninformed of sector specific regulations, the assisted (A) approach reminds those wanting to comply of their responsibilities and possible consequences. For those less willing to comply, the directed approach (D) guides an appropriate enforcement plan to deter or stop the behaviour. The enforced approach (E) targets those with a criminal intent and who are likely to undertake risky biosecurity activities using the full force of the law, if required.

I, myself, have a philosophy of not being highly regulatory and jumping and closing stuff down. Especially where someone voluntarily put their hand up and says, "I've got a problem". My motto is, I would prefer to be three days late in knowing it was an EAD [emergency animal disease] than three weeks late [because people don't notify authorities]. ***[Chief Veterinary Officer]***