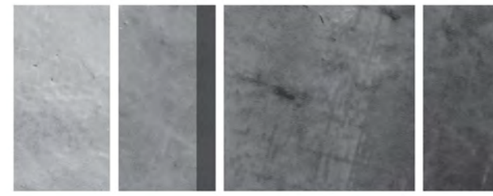
Designing Behaviour Change Interventions for Invasive Animal Control: A Practical Guide

Donald W. Hine, Lynette J. McLeod and Aaron B. Driver, University of New England

PESTSMART
CENTRE FOR INVASIVE SPECIES SOLUTIONS
mla MEAT & LIVESTOCK AUSTRALIA
une University of New England



Designing Behaviour Change Interventions for Invasive Animal Control

A Practical Guide

Donald W. Hine
Lynette J. McLeod
Aaron B. Driver

University of New England
Armidale, NSW, 2351
2019
An Invasive Animals CRC Project

Published by: Centre for Invasive Species Solutions.
Telephone: (02) 6201 2887
Facsimile: (02) 6201 2532
Email: communications@invasives.com.au
Internet: https://www.invasives.com.au

ISBN: 978-1-925727-06-7
e-Book: 978-1-925727-05-0

Acknowledgements: The authors would like to acknowledge the conceptual and financial support provided by Meat and Livestock Australia in the preparation of this guide.

This document should be cited as:
Hine DW, McLeod LJ, and Driver AB (2019). *Designing Behaviour Change Interventions for Invasive Animal Control : A practical guide*. Canberra, Australia: Centre for Invasive Species Solutions.

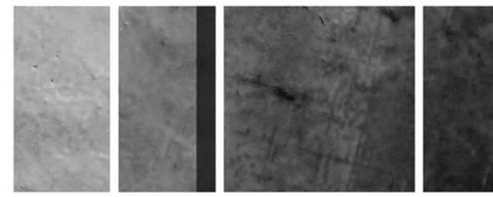
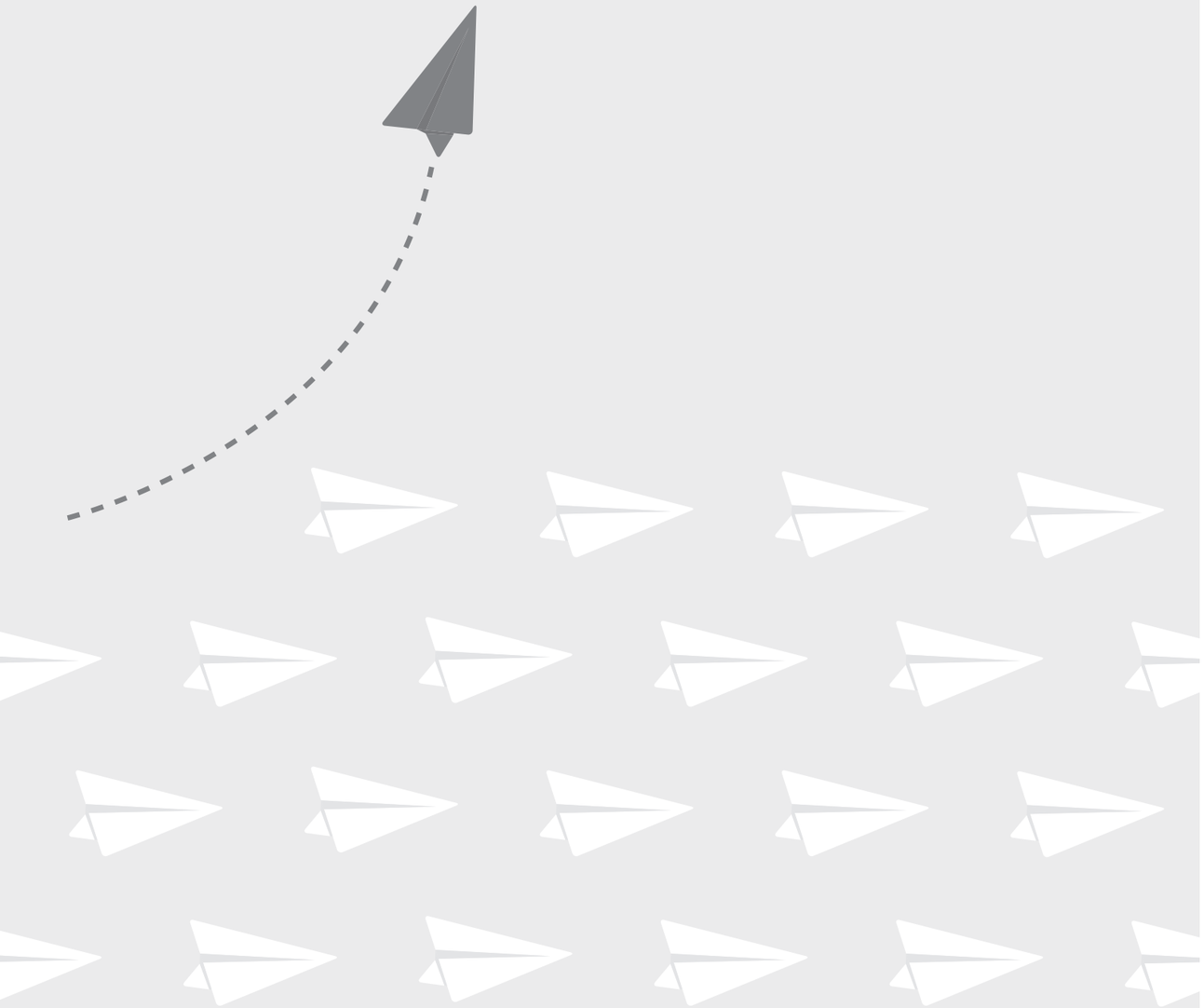


table of contents

"Knowing is not enough, we must apply. Willing is not enough, we must do." Goethe



Changing behaviour using effective interventions

Scientists, both within Australia and throughout the world, have developed an impressive set of technologies and recommended best practices for managing invasive animals. But these proposed solutions will fail unless the public – land managers, industry employees and community members – are sufficiently empowered and motivated to change behaviours and adopt new approaches.

Changing behaviour, and sustaining these changes over time, is a difficult process. Educating the public about the adverse impacts of invasive animals, and providing information about control strategies, is rarely enough.

Behaviour change interventions require a more sophisticated approach informed by behavioural sciences. Social psychology and behavioural economics have generated an array of intervention strategies and behaviour change techniques designed to increase audience understanding, engagement and, ultimately, adoption of desired behaviours.

In this guide, we summarise this information, and provide a systematic approach for developing new behaviour change strategies. This approach is based on four guiding principles:

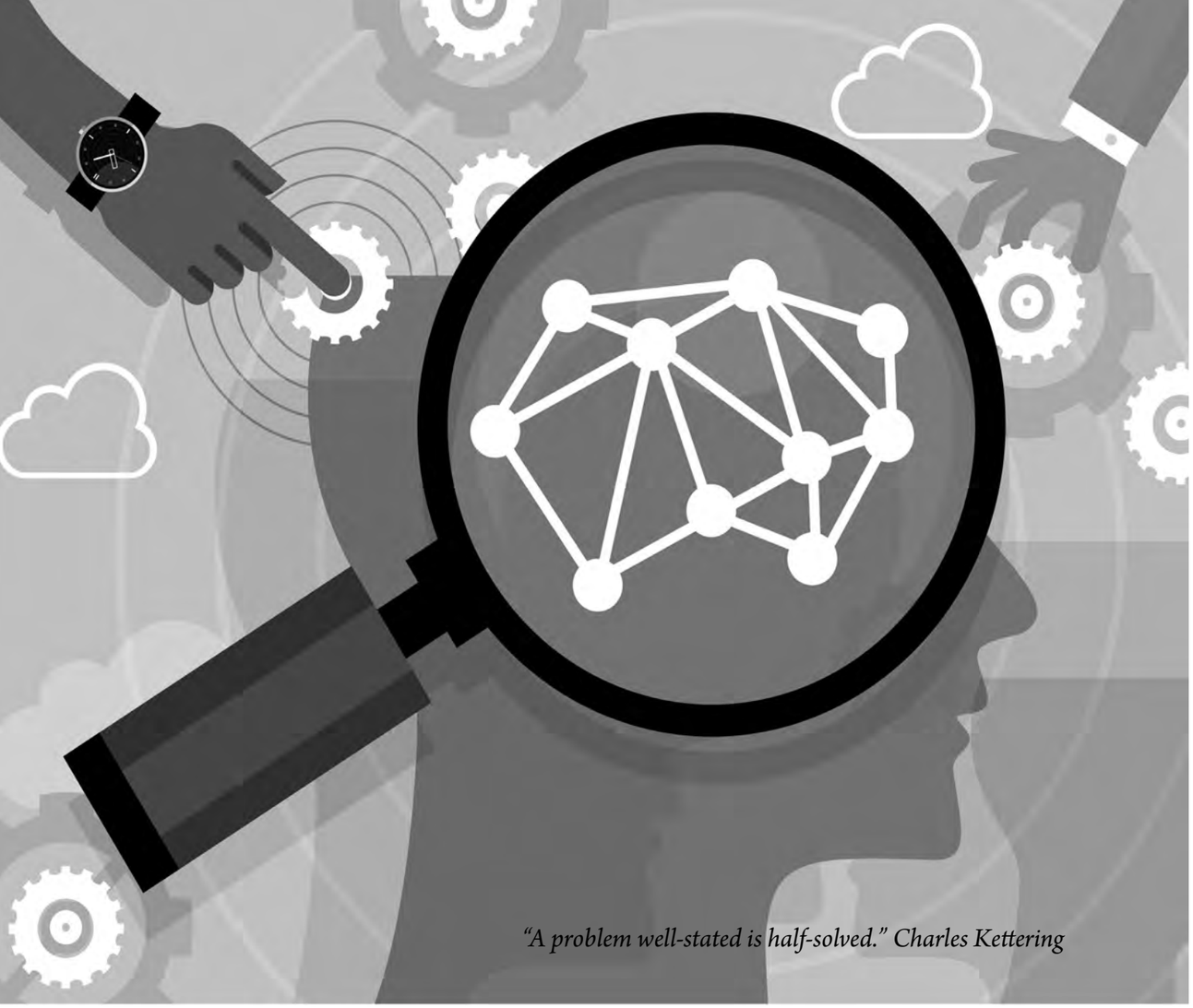
1. Focus on human behaviour.
2. Know your audience.
3. Match your interventions to the primary causes of behaviour.
4. Apply science-based evaluation.

This guide is for practitioners who are developing and delivering intervention strategies related to invasive animals. But the general principles and concepts discussed also apply to natural resource management more broadly. Above all, the guide outlines a systematic approach for developing behaviour change interventions, so that policymakers, scientists and engagement specialists can better connect with their target audiences to improve participation rates and hence the effectiveness of management programs.

How to use this guide

Each section of this document introduces a key principle for developing an effective behaviour change intervention, along with examples of how to apply that principle to invasive animals. Importantly, we have not provided detailed step-by-step instructions about how to apply each principle. This was a conscious decision. Developing, implementing, and evaluating a behaviour change strategy requires much more than following a simple recipe.

Each context is unique and needs to be systematically evaluated to determine which tools are most likely to effective in that particular circumstance. And very importantly, communication and consultation with the target community is essential to achieving effective outcomes. This should be a fundamental part of the whole process. First understand the context and target audience – then choose your tools carefully.



"A problem well-stated is half-solved." Charles Kettering

one

Focus on human behaviour

When we talk to engagement specialists in the pest animal management space there is a very common recurring theme: managing pest animals is a difficult and challenging task. Many pest animals breed quickly. They don't respect property boundaries. And they are often difficult to trap or kill. Although pest control technologies and strategies are improving, we've yet to meet anyone who argues that managing invasives is a simple or straightforward task. As Ringo Starr likes to say, "It don't come easy".

So managing pest animals is pretty hard. But most of you would probably agree that managing people is even harder! Again and again, engagement specialists emphasise to us that their biggest problems are with people, not the pests themselves.

One of the key challenges of effective pest management is that it requires sustained cooperation of groups of people, some of whom likely have divergent values, beliefs, attitudes and capabilities. Getting everyone on the same page can be incredibly challenging. Have you heard the expression, "It's like trying to herd a bunch of cats"? That's exactly the challenge facing engagement professionals working on invasive animals.

Often a substantial proportion of landholders are engaging in behaviours that are counterproductive to responsible pest animal behaviour. They are not baiting, not ripping up warrens, not sharing information with their neighbours. Or, in other situations, they are engaging in such action but aren't adopting the latest technologies or best practices.

Why focus on behaviour?

When we meet with engagement specialists, they often tell us their main goals are to increase awareness about pest animal problems, and increase knowledge and/or change landholder attitudes. These are noble intentions. But it is important to recognise that increasing awareness and knowledge, or changing an attitude, is almost never the desired endpoint. These are way stations on the road toward a more significant and tangible goal: behaviour change.

It is not enough for landholders to know about best practices in baiting; we want them to actually engage in these practices. Likewise, instilling positive attitudes about ejectors in only a first step; we need people to install these ejectors on their properties.

Interventions that increase awareness and knowledge, or change attitudes, will not inevitably change behaviour. Decades of psychological research indicates that the links between awareness, knowledge and attitudes on one hand, and behaviour on the other, are tenuous and inconsistent. A positive attitude toward baiting may increase the likelihood of baiting under certain favourable circumstances, but it certainly does not guarantee the behaviour will actually occur.

Effective engagement requires a more sophisticated understanding of human behaviour and its causes – the factors, inside and outside the individual, that increase and decrease the likelihood that desirable pest management behaviours will occur.

Defining the problem in behavioural terms

When developing a behaviour change program, it is critical to clearly define the problem in behavioural terms. In particular, four questions should be asked:

- What is the nature of the problem in ecological, economic, social or health terms?
- Which human behaviours are making the problem worse?
- Which human behaviours can help resolve the problem?
- Who are the individuals whose behaviour needs to change?

For example, it is not enough to say, "A serious wild dog problem exists in peri-urban areas of South East Queensland". If you want to design an effective behaviour change program, you'll need to drill deeper. What is the problem you wish to solve? Are dogs eating too many sheep? Are they threatening young children in parks, or killing koalas and other native species? Or perhaps the problem involves all these things?

When evaluating the effectiveness of a behaviour change program, it is, of course, important to know whether or not behaviour change has occurred. But it is equally important to demonstrate whether changes in behaviour have also produced measureable improvements in the economic, ecological, social or health problems that prompted the behaviour change initiative. Unfortunately, it is quite possible to change behaviour, but not fix the bigger problem one initially set out to solve.

Similarly, it is not enough to say that farmers need to participate more in wild dog management activities. It's important to specify which farmers. Are we talking about sheep and cattle graziers, hobby farmers, absentee landholders, or all of the above? And what exactly do these landholders need to do or stop doing? That is, which specific behaviours will have the biggest impact on reducing wild dog impacts? Is it better to encourage landholders to engage in coordinated baiting, to erect exclusion fencing, or report wild dog sightings to relevant authorities? When developing behaviour change interventions, we should efficiently allocate our time and resources towards "high-impact" behaviours, a topic we address in the next section.

Selecting which behaviours to target

Many behaviour change interventions fail because they attempt to:

- change the wrong behaviours, or
- change too many behaviours at once.

McKenzie-Mohr (2011) has developed a simple but powerful tool, the Behaviour Prioritisation Matrix, to help select which behaviours to target (Table 1).

Potential behaviours should be rated according to:

- the impact of the behaviour on tangible ecological, economic, social and public health outcomes
- the likelihood of adoption, and
- the proportion of the target population currently engaged in the behaviour (penetration).

Because behaviours do not generally happen in isolation, it is important to consider both direct and indirect (or spill-over) impacts of the behaviour.

In most cases, interventions should aim to influence a small number of high, positive-impact behaviours, which have a high probability of being adopted, and are currently not widely practiced within target communities.

You don't want to spend time, energy and money convincing people to engage in activities that will have minimal impact on your animal management issue. Nor do you want to waste resources trying to influence behaviours that are unlikely to be adopted or that everyone is already performing.

Table 1. The Behaviour Prioritisation Matrix for selecting behaviours to target in behaviour change interventions (based on McKenzie-Mohr, 2011).

Behaviour	Effectiveness	Likelihood of Adoption	Current Penetration	Selection Decision
1	Low	Low	Moderate	✖
2	High	High	High	✖
3	High	High	Low	✔

Note: As a general rule, design communications that target high-impact behaviours that have a reasonably high probability of being adopted, and are not already being performed by most of the target audience.

Further reading

Brasher, M. (2017). *Managing Australia's Pest Animals: A* guide to strategic planning and effective management. *Chapter 4: Engaging with communities and stakeholders* (pp. 51-68). Clayton South, Victoria: CSIRO Publishing.

McKenzie-Mohr, D. (2011). *Fostering sustainable behaviour: An introduction to community-based social marketing* (3rd ed.). *Step 1: Selecting behaviours* (pp. 11-20). Gabriola Island: New Society Publishers. http://www.cbsm.com

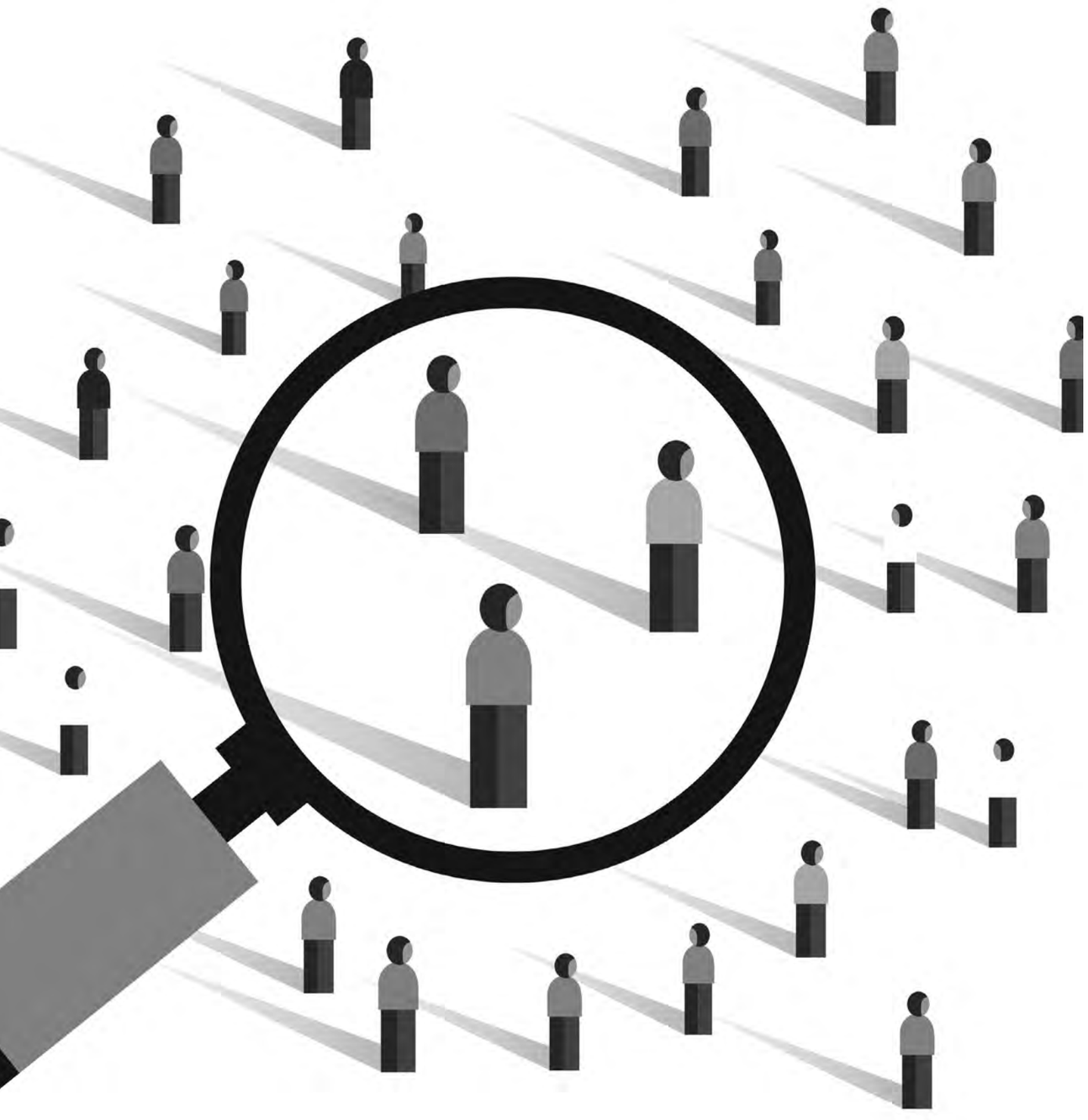
Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel. A guide to designing interventions.* UK: Silverback Publishing. http://www.behaviourchangewheel.com

Selecting behaviours for managing wild dogs in peri-urban Queensland

Wild dogs contribute to a range of negative impacts in Australian peri-urban regions. In this study, the Invasive Animals CRC human dimensions team worked in partnership with Queensland's Department of Agriculture and Fisheries, and the City of Gold Coast, to identify and prioritise 13 behaviours that peri-urban residents could engage in to reduce the impacts of wild dogs in their communities. Key-informant interviews and stakeholder focus groups were used to develop a list of wild dog management behaviours. Online surveys with wild dog experts (n=10) and peri-urban residents (n=301) were used to create a Behaviour Prioritisation Matrix (BPM), which ranked the behaviours in terms of projected overall effectiveness, based on: (1) expert estimates of impact, (2) current adoption levels (penetration), and (3) likelihood of future adoption. BPM analysis indicated that increasing community reporting of wild dogs and their impacts would produce the greatest overall benefits for wild dog management. Behaviours rated as highly effective by experts, such as baiting and trapping, had low projected impact given they were unlikely to be adopted by most residents.

Behaviours	Effectiveness (1-10)	Likelihood of Adoption (0-4)	Penetration (0-4)	Total Weighted Impact	Rank
Report wild dogs and impacts to council	5.83	3	0.93	68.74	1
Fence/contain pets	5.36	3	2.54	34.72	4
Permit use of injectors with cyanide on property	7.39	1.4	0.73	21.58	5

Table 2. For this study, 13 behaviours were assessed. Only three are reported here for illustrative purposes. Total Weighted Impact = Effectiveness x inverse Penetration x Likelihood of Adoption. This summary is based on Please, P. M., Hine, D. W., Skoien, P., Phillips, K. L., & Jamieson, I. (2017). Prioritizing community behaviours to improve wild dog management in peri-urban areas. *Human Dimensions of Wildlife*, 23(1), 39-53.



two

Know your audience

A man should look for what is, and not for what he thinks should be. • Albert Einstein

We've all heard the expression "one size does not fit all". What is true of socks, shoes and underwear is also true of behaviour change interventions. People vary considerably in terms their values, attitudes, beliefs and behaviours. These differences influence how they respond to behaviour change interventions. Just as we talk to our spouses differently than to our mates on big night out, we also need to craft and refine our behaviour change interventions with our intended target audience in mind.

Audience segmentation

Audience segmentation involves dividing a target population into subgroupings called segments, usually based on some combination of demographics, values, beliefs and behaviours. Behaviour change practitioners then design interventions to best match the characteristics of specific segments, a process known as targeting.

In some instances, practitioners will craft messages for specific individuals, as opposed to larger segments. This is referred to as message tailoring, and is becoming increasing common with advances in internet marketing.

The primary goal of tailoring and targeting is to increase the persuasive and behavioural impact of interventions by matching intervention content to audience needs.

Segmentation can assist engagement specialists and program planners to make four main strategic decisions.

1. **Who should be targeted?** Segmentation research provides information about the number of distinct audiences present in a population, as well as the characteristics and relative size of each. This information can be used to guide resource allocation decisions. For example, an organisation may decide it can maximise on-the-ground impact by targeting a large disengaged but receptive segment as opposed to focusing on a smaller group of hard core contrarians.
2. **How to optimise messages and intervention programs for each audience selected for targeting?** Each audience segment is characterised by a unique combination of demographic, psychological and behavioural attributes. These attributes can be helpful in guiding engagement strategies specifically designed to address the knowledge needs and potential behavioural barriers facing each segment. Some segments may be unaware that invasive animals are a problem in their region, whereas others may be motivated to act but lacking knowledge about how to implement best management practices.
3. **How to ensure the messages and interventions reach selected audiences?** Different audience segments may have their own unique preferences for where they obtain information about invasive animals. Some rely heavily on Facebook, others watch TV news, and others prefer reading traditional print media. Using the wrong

communication channel may prevent key messages from reaching their intended recipients. This can create unintended consequences if, for example, an intervention designed for an audience that is highly concerned about wild dogs is delivered to a group of landholders who do not believe wild dogs pose a serious problem.

4. **How to select messengers for each audience segment?** Not all audiences will perceive certain communicators as credible and trustworthy. If you want landholders to rip up rabbit warrens or conduct coordinated baits, sending out a soft-handed academic to a community meeting might not be the best strategy! Audience segmentation helps policy makers and engagement specialists select messengers with the relevant expertise, values and personal experiences needed to build and maintain trust with their audiences.

Which audience attributes should be used for segmentation?

Most communication specialists agree that crafting messages to match audience needs is a pretty good idea. But an infinite number of ways exists to break audiences into segments. We could do it on the basis of age, gender, enterprise mix, values, attitudes, beliefs, behaviours – or a combination of all of these things.

When it comes to developing tailored and targeted interventions related to invasive animals management, we believe two approaches are particularly useful.

1. Segmentation based on COM-B

The first approach is based on understanding the causes that:

1. Lead landholders to engage in the behaviours you want them to engage in (drivers), or
2. Prevent them from engaging in these behaviours (barriers).

In a recent review of the literature, Michie and her colleagues (2014) identified 83 psychological theories of behaviour change, each incorporating multiple causes of behaviour. For serious behaviour change specialists, it's not a bad idea to be familiar with this comprehensive list of potential drivers and barriers. But most people find the thought of reviewing dozens of theories of behaviour to be daunting, boring or both. Is there a simpler way? Yes there is.

One promising approach involves classifying drivers and barriers into three main types:

1. **Capability.** Do landholders have the relevant knowledge, skills and physical capacity to engage in the target behaviour? Do they know the best management strategies? Are they physically able to hunt, trap and bait?
2. **Opportunity.** Are situational conditions present to support the behaviour? Are relevant laws and other support structures in place? Are appropriate control technologies – such as baits, ejectors and viruses – readily available?
3. **Motivation.** Are landholders sufficiently motivated to take action? Are they aware a problem with invasive animals exists in their region? Do they possess the right combination of values, attitudes and beliefs to inspire action?

This approach is referred to as the COM-B model of behaviour – where "B" stands for behaviour. (Michie, Atkins & West, 2014). In a recent paper, we demonstrated that most drivers and barriers relevant to invasive animals management can be classified into the three COM-B categories (McLeod, Hine, Please & Driver, 2015).

2. Segmentation based on stages of change

A second approach to segmentation is based on the observation that behaviour change is often gradual and follows a process. People who are adamantly opposed to using toxins one day generally do not turn into avid baiters the next.

The most influential process model of behaviour change is the *Transtheoretical Model* (Prochaska et al., 1992). According to this model, when people change their behaviour they progress through five distinct stages:

1. **Pre-contemplation** – where they are not considering change.
2. **Contemplation** – where they are beginning to think about change.
3. **Preparation** – where they make a personal or public commitment to change in the near future.
4. **Action** – where they are actually changing their behaviour
5. **Maintenance** – where they are maintaining the changed behaviour.

People in each of the stages require different goals, and therefore different intervention strategies.

The main goal for people in the *Pre-contemplation* stage is to engage their interest in a particular issue and increase their awareness and knowledge. People in the Contemplation stage often require further motivation. This could be achieved by highlighting the pros and cons, or giving feedback from community members who are already performing the desired behaviour. People in the *Preparation* stage may need increased confidence and self-efficacy, through strategies, for example, that reinforce beliefs that change is possible, and that enhance knowledge and skills related to the behaviour. Action people need real-time support and advice, whereas those in the Maintenance stage would benefit from feedback on their progress, acknowledgement of their achievements and constructive advice for continuous improvement. Reminders and prompts are helpful to ensure timely performance of desired behaviours when required.

Reporting Wild Dogs and their Impacts: Audience Segmentation

We conducted a random-digit dial survey of peri-urban residents living in the City of Gold Coast. We found that only 2% of those respondents had ever reported a wild dog or a wild dog impact. (Reporting wild dogs and their impacts had been identified as a promising behaviour change in our quest to improve wild dog management in peri-urban areas.) We employed the COM-B framework to determine whether all "non-reporters" shared the same general pattern of Capability, Opportunity and Motivation, or whether important differences existed. In other words, we wanted to discover if we had one audience to engage or several.

We asked our sample to respond to 20 questions assessing Capability (e.g., I often have a hard time telling the difference between a wild dog and a domestic dog; I know who to contact if I see a wild dog or wild dog impact), Opportunity (e.g., Mobile coverage in our region makes reporting difficult; My family and/or friends think that reporting wild dogs is the right thing to do), and Motivation (e.g., It is cruel to capture and euthanise wild dogs; I believe my community would be safer if more people reported wild dog sightings and impacts to council).

Our segmentation analysis indicated two main types of "non-reporters" existed. The first group ("strongly opposed") didn't believe that wild dogs posed a serious threat to their community and did not want the dogs to be hurt or killed. This group was in the minority, comprising only 14% of the sample. Not surprisingly, this group indicated they would be reluctant to report a wild dog if they happened to see one. The second group ("positively predisposed") accepted that wild dogs were a problem and that reporting them would produce positive outcomes for farmers, public health and the environment. This group comprised 86% of respondents.

Given that these two group have distinct COM-B profiles, they may require very different engagement interventions to increase reporting rates, an issue we address in the next section.

Quantitative and qualitative approaches to audience segmentation

There is no single correct way to create audience segments. The ideal approach depends on goals, available expertise, financial resources and time constraints.

Statisticians typically identify audience segments by applying procedures like cluster and latent profile analysis to quantitative survey data. These techniques are complex, so it is usually a good idea to approach a statistician from your organisation or local university.

Depending on your goals, qualitative approaches, based on key-informant interviews, focus groups and literature reviews can be cheaper than quantitative segmentation.

Segmentation need not be time consuming or expensive. Slater (2006) has created a useful guide for segmenting on a shoestring budget.

Key recommendations

1. Use audience segmentation analysis to identify the number and nature of distinct audience segments in your target population with respect to your target behaviour.
2. Although an infinite number of ways to segment an audience exist, two particularly useful approaches involve creating segments based on landholders': (a) levels of capability, opportunity, and motivation, and (b) stage of change.
3. Make sure your audience segments reflect the target population by using representative sampling procedures, such as random sampling, when collecting information.

Further reading

Hine, D. W., Reser, J. P., Morrison, M., Phillips, W. J., Nunn, P., & Cooksey, R. (2014). Audience segmentation and climate change communication: conceptual and methodological considerations. *Wiley Interdisciplinary Reviews: Climate Change*, 5(4), 441-459.

McKenzie-Mohr, D. (2011). *Fostering sustainable behaviour: An introduction to community-based social marketing* (3rd ed.). *Step 2: Identifying Barriers and Benefits* (pp. 21-39). Gabriola Island: New Society Publishers. http://www.cbsm.com

McLeod, L.J., Hine, D.W., Please, P.M., & Driver, A. B. (2015). Applying behavioural theories to invasive species management: Towards an integrated framework. *Journal of Environmental Management*, 161, 63-71.

Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel. A guide to designing interventions.* UK: Silverback Publishing. http://www.behaviourchangewheel.com

Prochaska, J.O., DiClemente, C.C. & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.

Slater, M. (2006). Health audience segmentation in limited-budget and local social marketing interventions. *Health Promotion Practice*, 7, 170-17).

A broad range of behaviour change tools can encourage best practices for managing invasive animals.

three

Match your intervention to the causes of behaviour

> Correction does much, but encouragement does more. • Goethe

Once you have identified the behaviour(s) you wish to target and the audience(s) you want to reach, the process of creating a behaviour change intervention can begin in earnest.

A broad range of behaviour change tools can encourage best practices for managing invasive animals. But not all tools are equally well suited for all situations. You can increase efficiency and impact by matching your tools to the specific types of behaviour you are attempting to change.

In this chapter, we review two approaches for selecting behaviour change intervention tools. The first approach, based on Community Based Social Marketing, involves selecting behaviour change techniques that address the main barriers and drivers (benefits) relevant to the target behaviour. The second approach, based on the COM-B model, focuses on the specific Capabilities, Opportunities and Motivations that increase or decrease the likelihood that the target behaviour will occur.

1. Selecting behaviour change tools based on barrier and benefit profiles

Schultz (2014) provides a simple framework for selecting intervention tools based on perceived benefits and barriers of the target behaviour.

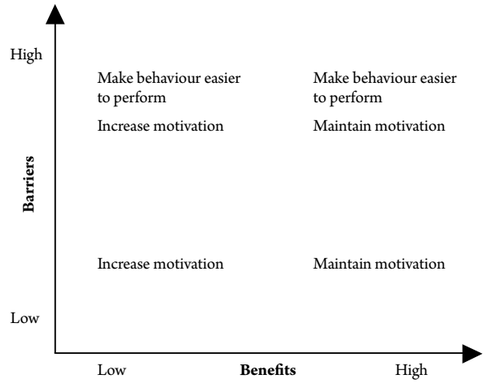


Figure 1. Select behaviour change tools that match the barriers and benefits profile of the behaviour you want to change. Adapted from Schultz (2014).

When perceived benefits and barriers are low, the target behaviour is relatively easy to perform and no substantial barriers prevent people from adopting the behaviour. That said, motivation for behaviour change is quite low because people see few benefits associated with the behaviour. Therefore, it makes sense to focus on boosting your audience's motivation to perform the target behaviour.

- Sometimes the benefits of a behaviour exist but people simply are not aware of them. In these cases, "educating" your audience about the benefits of the behaviour might increase motivation. For example, if you were encouraging people to keep their cats contained, you could highlight how containment substantially decreases the likelihood that their cat will be injured or killed. Keeping a pet healthy is an important motivator for many people.
- Normative feedback is another simple way to boost motivation in low-barrier contexts. Demonstrating that most people are concerned about and engaged in animal control practices will generate social pressure that encourages others to follow suit.

When perceived benefits are high and barriers are low, the audience is highly motivated to perform the behaviour and the target behaviour is easy to perform. In this case, the proportion of individuals in the target audience already engaging in the behaviour may be quite high. If so, your communication goal may be to maintain motivation for an existing behaviour or encourage new related behaviours.

Possible strategies include:

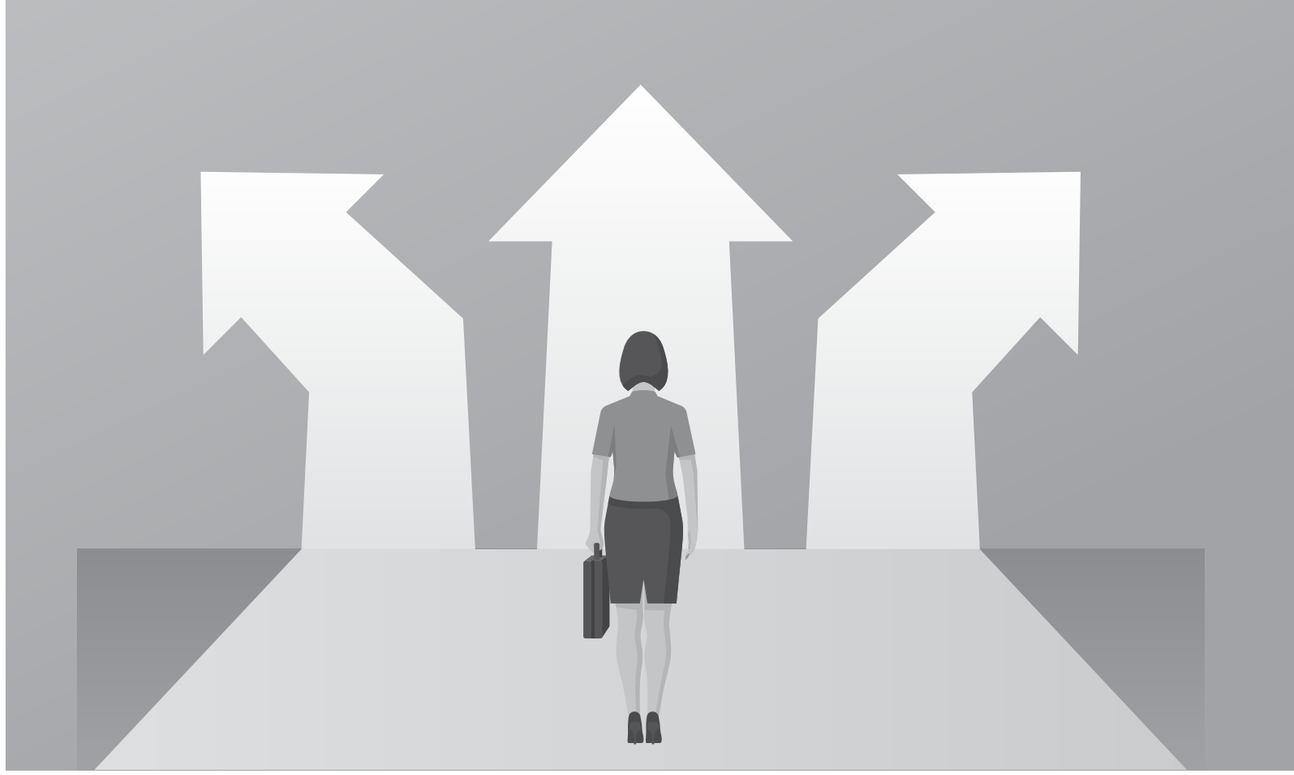
- Simply providing educational materials about new animal control strategies and technologies. Sometimes you get lucky, and you're dealing with highly motivated individuals who are generally well informed about invasive animal issues and committed to acting responsibly. They often welcome being informed about the latest control strategies and technologies, and sometimes will even volunteer for pilot tests to assess their effectiveness. These highly motivated and informed types often turn out to be very good messengers (see section 4).
- Helping people to remember, via memory prompts, to engage in repetitive management and control behaviours such as baiting, cat containment, free-feeding, checking for re-opened warrens, monitoring pest levels, and keeping updated with training.
- Providing feedback about personal contributions and overall progress towards local management and control goals. For example, for citizen science fox monitoring programs, feedback could be provided about the number of fox sightings reported in the past three months, who reported them, and where.

When perceived benefits are high and barriers are high, significant obstacles make it difficult for people to adopt the behaviour but the audience is highly motivated. In these cases, it's best to focus on making it easier to perform the behaviour.

- If the main obstacle is lack of knowledge about specific animal control strategies, one solution can be delivering persuasive educational materials in a readily accessible format, for example, video instructions delivered through phone apps.
- If purchasing bait is inconvenient or expensive, alternative delivery and subsidisation systems can be explored.
- Eliciting verbal and written commitments may be the best strategy where structural changes to address barriers are not possible but motivation is high. For example, landholders could be requested to sign a pledge card to bait at a pre-determined time of the year. Research suggests that commitments work best with audiences who are already motivated to engage in the behaviour.

When perceived benefits are low and barriers are high, communication professionals are facing the most challenging of situations. The target behaviour is difficult to perform and the audience may see no reason to change their current practices, which means it's likely that very few people are engaging in the target behaviour. Nevertheless, this is no time to throw in the towel. Numerous approaches are still worth trying:

- If your project requires rapid change, and you have the required resources, it might be worth considering changing the incentives associated with the target behaviour, for example, providing financial bonuses for adopting new control technologies, which may serve to both increase motivation and decrease financial barriers. When considering incentives, keep in mind that although incentives can induce rapid behaviour change, they rarely change intrinsic motivation. When the incentive is removed (e.g., provision of free toxic baits), behaviour often reverts back to pre-intervention levels. Careful intervention design is also required to avoid cost blowouts. Introducing a generous incentive scheme (e.g., feed-in tariffs in which residents sell renewable energy back to the grid at inflated prices) can lead to rapid, widespread adoption, quickly exhausting available funding.
- Evidence suggests that competitions may be effective in low-benefit high-barrier contexts (Schultz 2014). Pitting different regions or communities against each other to compete for can increase participation rates in programs. Importantly, the evidence also suggests that behaviour change effects from competitions are strongest for those who were initially less motivated to engage in the target behaviour. However, similarly to incentives, one drawback of competitions is that behaviour often reverts back to pre-intervention levels after the competition is completed.
- Keeping in mind the limitations of incentives and competitions, the best option in low-benefit high-barrier contexts may be to adopt a long-term strategy of experimentation and continuous learning. This means systematically introducing interventions designed to increase benefits and decrease barriers – both individually and in combination – and evaluating the effects. Over time, this will likely produce the most beneficial behavioural and ecosystem effects, and, if outcomes are properly documented, will generate a cumulative knowledge repository will help you and your successors to identify which interventions work best in different contexts. We will have more to say about the benefits of systematic experimentation and evaluation in the next section.



2. Selecting behaviour change tools based COM-B profiles

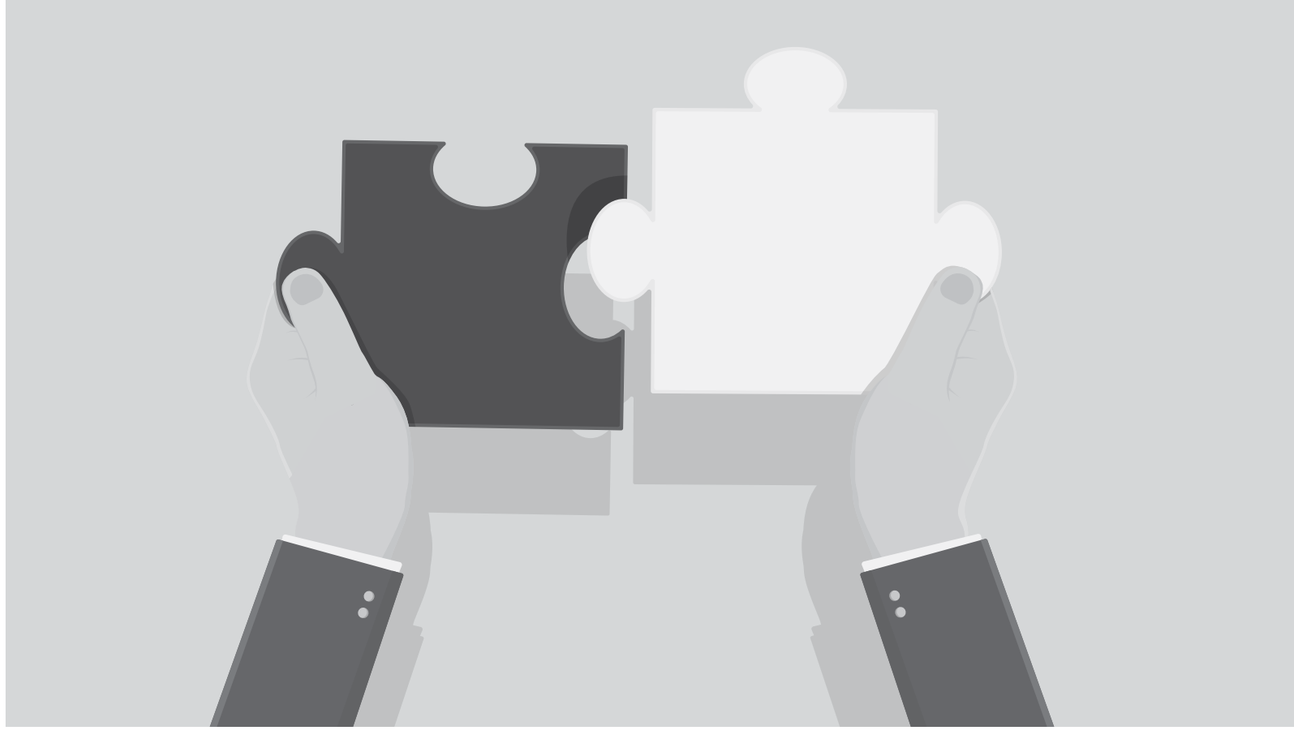
A second related approach involves selecting behaviour change tools based on the Capability, Opportunity and Motivation profiles of your audiences. In the chapter on knowing your audience, we noted that audiences can be segmented using many different factors, but also suggested that COM-B is an excellent framework for identifying and organising potential causes of behaviour.

If using COM-B to understand what makes your audience(s) tick, you should definitely consider continuing with this framework for developing your behaviour change intervention. In Table 3, we show how COM-B can be used to select specific behaviour change tools for improving the management of invasive animals.

To use this table, first locate your identified driver/barrier factor in the left-hand column. The middle column explains how to effectively address each driver/barrier, and the right-hand column provides suggestions for possible behaviour change tools to use. For example, if you identified that people were not performing your desired behaviour because they believed it would not fix the problem, this would be classified as an 'outcome expectancy' motivational barrier. To overcome this barrier, you would need to convince people that the desired behaviour will produce the required outcomes; a suitable behaviour change tool may be to offer a platform where other people can share their success stories.

Table 3. Behaviour Change Techniques Suitable for Invasive Animal Management

Identified Driver / Barrier	Focus of Intervention	Suitable Behaviour Change Tools
Capability		
Issue awareness	Promote awareness on all aspects of the issue	• Provide factual information on all aspects of the issue
Awareness of the contribution of the selected behaviour to resolve the issue	Explain the causes and effects of the issue and promote the role the behaviour plays Show the outcomes of performing the behaviour and let people experience the effects of behavioural change	• Provide factual information on all aspects of the issue and on the consequences of behaviour performance • Provide feedback from people already performing the behaviour and the outcomes they have achieved
Know how to perform the desired behaviour	Behavioural instruction and training	• Instruct on how to perform a desired behaviour, including information on when to act • Provide a stimulus to prompt or cue the performance of desired behaviour at the appropriate time
Physical skills to perform the desired behaviour	Establish and improve physical skills	• Train on how to perform the desired behaviour and practice opportunities • Adopt methods that are easier to perform
Cognitive or personal skills to perform the desired behaviour	Support and improve personal thinking and reasoning skills	• Advise on how to perform a desired behaviour incorporating self-belief and covert learning strategies • Encourage and support in a personal and/or social setting • Provide pointers to prompt or cue the behaviour • Adopt methods that are easier to perform
Confidence in performing the behaviour	Boost confidence and encourage action	• Advise on how to perform a desired behaviour incorporating self-belief and covert learning strategies along with practice opportunities • Encourage and support in a personal or social setting



Identified Driver / Barrier	Focus of Intervention	Suitable Behaviour Change Tools
Opportunity		
Physical environment	Modify the physical environment to remove barriers and increase the convenience and opportunity to display desired behaviour, or remove the triggers and impede the performance of undesired behaviours	• Increase the availability of facilities or material resources • Provide detailed information on the influence of physical setting on behaviour and consequences • Make direct changes to the physical environment • Provide prompts and triggers in the environment to encourage desired behaviours
Available technologies	Introduce new technologies which will support and promote desired behaviour Promote only those technologies that encourage desired behaviour Encourage change in the market supply of desired technologies	• Make new technology and methods available • Promote their adoption with subsidies and incentives • Provide comparative information of technologies • Regulate that only certain technologies can be used • Use subsidies or taxes to make the preferred technologies more attractive
Individual resources	Encourage desired behaviour by making it more affordable and advantageous to individuals	• Introduce financial subsidies and incentives • Influence cost/benefit ratio • Develop cheaper technology and methods • Provide detailed information to promote time-saving practices
Current economic climate	Reduce financial risks and lower costs of desired behaviour	• Provide subsidies and incentives for desired behaviour • Introduce taxes and levies on undesired behaviours

Identified Driver / Barrier	Focus of Intervention	Suitable Behaviour Change Tools
Opportunity (continued)		
Social / cultural views and values	Align objectives and behaviours with the preferences of a community or (sub) culture Align communications with social and cultural values	• Develop solutions that are socially or culturally acceptable in consultation with the community • Frame information so it is consistent with social values • Use credible sources that people associate with and trust • Provide information about what 'important others' think about the behaviour • Provide information about important others' performance of behaviour • Establish and engage community groups
Legislation	Amend legislation to promote desired behaviours and prohibit undesired behaviours Work towards achieving legislative consistency across all areas that influence the performance of the desired behaviour	• Introduce new legislation, or amend current legislation, to encourage performance of desired behaviour while discouraging undesired practices • Take into consideration all potential policy areas that may affect the performance of a desired behaviour when introducing legislation
Role model behaviour	Ensure all influential public organisations are consistently adopting the desired behaviour Promote the participation by influential public organisations	• Inform and support influential organisations • Provide information on the performance of the desired behaviour by influential public organisations

Identified Driver / Barrier	Focus of Intervention	Suitable Behaviour Change Tools
Motivation		
Pre-existing belief or attitude to issue or behaviour	Introduce and endorse the benefits of the desired behaviour or the negative implications of undesired behaviours Dispel any underlying misconceptions	• Improve awareness of the behaviour by explaining misinformation and emphasising correct facts • Use credible sources that people associate with and trust • Provide information so that people can compare reasons for performing or not performing the desired behaviour • Provide information and feedback on other people's performance and experience of the behaviour • Provide an example of behaviour performance that people can observe or experience
Outcome expectancies	Convince people that desired behaviour will produce the required outcomes or that undesired behaviours will have negative implications	• Inform about the behaviour options so that people can compare reasons for performing or not performing the desired behaviour • Inform about the consequences • Provide feedback on other people's performance
Control in achieving outcomes	Convince people they can achieve the required outcomes if they perform the behaviour	• Advise on how to perform a desired behaviour, incorporating self-belief and covert learning strategies along with practice opportunities • Provide a stimulus to prompt or cue the performance of the desired behaviour at the appropriate time • Encourage and support in a personal and / or social setting • Adopt methods that are easier to perform
Priority / goal setting	Inspire action by prioritising or setting a target defined in terms of either the behaviour or the positive outcomes to be achieved	• Advise and inform to assist in goal setting and prioritising • Inform so that people can compare reasons for performing or not performing the desired behaviour • Get a written or verbal affirmation to perform a desired behaviour • Encourage and support in a personal and / or social setting
Social norms	Encourage and promote group or community performance of the desired behaviour	• Provide information about what other people think about the behaviour, as well as feedback about other people's performance, to draw attention and allow a comparison • Advise, encourage and support in a social setting • Use credible sources that the group can associate with and trust • Adopt a perspective that is linked to group values • Gain written or verbal commitment within a group to perform a desired behaviour • Provide group incentives or reward the group as a whole for performing desired behaviour

Identified Driver / Barrier	Focus of Intervention	Suitable Behaviour Change Tools
Motivation (continued)		
Reinforcement	Reinforce performance of behaviour	• Introduce rules to increase the likelihood of engaging in the desired behaviour or to deter the performance of undesired ones • Entice or compensate for performing the desired behaviour, or for not performing an undesired behaviour • Penalise for not performing the desired behaviour, or for performing an undesired behaviour
Personal values / morals	Link the desired behaviour to specific personal values, morals and other motives Build upon displayed general values (such as altruism, environmental concern, animal welfare) to encourage the desired behaviour	• Adopt a deliberate perspective linked with values to provide information on the desired behaviour and the consequences of non-action • Clearly explain misinformation and emphasise correct facts • Draw attention to discrepancies between values and current behaviour to create discomfort and change • Get a written or verbal affirmation that is linked to specific values to perform a desired behaviour • Identify individuals' behaviour as important to setting examples to significant others
Self-identity Social / professional role	Promote awareness of the consequences of actions on others and enhance personal responsibility for them	• Adopt a perspective linked with social role to provide information on the consequences of non-action • Identify individuals' behaviour as important to setting examples to significant others
Personal feelings Emotive responses	Highlight the positive aspects of the desired behaviour and / or negative aspects of undesired behaviours	• Frame the behavioural information to emphasise the positive aspects of the desired behaviour (the 'feel good factor') • Provide positive feedback from those already performing the behaviour so people can experience the positive emotions
Habitual / routine behaviour	Break ingrained undesired behaviours by encouraging a reasoned reconsideration of the options Encourage repetition of the desired behaviour in the same context so that context elicits the behaviour	• Provide factual information on all aspects of the issue, and on the consequences of behaviour performance • Draw attention to discrepancies between values and current behaviour to create discomfort and change • Provide a stimulus to prompt or cue the performance of the desired behaviour at the appropriate time • Advise on self-belief and covert learning strategies • Offer a temporary reward for performing correct behaviour • Associate performing behaviour at the same time each year or in conjunction with another activity • Provide prompts and triggers in the environment to encourage desired behaviours

Peri-Urban Wild Dogs – Matching Behaviour Change Interventions to Cause of Behaviour

In our peri-urban wild dog study, we identified two distinct types of individuals who did not report wild dogs and their impacts.

1. The "positively predisposed" were more likely to accept that wild dogs were a problem and that reporting them would produce positive outcomes for farmers, public health and the environment.
2. The "strongly opposed" didn't believe that wild dogs posed a serious threat to their community and did not want the dogs to be hurt or killed.

What's the best way to change the behaviours of each of these groups?

For the "positively predisposed", interventions could aim to make reporting as easy as possible. This could include multiple reporting channels (e.g., phone, web page, email or smartphone app) and enduring prompts such as fridge magnets and signage, which remind residents about the importance of reporting, and how to report.

The "strongly opposed" need to be persuaded that wild dogs present a genuine threat to the community, and that dog control methods are humane. They might also respond to interventions designed to reduce their positive emotional attachment to wild dogs. Once convinced that dog sightings should be reported, regular reminders could remind residents about the importance of reporting, and how to report.

Given that the "strongly opposed" only represent a small part of the population (14%), and that persuading individuals to change their views on an emotionally charged issue can be very difficult, another strategy, particularly if resources are limited, would be to focus most resources on the positively predisposed group, as opposed to trying to change the behaviour of everyone.

Assessing the feasibility of potential interventions

During any budding intervention design it is important to consider appropriateness and feasibility. Michie et al. (2014) has developed the APEASE system to assess the feasibility of an intervention. If you are considering several possible interventions, the following criteria can be helpful in selecting the best option.

Potential interventions can be rated using six criteria:

- Affordability – can the intervention be delivered within an acceptable budget?
- Practicality – can the intervention be delivered effectively as designed in a real-world context?
- Cost effectiveness – what impact will the intervention have in relation to the desired outcomes in a real-world context? And is the expected impact worth the cost required to achieve it?
- Acceptability – is the intervention judged to be appropriate by all stakeholders?
- Side-effects – are there likely any unwanted side-effects or unintended consequences? These are sometimes difficult to predict, but definitely worth considering.
- Fairness - does the intervention produce disparities between different sectors of society?

Key recommendations

1. Match your behaviour change tools to the specific types of behaviour you are attempting to change.
2. Where perceived benefits of the behaviour are low, use tools that increase motivation, and where perceived barriers are high use tools that make it easier to engage in the targeted behaviour.
3. Where barriers are associated with an individual's Capability to engage, use tools that educate, train or enable them to participate.
4. Where barriers are associated with external Opportunities to engage, use tools that enable, restrict or restructure the physical or social environment.
5. Where barriers are associated with an individual's Motivation to engage, use tools that persuade, educate and model the targeted behaviour, or offer incentive or coerce.
6. Assess the feasibility of your proposed intervention using APEASE criteria: affordability, practicality, cost effectiveness, acceptability, fairness and any side effects.

Further reading

Godin, S. (2000). *Unleashing the Ideavirus.* US: Do You Zoom, Inc.

Halvorson, K., & Rach, M. (2012). *Content strategy for the web*. (2nd ed.). Berkley, CA: New Riders.

Hine, D. W., Please, P., McLeod, L., & Driver, A. (2015). *Behaviourally effective communications for invasive animals management: A practical guide*. Canberra: Invasive Animal Cooperative Research Centre.

McKenzie-Mohr, D. (2011). *Fostering sustainable behaviour: An introduction to community-based social marketing* (3rd ed.). Step 3: Developing strategies (pp. 41-44). Gabriola Island: New Society Publishers. http://www.cbsm.com

Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel. A guide to designing interventions. Chapter 3: Identify content and implementation options.* UK: Silverback Publishing. http://www.behaviourchangewheel.com

four

Apply Science-Based Evaluation

> *We humans seem to be extremely good at generating ideas, theories, and explanations that have the ring of plausibility. We may be relatively deficient, however, in evaluating and testing our ideas once they are formed.* • Thomas Gilovich

Each year millions of dollars are spent developing and distributing materials to engage the public about natural resource management issues. But when these communication projects are completed, we often have little useful information about whether they have changed audience behaviour or achieved environment outcomes.

This is unsatisfactory but entirely preventable by building in an appropriate evaluation plan at the beginning of your project. This is a point worth re-emphasising: evaluation plans should be considered at the beginning of the process – not as an afterthought once the intervention is implemented.

Piloting

Interventions can be costly to implement, so once initial development is complete, it is a good idea to have a 'test run' on a small scale to identify and address any unforeseen problems. Strategy refinement after a smaller pilot study is less difficult and expensive than for a larger project.

Evaluation principles

When attempting to determine what works and why, methods matter! Here are eight principles to keep in mind when developing an evaluation plan.

- **Always include a control group.** A control group is a comparison group that does not experience the intervention. Without a control it is impossible to know whether a change in behaviour or outcomes is due to the intervention or an infinite number of other uncontrolled factors, such as an increase in public interest driven by media reports, or an overall increase in the targeted issue.
- **Whenever possible, use random assignment.** Across many scientific disciplines, randomised controlled trials represent the gold standard for evaluating a treatment or project. The same principles can apply to evaluating intervention strategies. Random assignment of participants to experimental conditions ensures that these groups are as similar as possible before delivering the intervention. As a result, after the intervention, any observed differences between the treatment and control groups should be attributable to the intervention, and not pre-existing group differences or other uncontrolled factors.
- **When random assignment is not possible, use quasi-experimental designs.** Quasi-experiments compare naturally occurring or self-selected groups. For example, if you launch an intervention promoting the reporting of stray or feral cats in a community, you could compare the reporting practices between those who are aware of the intervention and those who are not. Compared to a randomised control experiment, quasi-experimental designs will not give you the same level of confidence that your intervention was the main factor driving the behaviour change. But, in most cases, having imperfect evidence is better than having no evidence. References provided at the end of this chapter provide an excellent overview of designs for a wide range of contexts.
- **Use statistical tests to evaluate effects**. Statistical tests help you decide if the measured differences between treatments are 'real' or simply due to chance. In some situations, you can be confident that your intervention has been effective. For example, if you find participation has increased by 80% in your treatment group compared to 10% in the control, you can be fairly certain you're onto something. However, if you find participation only increases 10% in your treatment group compared to a 5% increase in the control group, how certain can you be that you have a meaningful result? If you are unfamiliar with the many statistical tests and software options available, consult a qualified statistician within your organisation or at a local university. And remember to allocate funds for data analysis when developing project budgets.
- **Measure actual behaviour change.** If your intervention has increased awareness, changed attitudes, or even the intention to act, that can be an important discovery. But remember – changes in awareness, attitudes and intentions do not always translate into behaviour change. Thus, where possible, measure behaviours directly. Also note that self-reported behaviour, based on survey responses, is sometime unreliable. People's actions do not always match their claims. Therefore, where possible, undertake direct observations of desired behaviours.
- **Link behaviour change to on-ground impacts and management outcomes.** Getting people to adopt recommended management practices does not automatically deliver positive outcomes such as increased production or biodiversity. For example, if there isn't the expected increase in lamb survival following an expansion of a community fox baiting program, the original assumption linking lamb survival to fox management may be incorrect. Or perhaps other unanticipated factors such as the weather or sheep health may be at play. These need to be investigated.
- **Evaluate the cost-effectiveness of interventions.** Resources are always limited. So not only is it important to measure success with behaviour change and outcome achievement, it is also important to calculate cost-effectiveness – that is, the overall benefit per dollar spent. Cost-effectiveness calculations can help you choose between competing intervention strategies. If two strategies are as effective as one another, but one costs substantially less, then it would make sense to select the cheaper option for future implementation.
- **Embrace continuous learning.** Interventions that fail to achieve the required behaviour change or outcomes should not be swept under the carpet. All outcomes

Peri-urban Wild Dog Management – Evaluation of Developed Intervention

In the previously described Peri-Urban Wild Dogs Behaviour Change Project (Please et al. 2018), an intervention was developed to promote community reporting of wild dogs and their impacts to council. This intervention included a promotional flyer with reporting options and contact details, and a fridge magnet with the same contact details (to act as a prompt).

An experimental design to evaluate the effectiveness of this intervention could involve dividing the council area into four sub-areas (designated by postcodes). The four treatments (flyer only, prompt only, flyer and prompt, control) could each be randomly allocated to one area.

After the interventions were rolled out, residents could be surveyed to measure their reactions to the intervention, and gain an understanding of their intentions and self-reported behaviour. A direct measure of behaviour change could be obtained by quantitatively analysing the number of reports made to council over a specified period: 1) both before and after the intervention was rolled out, and 2) across postcodes where the different treatments were rolled out. These data would then be compared to the 'control' treatment where the intervention was not rolled out.

from well-designed studies are informative. If your intervention did not work as planned, consult relevant stakeholders, review your development process, delve into relevant theories and methodologies, and try again

- **Rethink, reapply and re-evaluate.** Changing people's behaviour, along with creating solutions to invasive animal problems, are complex issues. Solutions will not appear overnight. A systematic, long-term, scientific approach is required, in which we incrementally increase our knowledge about what works in what contexts. This commitment to continuous learning and improvement is necessary for both ecological and human dimension research.

Key recommendations

1. Before implementing your intervention, consider a pilot run to identify any problems.
2. Evaluate the effectiveness of your intervention against your program goals.
3. Use rigorous methods to determine whether your program works, including treatment and control groups, random assignment, and statistical tests to rule out chance as an explanation for your results.
4. Assess the impact of your intervention on behaviour (not just awareness or attitudes), and where possible link behaviour change to on-ground impacts and management outcomes (not just program outputs).
5. As resources are almost always limiting, include a cost-effectiveness component in your evaluation.
6. Adopt an adaptive management mindset, where evaluation results – both successes and failures – contribute to a loop of continuous learning and improvement.

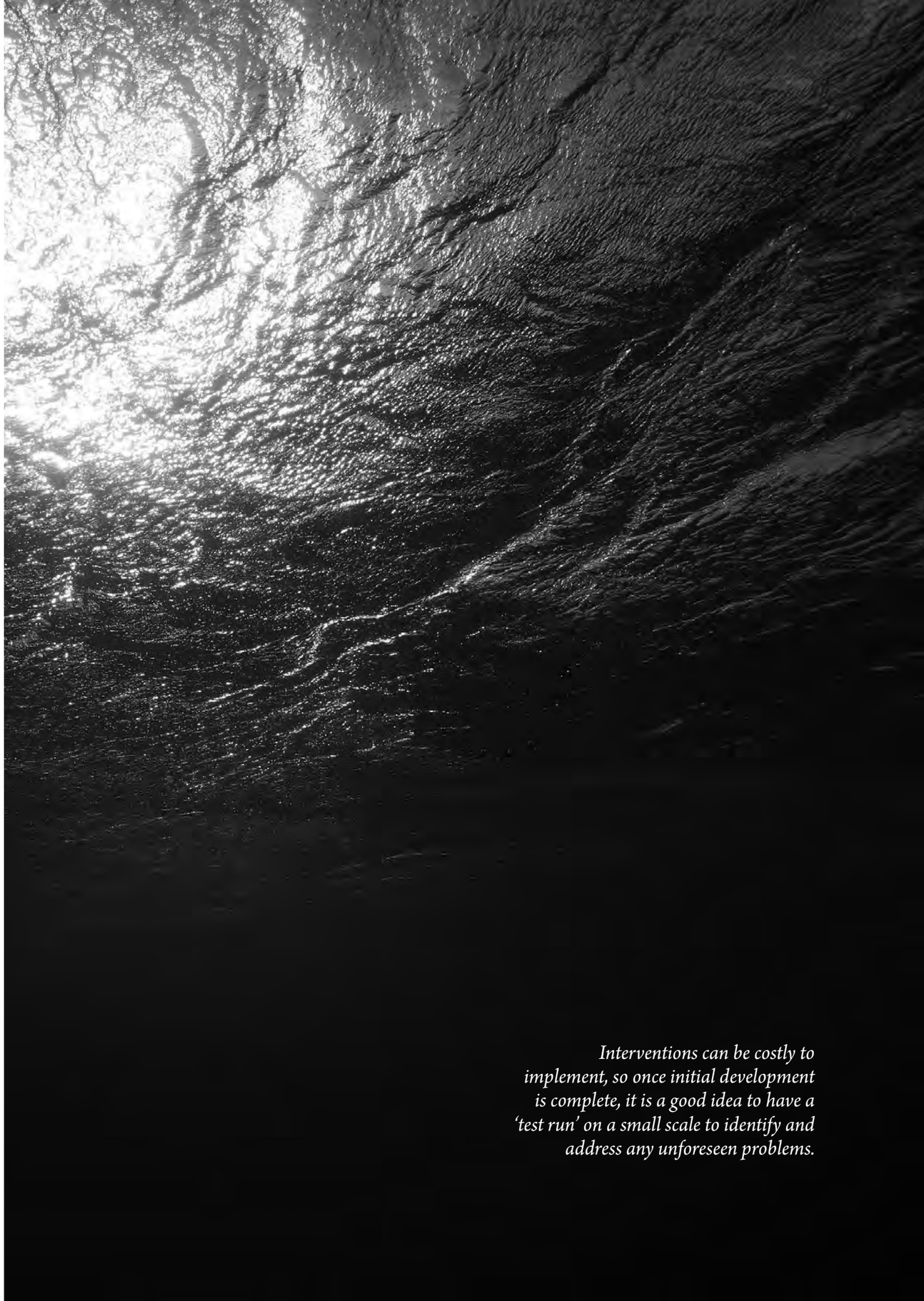
Further reading

McKenzie-Mohr, D. (2011). *Fostering sustainable behaviour: An introduction to community-based social marketing* (3rd ed.). Step 4: Piloting (pp. 137-142). Gabriola Island: New Society Publishers. http://www.cbsm.com

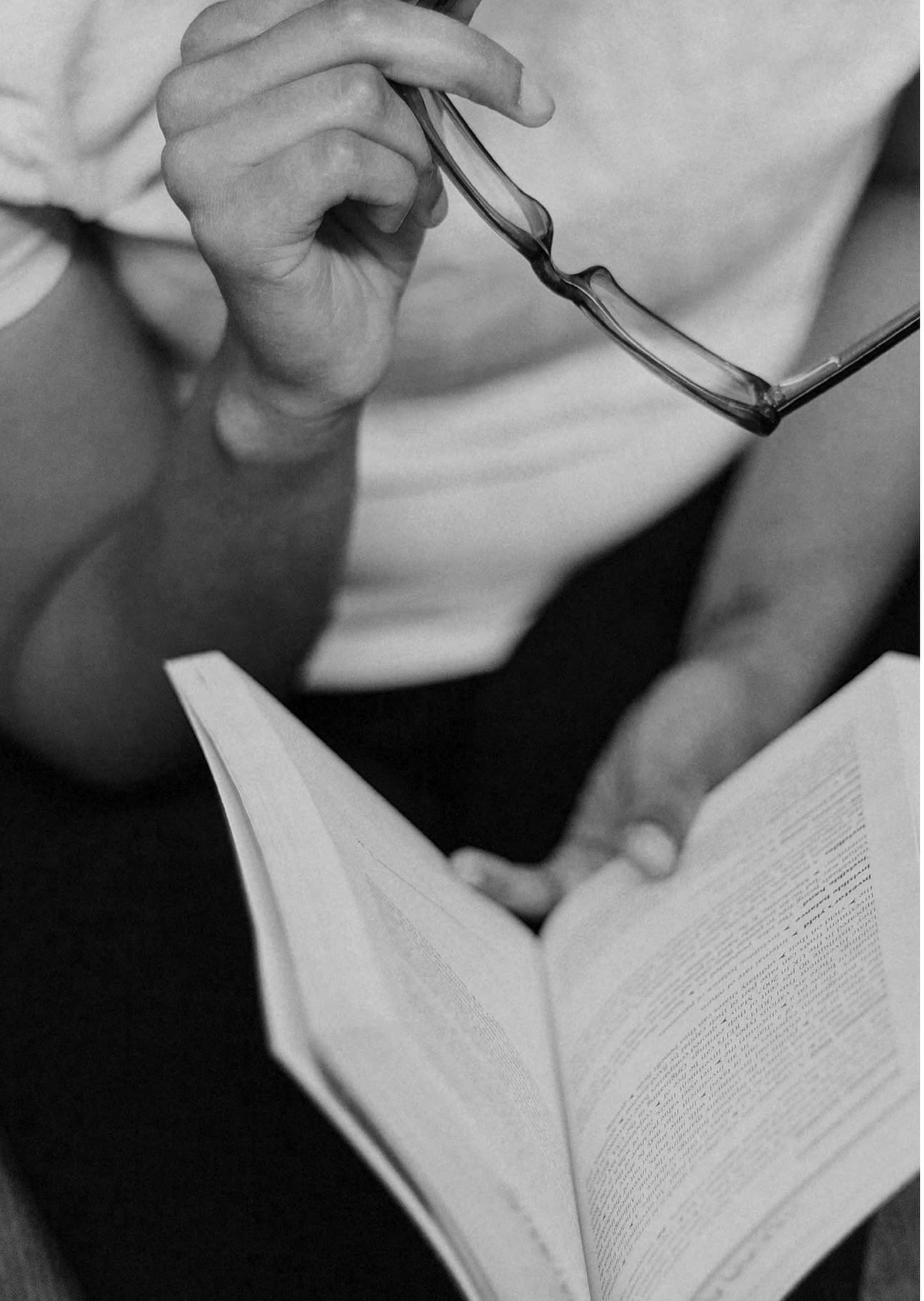
Murnane, R. J. & Willett, J. B. (2010). *Methods matter: Improving causal inference in educational and social science research*. New York: Oxford University Press.

Rossi, P. H., Lipsey, M. W. & Freeman, H. E. (2004). *Evaluation. A systematic approach* (7th ed.). London: SAGE Publications Inc.

Shadish, W. R., Cook, T. D. & Campbell, D. T. (2002). *Experimental and Quasi-experimental Designs for Generalized Causal Inference*. Boston: Houghton Mifflin.



Interventions can be costly to implement, so once initial development is complete, it is a good idea to have a 'test run' on a small scale to identify and address any unforeseen problems.



five

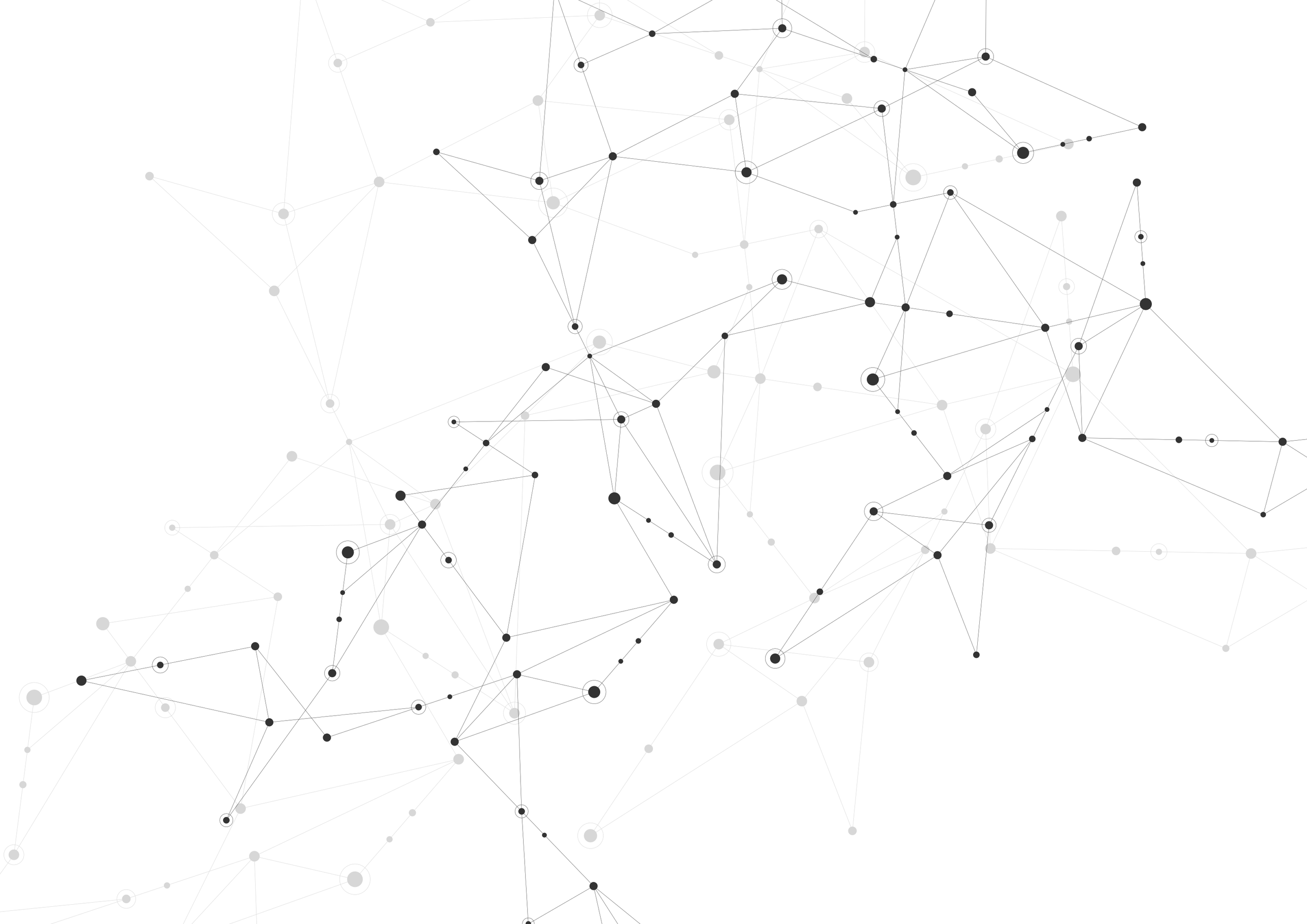
Further Resources

As part of the Human Dimension Programme for the Invasive Animals Cooperative Research Centre (IACRC), we have developed several resources which offer practical guidance for practitioners who are developing and delivering intervention strategies.

1. *Behaviourally Effective Communications for Invasive Animals Management: A Practical Guide* (http://www.pestsmart.org.au/behaviourally-effectivecommunications-for-invasive-animals-management): An effective communication strategy is vital to connect with your target audience. This manual, written specifically for practitioners, outlines the key principles for developing and evaluating effective communications using best-practice behaviour change theory. For each principle, it summarises the key literature and provides examples of how to apply it in the invasive species context.
2. *Invasives Action Tool* (https://community.pestsmart.org.au/): This resource provides a range of tools for the practitioner to develop their knowledge and skills in engaging the community more effectively, deploying the science of behaviour change, and communicating more strategically. It brings together the knowledge of leading engagement specialists from the US and Australia, and provides a complete suite of interactive lessons and activities so practitioners can plan, execute, evaluate and iterate their own projects as they learn. There is also a team function where team members can share, communicate and work together to create a finished project.

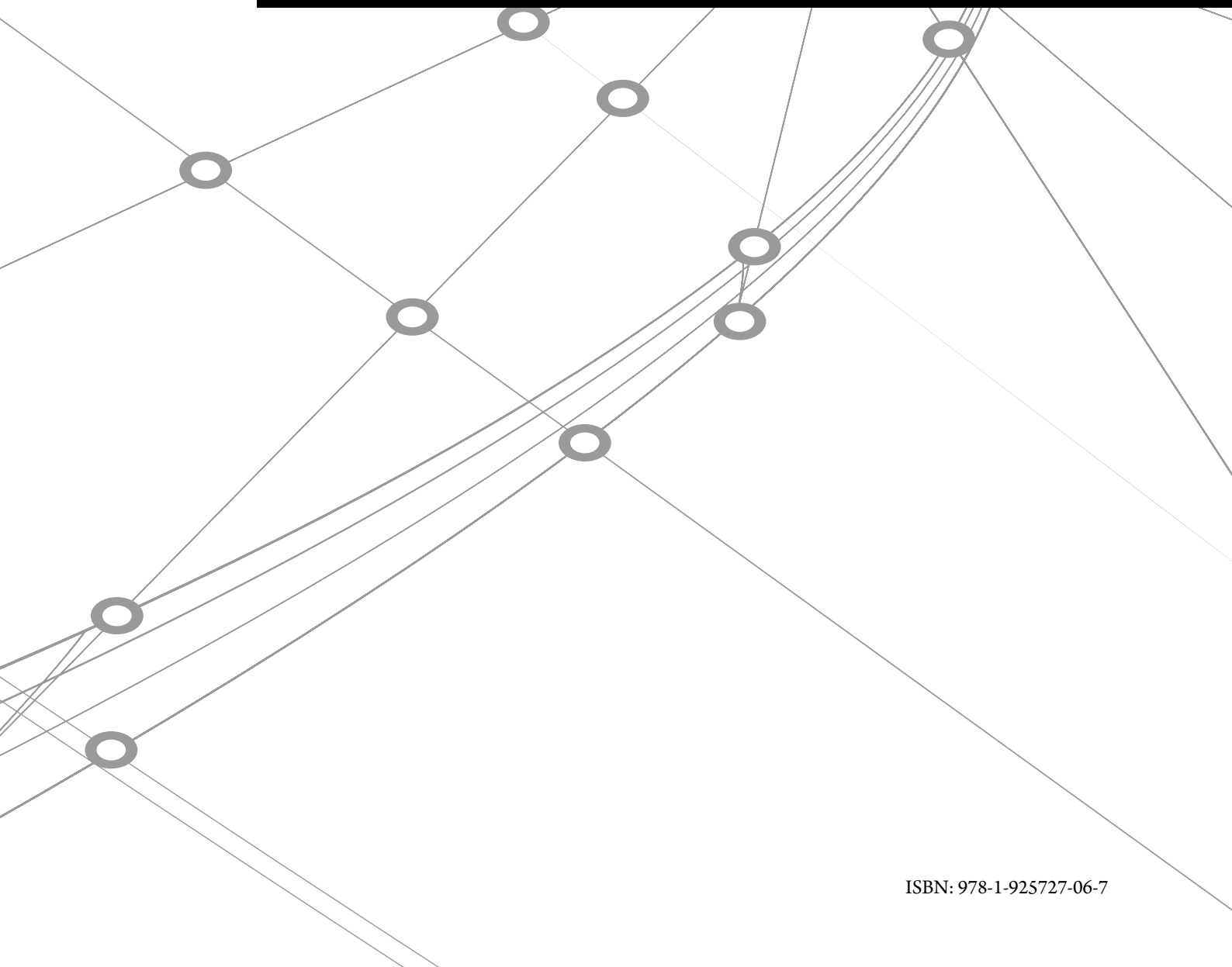
Other online tools not directly related to our IACRC project include:

1. *Community-Based Social Marketing website* (http://www.cbsm.com): This site provides a comprehensive introduction to community-based social marketing and how it is being applied to foster sustainable behaviour across diverse fields such as conservation, transportation, waste reduction and water efficiency.
2. *Tools of Change website* (http://www.toolsofchange.com): This site provides practitioners with some great social marketing planning tools and resources to change behaviour in health, safety and sustainability.
3. *Human Behaviour Change for Animals website* (http://www.hbcforanimals.com): This site provides information, tools, resources, services and products that will improve the application of behaviour change interventions across all sectors that involve human-animal interactions.



"Designing Behaviour Change Interventions for Invasive Animal Control: A Practical Guide" introduces key principles for developing effective interventions. Importantly, the guide provides examples of how to apply each principle to invasive animals.

This book is intended for natural resource management organisations and practitioners that communicate with the general public and interested stakeholders about the management of invasive animals.



ISBN: 978-1-925727-06-7