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Participatory wild dog management

Views and practices of Australian wild dog management groups

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Summary

Attacks by wild dogs (including dingoes, feral domestic dogs and hybrids) on livestock have an adverse effect on Australia's agricultural production and agricultural communities. The objective of this project, undertaken for Australian Wool Innovation (AWI), is to examine the features of wild dog management groups, particularly in terms of landholder participation and collaboration, to identify what helps or hinders the groups in achieving coordinated and effective wild dog management.

People involved in wild dog management programmes represent varied interests and deal with significant social and economic effects of wild dog attacks. Collective attempts to tackle complex problems such as managing wild dogs have been shown to be influenced by how people participate, including: how they plan, record and analyse their activities; how they negotiate and make decisions; and who participates. The literature review for this project shows there has been limited research into collective action in wild dog management, and there was a need and opportunity to investigate current approaches by groups and the issues affecting them.

A number of key features of groups and their members that might influence effective wild dog management outcomes were identified for investigation drawing on the literature review. A qualitative approach, using a questionnaire to interview thirty representatives of wild dog management groups across Australia, was used to investigate these features, including:

- group members' views on the impacts of wild dogs (ecological, financial, social)
- group composition and structure, and motivations for participating
- perceived success of group activities and potential sources of conflict within the groups
- coordination and collaboration.

The key findings of the study are summarised here.

Impacts of wild dogs

Group members' views on the impacts of wild dogs varied between the groups. Representatives of some groups in areas with severe wild dog predation said they were at the frontline of managing the problem and struggling to maintain sheep farming in the region. Other groups were working to maintain the status quo, to stop wild dog predation from getting any worse. Another category of groups were those in areas with relatively minor incursions of wild dogs, who were focusing on stopping the dog problem advancing into their areas.

Financial impacts (for example loss of production and costs of management) and social impacts (for example stress and loss of farmers from the area) were ranked high by participants and reported as being strongly linked, while environmental impacts, including biodiversity loss, were ranked lowest. Financial impacts differed depending on the severity of attacks, livestock composition and the type of management strategies in place. Social impacts were frequently associated with contraction of the sheep industry—hence the link to financial impacts—and the stress on individuals from hyper vigilance and finding dead and mauled livestock. If the sheep industry was to become unviable—which has occurred in some areas—the impact flows through to locals and local businesses. Environmental impacts were regarded as difficult to report because of their complex nature. However, some interviewees had observed an increase in biodiversity as dog numbers decreased.

Group composition and structure

Groups varied greatly in their length of operation (1 to 33 years), number of members (4 to 180), and the area they covered (10 000 hectares to 5.8 million hectares). However common features across groups included: strong leadership; a central core of group members making decisions; regular informal communications; integration into a wider network; and a strong action focus.

Interactions and communications among the group members were often based on personal face-to-face contact, weekly meetings and direct email. Group leaders recruited new members through long term relationships they have with people living in the region.

Most groups operated on an informal basis, although formal group structures were becoming more common because of a number of factors, including: perceived escalation of dog numbers; legislative requirements for landholders to control dogs on their properties; and requirements to be incorporated to access resources. All groups expressed their dependence on external funding, having received funding variously from federal, state/territory and/or local governments, AWI and other sources. These sources complement internal resourcing through membership fees and in-kind contributions.

As expected, livestock farmers were represented on all groups. The majority of groups also included government stakeholders, and approximately one-third of groups had representation from conservation organisations. A small number of groups had non-agricultural industry representation from mining, tourism and forestry. Indirect involvement in the group was also reported, including from representatives of AWI, state agriculture departments, local councils, state national parks and wildlife services, regional NRM bodies, and energy companies.

Generally groups were reported to be working well, with good leadership and conflict management. Where there were conflicts, they largely concerned differing opinions on group member responsibilities, allocation of funding and methods of control.

Support

Interviewees emphasised the importance of AWI and state coordinators, as well as the national coordinator, to the effective operation of their groups. Project coordinators were seen as playing a critical role in supporting the establishment of new groups and in the ongoing operation of groups.

Interviewees generally reported effective collaboration with government agencies, although the transition to greater community-based management has in some cases created gaps in wild dog management at points in time when there has been reduced resourcing by some state agencies. Local government is often playing a major support role.

The most useful external supports were reported to be regional coordination between groups, the availability of professional doggers, landholder training, mentoring, research, and assistance with administration. AWI is seen as playing an important role in supporting groups to engage the services of doggers and to obtain training. Providing access to research findings and communicating success stories was also seen as an important role for AWI and other organisations supporting wild dog management efforts.

The interviews revealed that wild dog management groups function as important social networks that help farming communities cope with the detrimental effects of wild dogs. While most groups were uncertain about the details of future resourcing of wild dog management

activities in their area, most interviewees were confident that there was good support from group members in continuing to work towards the shared objective of helping wool producers stay in the industry.

Group effectiveness

The majority of groups (67 per cent) self-rated their effectiveness as high. When asked what these effectiveness ratings were based on, interviewees gave a range of factors, including dog control success, participation levels, commitment and collaboration, and the extent to which decision-making processes were democratic.

Those in groups noted that rating group effectiveness highly did not necessarily mean there had been a decrease in dog numbers. Groups measured success or challenges of wild dog management against different outcomes. Some interviewees expressed frustration that stock losses to wild dog attacks had not reduced as a result of the wild dog management group's activities, even when group members were considered to be working together effectively. Dog numbers were actually on an upward trend in some areas but this was influenced by a range of other reasons. A view held by many was that significantly more losses would have occurred without the groups' management activities. Interviewees reported that a positive outcome of wild dog management group activities had been more strategic and targeted actions and better communication between neighbours.

Barriers to group effectiveness included: insufficient funding; lack of cooperation from some land managers across different tenures, including farmers, absentee landholders, public land managers and non-agricultural landholders; finding the right control methods and delays in introduction of new technologies or more effective methods; time constraints; and maintaining enthusiasm and motivation.

Interviewees highlighted support measures that would have benefits for the effectiveness of groups. These included:

- further assistance in transitions from government to community led approaches. A 'ghosting' period may be useful—where government stays involved for a period as a safety net in a monitoring role, while supporting a community to take leadership of the situation
- developing support for strategic plans, including support to help groups document and trial processes for assessing the effectiveness of the groups
- supporting a greater diversity of stakeholders—representing all land tenures—within group membership, as well as more inclusive participation by the wider community
- sharing among groups a range of communication, monitoring and planning tools and techniques developed by some groups. This would supplement the already extensive sharing of information that occurs between groups
- increased security of resourcing for groups, where they do not have ongoing arrangements in place (such as council levies), to support longer term funding arrangements.

This study is intended to assist AWI by informing further development of strategies and programmes supporting stakeholders to successfully engage in coordinated wild dog management. The findings have also been used to inform design of a national landholder survey on wild dog management (in late 2014), to provide tracking of changes in impacts and management approaches following a 2010 landholder survey.

1 Introduction

This report forms part of a research package, 'Wild dog management in Australia—a landscape approach to management, including pests, people and place', funded by Australian Wool Innovation Ltd (AWI), which is being conducted by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). The research aims to support collaborative approaches to managing wild dogs, thus helping wool producers to remain in the wool industry.

Reason for study

Attacks by wild dogs (including dingoes, feral domestic dogs and hybrids) on livestock have an adverse effect on Australia's agricultural production and agricultural communities (Wicks et al. 2014). People involved in wild dog management programmes represent varied interests and deal with significant social and economic effects from wild dog attacks. Collective attempts to tackle complex problems such as managing wild dogs have been shown to be influenced by how people participate, including: how they plan, record and analyse their activities; how they negotiate and make decisions; and who participates in groups.

The objective in this part of the overall project is to examine the nature of wild dog management groups and how they operate, in terms of landholder participation and collaboration (that is, the participatory process)—what helps or hinders them in achieving coordinated and effective wild dog management—and what support they may need in future to achieve effective wild dog management. This report adds to the evidence base on collective action in invasive species and natural resource management and will assist AWI and other stakeholders to strengthen and plan future investments in wild dog management programmes.

The study was designed to respond to findings from the initial literature review (Thompson et al. 2013), which was part of the overall project. The review indicated four areas of tension that can influence effective collective action in wild dog management. These areas are explained in detail in the next section, but are summarised here as:

- wildlife conservation objectives versus agricultural production objectives
- animal welfare concerns versus the need for effective control
- local versus government-controlled management
- scientific versus local knowledge.

The literature review (Thompson et al. 2013) also showed there had been limited research into collective action among the wild dog management community. Overall, the review findings highlighted a need for participatory research investigating collective action on wild dogs (where stakeholders involved have an active role in the research).

Group attempts to manage natural resources have been shown to succeed or fail based on a number of factors related to group processes, including learning processes; documenting and analysing activities; use of local knowledge; wider public debate; negotiation and participation processes; decision-making (for example consensus versus majority); representativeness; and group composition and power relations (Quaghebeur et al. 2004; Stenekes et al. 2008; Ford-Thompson et al. 2012).

The literature review outlined a range of collective action approaches thought to be beneficial in dealing with complex multi-stakeholder problems such as wild dog management. The research

in this current study identifies the kind of approaches being employed by wild dog management organisations and groups and investigating the effectiveness of different approaches.

Approach and research questions

The primary approach used to collect data was to interview representatives of wild dog management groups in wild dog-affected areas around Australia. The focus of interviews was on answering the following key research questions, which were developed in consultation with AWI:

- what is the structure of wild dog management organisations, including leadership, stakeholder representation and involvement?
- what participatory processes do these groups use?
- what are the success factors within these groups and their approaches?
- what are the areas for improvement?

In consultation with AWI and other key players in wild dog management, including the National Wild Dog Management coordinator and state based wild dog coordinators, ABARES identified potential groups to be studied. People involved in wild dog management were informed about the study through AWI contacts, and group intermediaries through emails and a project flyer. In total, representatives from 30 wild dog management groups were interviewed between late 2013 and early 2014, using questions guided by findings of the literature review and a previous study of invasive vertebrate management programmes (Ford-Thompson et al. 2012). Information from interviews was analysed qualitatively to understand the dynamics in participation and collective action.

Report structure and study outcomes

This report outlines key points from the initial literature review relevant to social aspects of wild dog management in Australia (section 2). Section 3 covers in more detail the methods for selecting groups and data analysis. Section 4 summarises results on how groups are functioning and also includes information on the characteristics of groups and regional linkages, the wild dog control methods used by landholders and groups collectively, as reported by representatives. Section 5 discusses the results in light of findings from the literature review.

The findings are expected to be of interest to those involved directly with and coordinating wild dog management. The study will be able to inform development of strategies and programmes supporting stakeholders, in particular wild dog management groups, to successfully engage multiple stakeholders in coordinated wild dog management. This is a key objective of AWI.

The findings have also been used to inform design of the 2014 national landholder survey on wild dog management, which will provide longitudinal tracking following a survey in 2010. The survey will add a layer of data about both participatory management and current impacts of wild dogs, from the perspective of individual landholders.

2 Background

This section draws on a literature review of the social impacts of wild dogs and participation in wild dog management (Thompson et al. 2013) to provide key insights to support the findings of this component of the study.

Origins of wild dogs in Australia

Australia's original 'wild dog', the dingo, is thought to have entered Australia from southern Asia around 4,000–4,500 years ago (Corbett 2008; Oskarsson et al. 2011). Dingoes have since spread across mainland Australia but have not reached Tasmania. When they first arrived in Australia, dingoes may have travelled with Indigenous people as semi-domesticated camp dogs (Litchfield et al. 2009). European settlers introduced fully domesticated dogs to Australia much more recently and some have escaped to the wild. However, wild-living European domestic dogs (sometimes called 'feral dogs') readily interbreed with dingoes, creating hybrids. 'Pure' dingoes and hybrids are difficult to distinguish as they may look very similar, and all have been considered to be subspecies of the grey wolf (*Canis lupus*). Following this terminology, in this report the term 'wild dog' is used to describe all dogs living in the wild in Australia, including dingoes (*Canis lupus dingo*), feral European domestic dogs (*Canis lupus familiaris*), and dingo–domestic dog hybrids (*C. lupus dingo x C. lupus familiaris*).

A recent paper by Freedman et al. (2014) reports on DNA sequencing of a range of dog genomes and argues, on this basis, that dingoes and domestic dogs are genetically distinct, and that both are also distinct from wolves. A further paper by Crowther, Fillios, Colman and Letnic (2014), based on detailed physical examination of dingo specimens collected relatively soon after Europeans settled Australia (and presumed to be 'pure' dingoes), argues that the dingo has clear differences from the domestic dog. This tends to support its status as a separate species, Canis dingo. Nonetheless, the observation that dingoes and European domestic dogs interbreed in the wild is not in question, nor that both may prey on livestock and even attack people.

Impacts of wild dogs

In Australia, wild dogs can have social, economic and environmental impacts on humans and human enterprises, as well as on native wildlife (Wicks et al. 2014). Since early in European settlement, wild dogs have been a problem in farming areas because they attack livestock. Sheep, lambs, goats and calves are particularly susceptible to these attacks (Fleming et al. 1989). McLeod (2004) estimated that wild dogs cause damage to the Australian economy of the order of $66.3 million annually, including the value of sheep and cattle lost to their attacks, and costs of wild dog control measures.

Newsome (2001) and Allen et al. (2013) suggest that the presence and effects of wild dogs are a major factor influencing landholders' decisions about whether or not to stock sheep, and hence an important influence on how Australia's sheep flock is distributed overall. Wild dogs do have significant social and economic effects on landholders, particularly sheep farmers and wool producers.

There is considerable debate about the environmental and ecological effects of wild dogs, with some scientists arguing that they are an important 'top predator', or even a 'trophic regulator' or 'biodiversity regulator', and that they help to conserve native wildlife by controlling other introduced predators such as foxes and cats (Glen et al. 2007; Allen et al. 2012). They may also prey on rabbits and therefore reduce rabbits' impacts on native vegetation (Glen et al. 2007).

The counter-argument is that wild dogs prey on some native wildlife, and hence controlling or eliminating wild dogs can benefit native wildlife populations (Allen et al. 2013). A further complication is the possible negative effects that wild dog control measures (particularly use of 1080 poison baits) have on native wildlife, including endangered species (Department of the Environment and Heritage 2004).

While there has been substantial research on the biology and ecology of dingoes in particular, there is rather less study of the social and economic impacts of wild dogs in general. In the review of literature on the social impacts of wild dogs done as part of this study, Thompson et al. (2013) examined the background drivers for participatory approaches to managing wild dogs. They discuss the importance of collaborative management involving a range of different landholders from areas where wild dogs are a problem, because wild dogs do not respect most property boundaries—an exception being boundaries marked by special purpose exclusion fences or 'dog fences'. They suggest, based on the literature, that a 'whole of landscape' or 'nil tenure' management approach is likely to lead to the best outcomes, in situations where wild dog populations range across land tenures, jurisdictions and land uses. This approach relies on cooperation and coordination among landholders in affected areas. They point out a range of issues and tensions in groups that may arise in reaching agreement to try a nil-tenure strategy where stakeholders often have varying objectives and jurisdictions (Chudleigh et al. 2011, in Thompson et al. 2013). In general, they identify four major areas of tension in managing wild dogs:

- wildlife conservation objectives versus agricultural production objectives. Some people view dingoes as a native species deserving protection. This can conflict with farmers' views of them as pests. Some wildlife managers also believe that managing the numbers of wild dogs, including dingoes, can help conserve native animals, particularly small- to medium-sized native mammals
- animal welfare concerns versus the need for effective wild dog management. Community views relating to animal welfare can range from seeing no current wild dog management techniques (or at least no lethal control methods) as being acceptable and humane, through to varying degrees of acceptance of current techniques
- local management versus government-controlled management. Tensions have arisen about a perceived 'top-down', government-controlled approach to wild dog management that is seen by some to disempower local people, discount their knowledge and create legislative and regulatory barriers to effective management
- scientific knowledge versus local knowledge—including the differences between scientists who distinguish between dingoes and other wild dogs and advocate different management strategies for them, versus local people who want all wild dogs effectively managed; controversies about the effects of wild dog predation; differing interpretations of wild dog impacts overall; and differing views about the validity of farmers' evidence of these impacts.

This study examines at the impact of these tensions on the internal dynamics of for wild dog management groups.

As a further attempt to better understand wild dog impacts, Wicks et al. (2014) report on findings from a national landholder survey (525 respondents) in areas known to be inhabited by wild dogs in Australia. They also report on case studies of three regions affected by wild dog attacks, including an assessment of psychological impacts of dog attacks, and a choice modelling survey of respondents (1817 respondents) in the states where the case studies were (Victoria, Queensland and South Australia). Choice modelling was used to estimate the willingness of individuals to pay for the management of wild dogs in order to reduce social and environmental

impact. In the national landholder survey, approximately 66 per cent of landholders reported that there were wild dog problems on their property in the 12 months before the survey. Of these landholders, approximately 34 per cent said the problem was severe. Approximately 47 per cent of landholders with wild dog problems on their property believed that management actions in their area were effective. Interviews with landholders in the case study regions showed that wild dog impacts go beyond the damage caused to livestock and resulting losses in farm income, and also cause psychological stress.

Wicks et al. (2014) conclude there is likely to be a role for governments in supporting coordinated action among landholders to improve wild dog management and, to the extent that private landholders can be confident that similar actions are being taken on neighbouring land, they are likely to increase their investments in managing wild dogs. They also conclude that the results of the study's non-market valuation suggest that significant non-market benefits arise from managing wild dogs. Both urban and rural residents in the choice modelling survey expressed a positive willingness to pay to reduce the number of households, number of threatened native species and the area of public land adversely affected by wild dogs in Australia.

Knowledge types and knowledge-sharing

It has already been observed that scientific and local knowledge may conflict in wild dog management. There may be other knowledge types that are important for understanding the social dynamics in wild dog management groups and their influence on management outcomes.

People tend to possess and give credence to different kinds of knowledge, depending on their social and cultural setting, education, occupations and life histories. Different groups of people consider different issues important and they are also likely to hold different priorities for action (Aslin et al. 2004). Brown (2008; 2013) has distinguished the major types of knowledge in western societies, which are considered relevant to understanding the social dynamics within wild dog management groups. These are as follows:

- local knowledge: held by local community residents and based on shared local experience, place-related, and founded in 'common sense'
- specialised (often also referred to as 'scientific' or 'expert') knowledge: held by members of expert academic disciplines and professions, defined by specialisation and often de-contextualised (not place-based)
- strategic knowledge: held by administrators and elected representatives of groups or communities, based on implementing agreed agendas and plans
- integrative knowledge: held by designers, coordinators and facilitators; based on working towards whole of community solutions by incorporating a range of different kinds of knowledge and different kinds of stakeholders.

An awareness of these different knowledge systems and how they are shared was an important consideration in this study for understanding the source of tensions in wild dog management groups and how they could be resolved. To explore this issue further, questions about the influence of different knowledge types were included in the interviews with wild dog group representatives.

Participation in wild dog management

The literature review undertaken for this project showed there had been limited research into collective or collaborative action among those involved in wild dog management. Overall, the

findings highlighted a need for participatory research investigating collective action to manage wild dogs (Thompson et al. 2013).

A recent study by Southwell et al. (2013) concluded that important factors influencing participation in wild dog management generally include landholders' beliefs about the role of these animals in the ecosystem, whether or not their neighbours participate in management, and whether or not management is coordinated across land tenures (the study examined management of wild canids, which include wild domestic dogs, dingoes, their hybrids, and the European red fox).

Research into collective action in natural resource management (NRM) shows that approaches need to take into account power relations and governance arrangements, including the degree to which groups focus on local versus national or regional concerns (Quaghebeur et al. 2004). Group attempts to manage natural resources have been shown to succeed or fail based on a number of factors related to group processes, including learning processes; documenting and analysing activities; using local knowledge; engaging in public debate; negotiation and participation processes; nature of decision-making (for example consensus versus majority); representativeness; and group composition and power relations (Quaghebeur et al. 2004; Stenekes et al. 2008).

Keough & Blahna (2006), in considering how to achieve integrative, collaborative ecosystem management, identify eight factors considered important to success: integrated and balanced goals; inclusive public involvement; stakeholder influence; consensus group approach; collaborative stewardship; monitoring and adaptive management; multidisciplinary data; and economic incentives.

Ross et al. (2002), based on Australian experience, proposes a typology for participation in NRM. This typology is shown in Appendix A and is discussed in reference to this study's findings, in Group typologies.

Quaghebeur et al. (2004) observe that participation is successful when it creates 'some kind of public space of negotiation'. This research seeks to examine what kinds of approaches are being employed by wild dog management groups, and to investigate the effectiveness of different approaches in creating this space of negotiation.

The groups on which this report focuses fall under the larger heading of 'invasive vertebrate species management groups'. In the literature review for this study, Thompson et al. (2013) found that relatively few studies focus specifically on the social and human dimensions of this aspect of NRM, or on the nature of people's participation in these groups. Ford-Thompson et al. (2012) interviewed managers of 34 participatory invasive vertebrate programmes in Australia, covering species such as wild dogs, cats, foxes, starlings and cane toads. They identified variables potentially affecting group outcomes (Table 1). These were used to guide the present study, in particular, in the development of questions to interview wild dog management group representatives (Appendix B).

Table 1 Variables potentially affecting outcomes of participatory invasive vertebrate management programmes

Variable	Description
Effects of invasive species:	**Effects of the species in question either on the environment or humans**
- Environmental	Predation on or competition with native species, disturbance of ecosystem function, loss of genetic diversity e.g. through hybridisation with native species or extinctions of native species
- Economic	Financial loss e.g. because of effects on agriculture and livelihoods
- Social	Risks to human health e.g. through transmitting diseases; causing stress and anxiety to humans; damage to human property, including livestock; causing social conflict among stakeholders
Programme initiator:	**Level at which the programme is initiated (due to whose concerns)**
- Agency-initiated	Initiated by government or non-government organisations with strong links to government
- Citizen-initiated	Initiated by community groups, individuals or non-government organisations
- Jointly-initiated	Initiated by a combination of citizens (individuals or non-government community groups) and agencies
Nature of governance:	**Kind of governance and administration involved**
- Agency-governed	Administered by government or by organisations with strong links to government
- Citizen-governed	Administered by community groups, individuals or non-government organisations
- Jointly-governed	Administered by a combination of citizens (individuals or non-government community groups) and agencies
Geographical scope:	**Geographical extent or operational area of the programme e.g. broad, regional, district, local**
Motivations for using a participatory approach:	**Reasons for involving stakeholders and the nature of their involvement e.g. extent of their decision-making power**
- Obligation	Legislative or funding requirement
- Social and political pressure	Demands by stakeholders to be involved
- Community resources	Need for community resources e.g. time, labour, funding
- Education and informing	Need to increase stakeholder awareness of the issues or programme
- Gathering information	Need to collect data or information from the public or particular stakeholders e.g. via citizen science
- Consultation	Need to present information to stakeholders and seek their feedback
- Deliberating	Need to deliberate and come to an agreement that will be implemented
Stakeholder composition:	**Numbers and kinds of different stakeholders participating**
- Homogeneous	Four or less stakeholder groups involved
- Heterogeneous	More than four stakeholder groups involved

Variable	Description
Nature of representation:	**Relative presence and power of stakeholder groups in participation process**
- Controlling	All participants from the same interest group
- Proportional	Interest group participation proportional to presence in population
- Symbolic	All relevant interest groups present but not in a way proportional to their presence in the population
- Under-represented	Some interest groups that would ideally be participating not currently doing so
Participation methods:	**Way participation is implemented and specific techniques used**
- Activity-based	On-ground activities, including culling invasive species, monitoring or reporting on invasive species
- Consumerist	Primarily surveys about service delivery e.g. attitude surveys, satisfaction surveys, complaints and suggestions
- Traditional	Primarily informing participants about programme e.g. through public meetings, question and answer sessions, consultation documents
- Innovative	Extracting local knowledge via a range of innovative methods e.g. via visualisations and using community indicators
- Deliberative	Using deliberative discussions and strategic planning methods
- Democratic	Using democratic methods e.g. citizen juries and panels, and referendums
Management outcomes:	**Changes because of management action**
- Ecological outcomes	Changes in invasive species abundance, environmental and ecological changes, changes in agricultural conditions
- Social outcomes	Changes in stakeholder interactions, changes in participation, changes in occurrence of conflicts

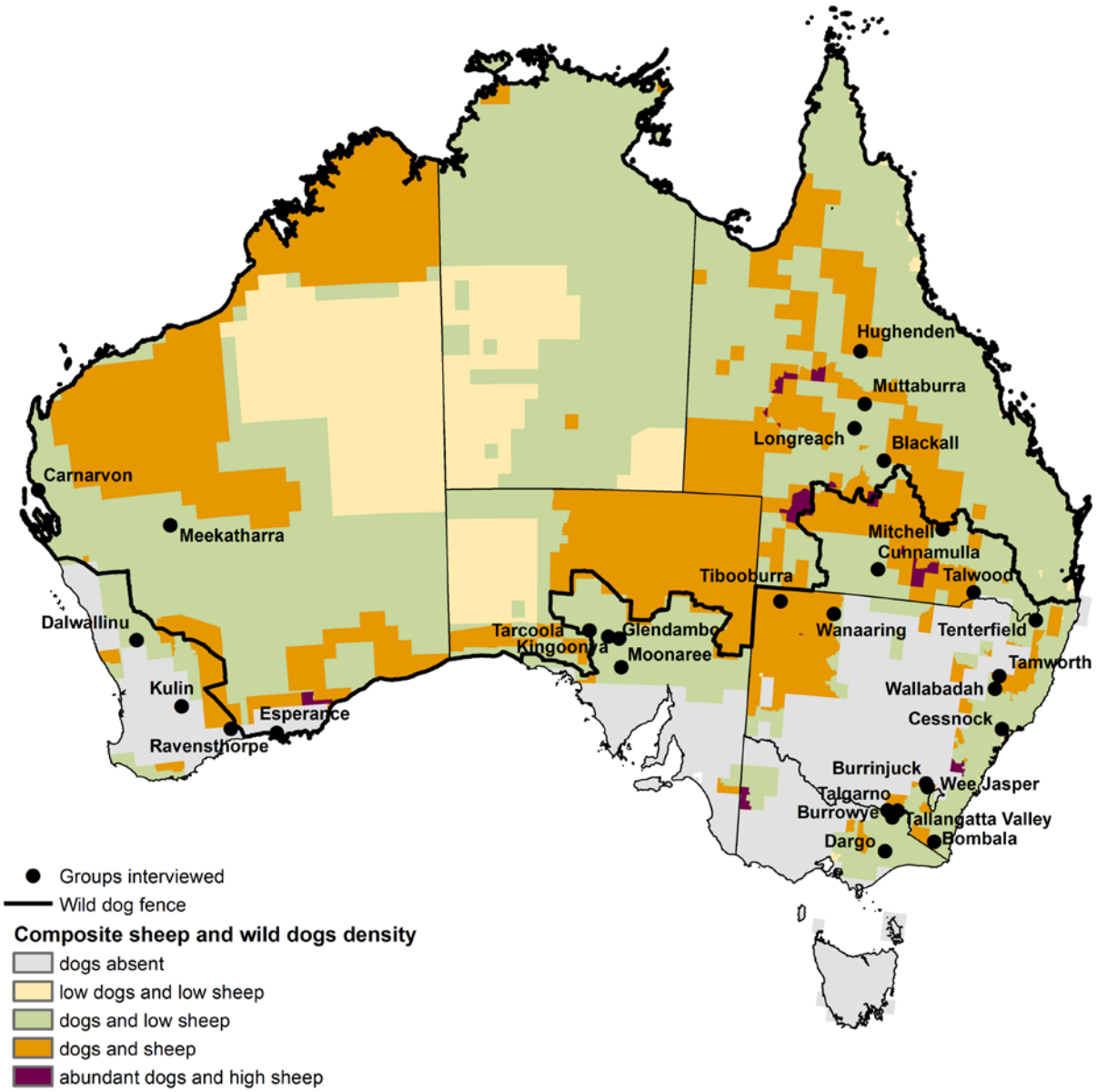
Source: Adapted from a table in Ford-Thompson et al. (2012, p348)

3 Methods

In this study 'semi-structured' telephone interviews were undertaken with representatives of wild dog management groups, based loosely on the approach used by Ford-Thompson et al. (2012). A qualitative interview-based approach was regarded as the best method to explore the research questions—i.e. relating to the structure of wild dog management groups, what processes of participation they use, the success factors for groups and areas for improvement—because the approach is flexible and can reveal the perspectives of group representatives on these questions. Semi-structured interviews have some degree of openness, allowing new ideas to be brought up during the interview as a result of what the interviewee says, and allowing the interviewer to modify the wording, number and order of questions. They contain some open questions where the interviewee can answer in their own words rather than according to a fixed set of categories. They differ from structured interviews that have a rigorous set of questions in a fixed order and with fixed response categories, which limits flexibility to explore new or interesting topics. The telephone contact method enabled the researchers to have wider geographical access to group representatives across Australia than face to face methods.

The groups were selected in consultation with national and state contacts and other key players in wild dog management. In addition, extensive internet searches were undertaken to identify people who had spoken about wild dog management issues in the Australian rural and regional media, and what wild dog groups they represented. To guide the selection of groups, the mapping tool MCAS-S (Multi-Criteria Analysis Shell for Spatial Decision Support) was used to provide a decision framework combining datasets of sheep numbers and wild dog density, location of the dog fence and location of groups involved in wild dog management. Using this spatial representation, efforts were made to ensure that the groups from which interviewees were drawn were spread around Australia in areas where sheep and wild dog distributions overlapped. Interviewees were asked permission to map the location of their groups. Groups considered in this study were from: NSW = 8 (27 per cent); Queensland = 8 (27 per cent); South Australia = 3 (10 per cent); Victoria = 5 (17 per cent); Western Australia = 6 (20 per cent). The locations of the 30 groups are shown on Map 1.

Map 1 Wild dog management groups participating in the study and wild dog and sheep distribution



Note: Data on sheep numbers (dry sheep equivalents) by Statistical Local Area from ABS Agricultural Census 2006–07. Data on wild dog density in 2006 from National Invasive Animals Assessment—in classes including absent, distribution unknown, occasional, common, abundant (local or wide). The two datasets were combined in a 1:1 relationship to show composite density, presented as four classes where wild dogs were present, using MCAS-S software. The terms 'low sheep', 'sheep' and 'high sheep' and similar for 'dogs' indicate increasing relative density along the scale created
Source: ABARES

The research undertaken by Ford-Thompson et al. (2012), summarised in Table 1, on its stakeholder participation in managing invasive invertebrates informed development of the interview questions (Appendix B). These questions were presented to AWI for comment and were trialled before being used.

Interviews were designed to obtain the following information about wild dog management groups:

- background information
- role and function of groups
- membership composition and governance structure
- value perspectives of different stakeholders
- extent to which groups incorporated different kinds of knowledge
- participation methods and motivation for participating
- planning, monitoring and evaluation processes used
- stakeholder satisfaction with group efforts
- impacts of wild dogs—ecological, economic, social
- perceived success of group activities and how success is defined
- conflicts within the group.

Conduct of interviews was based on interview principles outlined by Minichiello et al. (2008). Analysis of interview data was designed to provide a description of these groups and how they operated, identify the structures and processes they used, and identify factors that may have affected how successful these groups were in achieving their objectives.

Interview analysis was based on detailed notes of comments made by interviewees and their answers to the questions posed in the interviews. These notes were transcribed and analysed, which consisted mainly of simple enumeration in the case of structured questions (fixed response categories) and content analysis for un-structured questions. Results from the interviews are presented in the next section, followed by a discussion, including implications for future support for groups. Where the sample size is not mentioned in quantitative results, it can be assumed that N=30 (that is, all groups are included).

4 Results

This section reports the results of the data collection through key informant interviews. The section covers the following topics: impacts of wild dogs; characteristics of groups; stakeholder representation; wild dog group activities; resourcing; and group effectiveness. Additional detail on the representation and roles of interviewees is in Appendix C.

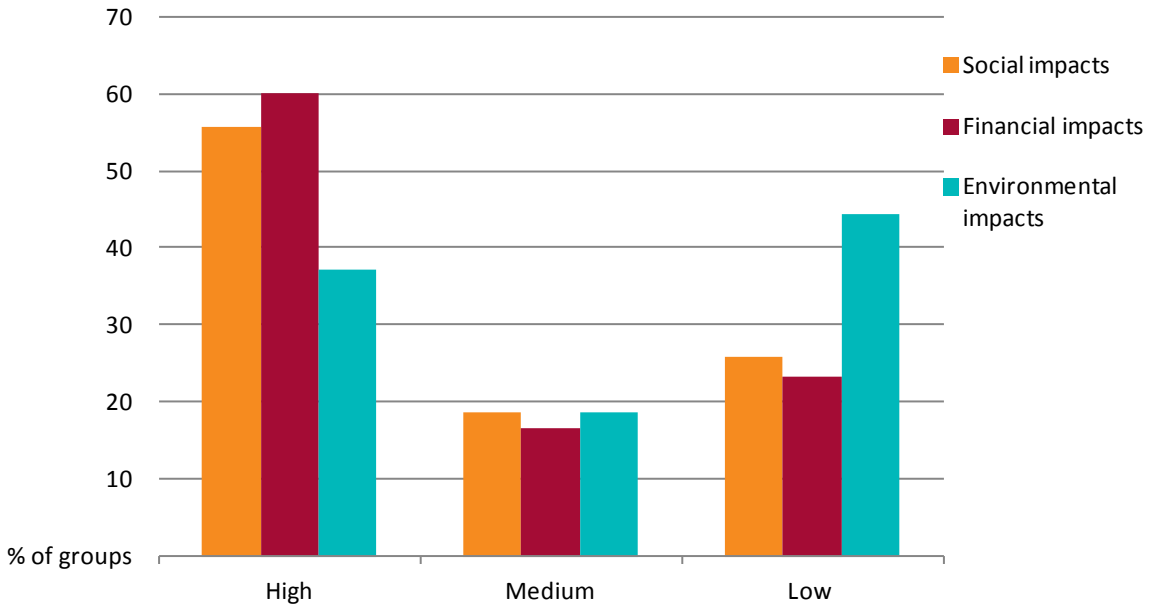
Impacts of wild dogs

Important context for this report is the wild dog situation in the areas examined in this study. Groups included in this study ranged from those at the frontier of wild dog infested areas where sheep farming has become untenable because of the severity of attacks to areas where there were few attacks and the role of the group was proactive and preventative.

Participants were asked to rank the severity of wild dog problems in their area on a scale of 1-5, where 1 was 'not a problem' and 5 was 'a very significant problem', in regards to social impacts (for example loss of people from the area, personal and family stress, conflicts in the community), financial impacts (for example loss of agricultural production, diversion of labour or labour costs from production) and environmental impacts (for example biodiversity loss and environmental degradation).

Figure 1 presents the relative ranking of social, financial and environmental impacts of wild dogs according to participants, where 'low' is a score of 1 or 2, 'medium' is 3 and 'high' is 4 or 5. This shows the large variation in the perceived severity of wild dog impacts faced by groups participating in the study. More than half of the interviewees (60 per cent) thought they were dealing with high financial impacts, 56 per cent ranked the social impacts as high, and 37 per cent ranked the environmental impacts as high.

Figure 1 Ranking of social, financial and environmental impacts of wild dogs

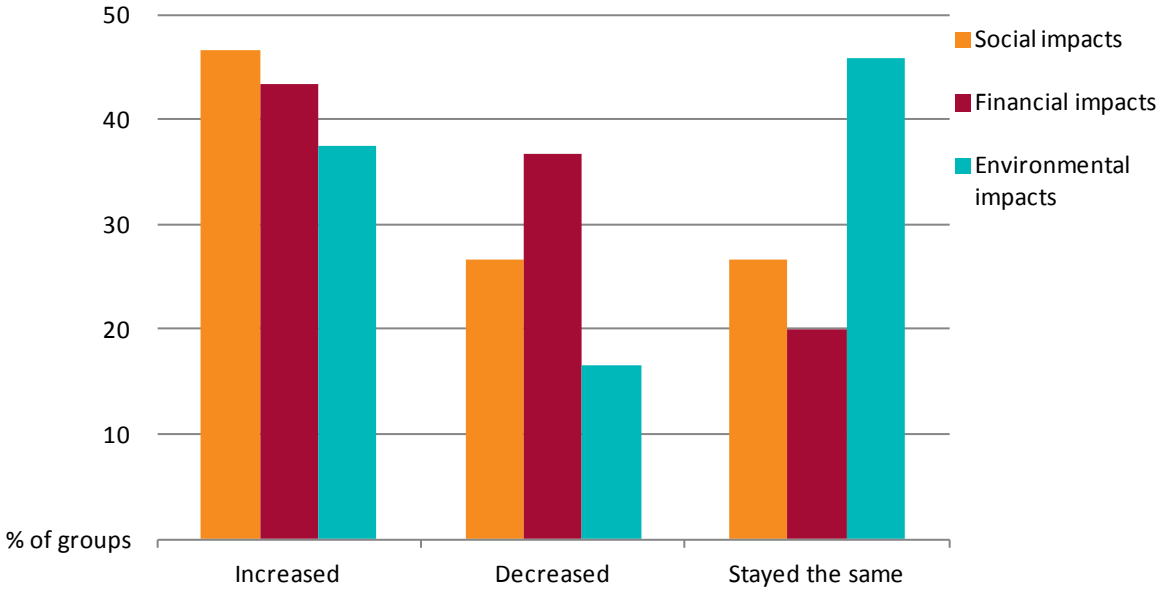


In terms of averages across the groups, the perceived financial impacts of wild dogs (average ranking of 3.8; median = 4.0) were similar to those of the social impacts (average ranking of 3.8; median = 4.0). As often commented by interviewees, social and financial impacts are strongly linked. Some groups reported low social and financial impacts and in many cases this was because they believed that the wild dogs had been controlled in the past few years.

Participants were asked for each type of impact whether impacts had increased, decreased or stayed the same since 2010. While all participants were comfortable in estimating the change in social and financial impacts, not all were prepared to estimate the change in environmental impacts and six participants did not do this. The results are presented in Figure 2.

Nearly half of the interviewees (43 per cent) said financial impacts associated with wild dogs in their areas had increased, while 37 per cent said they had decreased and 20 per cent said they had remained the same. With social and financial impacts linked, not surprisingly a similar proportion, 47 per cent said social impacts had increased, while 27 per cent said they had decreased. In terms of changes in environmental impacts because of wild dogs, 38 per cent said environmental impacts had increased, 17 per cent said they had decreased and 46 per cent said environmental impacts were the same.

Figure 2 Change in social, financial and environmental impacts 2010 to 2014



Financial impacts

Financial impacts differed depending on the severity of wild dog attacks and the proportion of sheep operations compared with cattle in the region. The financial impacts also depended on the types of wild dog management strategies in place. Participants counted sheep losses under financial impacts and although these were difficult to estimate, they often had in mind a figure to represent that loss. Comments included, 'If you lose 300 sheep in a year, you've lost $15 000 a year ($50 a sheep)'; '[We] were losing 300–400 sheep a year'; and 'In the period 2000–2006, when dogs were rampant [we had] $60 000–$100 000 a year in lost income'.

As well as direct loss of income through sheep kills or mauling, other costs of wild dogs mentioned were increased labour costs and management costs, such as fencing. The flow-

through effects of loss of sheep through attacks, and the financial impacts of the resultant threat to the industry were observed by many of the participants.

> If sheep were eliminated this would have a huge impact on the broader community and shearers. You have to think in terms of community, then you can achieve more. If they are losing stock, the local town is losing interaction, employment, shops.

Social impacts

Social and financial impacts were highly correlated ($r(30) = .828$, $p < .001$), meaning that in most cases, participants who ranked financial impacts as high, also ranked social impacts as high. Frequently reported social impacts of wild dogs were those associated with contraction of the sheep industry in the area.

> There has been a downturn in the pastoral industry, affecting shops, pubs, and mechanics. Lost many businesses. Shearers only have 10 per cent of the stock they had. Transporters have left. Abattoirs closed, fencing contractors and musterers have left.

While there are multiple reasons for downturn in the industry, wild dog attacks were often seen as a final straw for sheep farmers. One participant who said the improvement as a result of wild dog control was 'phenomenal' shared the stress related impacts associated with wild dog predation in this way:

> For five to six years I got out of bed and picked up the rifle and would find 20-30 dead sheep. You cannot quantify this sort of stress when you go and count mauled sheep. I do not have it anymore. Now the rifle is in the cupboard.

Participants frequently mentioned the stress associated with wild dog attacks that were affecting individuals in their community as well as themselves:

> Regarding social impacts, there is emotional stress—I speak from personal experience.

> For ten years previous it was horrific because it was impossible not to see every day a sheep ripped up. Mental stress—you can't go away—on duty all the time checking if the fence is still working.

Other social or financial impacts related to wild dogs included the spread of disease, with one participant noting there had been two major *Neospora caninum* outbreaks in the area, which were associated with wild dogs.

Environmental impacts

Environmental impacts of wild dogs were reported to be low and high in almost equal quantities by participants with an average score out of 5 of 2.8 (median = 3.0). There was a medium correlation between scoring of environmental impacts and both financial impacts ($r\ (30) = .405$, $p < .03$) and social impacts ($r\ (30) = .471$, $p < .01$).

In comparison with the other impact areas, reporting on environmental impacts of wild dogs was more complex, with some interviewees saying the dogs had little impact on the environment and others saying that dogs had a large impact, particularly noticeable as dog numbers decreased and signs of wildlife returning were observed.

> Regarding environmental impacts—baiting and trapping efforts have had positive impacts. I have noticed that ground-dwelling birds and lizards have come back. Biodiversity has increased because of wild dog control.

> We have found brush tailed bettong and native mice in the gut [of dogs]... [Impacts on biodiversity are] worse in areas [of high dog density], there is nothing but cattle and dogs up north.

The return of native animals was commonly reported in areas where dog control had been successful. Baiting was reported to be also reducing fox numbers, which was leading to improved biodiversity.

> In 1967 there were a lot of bustards and small ground animals. Now we are seeing bustards back on the farm. They are coming back thanks to controlling dogs, cats and foxes.

One participant who thought that wild dog management efforts were successful in reducing foxes also suggested that foxes and rabbits had more of an impact on the environment than wild dogs and the return of native animals was associated with control of these pests, rather than dogs.

Characteristics of groups

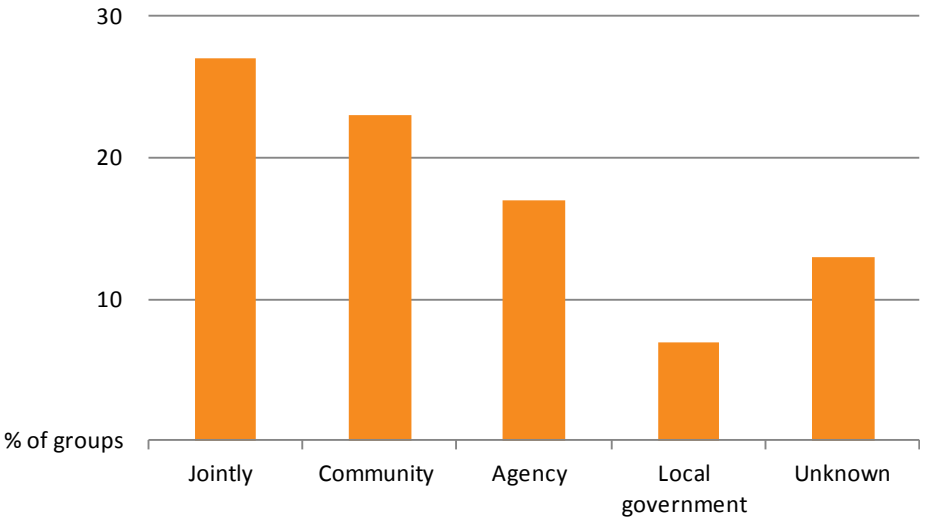
Despite some common features, as reported by interviewees, the groups varied greatly in how formal their management arrangements and group structures were. This depended partly on the state where they were located. There was a wide variety of stakeholder-participation, leadership, decision-making and information sharing approaches. Most interviewees were happy with the structure of the group, with only 26 per cent of the participants saying that the group structure could be improved. In general the groups were action focused as portrayed by one participant's comment '[We] decided we have to do things, not just talk. Once we started doing things, members got proud'. Specific characteristics of the groups were investigated and these are reported in this section. The land area covered by groups varied significantly, ranging from 10 000 hectares to 5.8 million hectares.

Group structure

Interviewees were asked a series of questions relating to group origins, group funding arrangements, group structures and stakeholder representation on groups. According to interviewees the length of time groups had been operating ranged from 1 to 33 years, with an average length of 9 years. In some cases individual landholders had been working together for some time but without a formal group structure, being involved primarily in community-based efforts to bait dogs. One participant noted 'The group was formalised 20 years ago but people had been baiting for 60 years'.

Identifying the origins of groups was not always straightforward. Often there were many influences that brought about the creation of a group. Figure 3 shows the percentage of groups initiated by different stakeholders, based on estimations of which stakeholder took the first step to create the group. The highest percentage were jointly initiated by a mix of stakeholders. The next highest proportion were initiated by community members. Agency, including state and territory government and non-government (such as AWI) were seen as the primary driver for initiation of 17 per cent of the groups and for 13 per cent of the groups, the initiator could not be ascertained.

Figure 3 Stakeholder responsible for group initiation



From interviewees' reports, formalisation of groups has become a trend in recent years. This process has been expedited by a number of factors, including perceived escalation of dog numbers, introduction of legislative requirements for landholders to control dogs on their properties and opportunities for groups to apply for external assistance i.e. they need to be incorporated in order to qualify for funding. Formalisation was also needed in some cases in order to obtain chemicals and 1080 accreditation without reliance on wild dog coordinators. Some groups created group structures after hearing about models such as the Paroo model—an example of the 'nil tenure' approach to wild dog management, which means that problems and solutions are recognised as crossing land tenures and require high levels of collaboration among affected and unaffected stakeholders (Thompson et al. 2013). Some groups were invasive species groups that had been established with government support and dealt with all invasive species, not just wild dogs.

According to interviewees, groups were typically organised on a local and voluntary basis and incorporated landholders in the area who knew each other before the group was formed. As one participant observed, 'Anyone is welcome to join the group and become a member by just turning up to a meeting'. Some groups organised themselves, others had been initiated by state or local government facilitators who contacted people from ratepayer lists, or were enlisted by NRM, AWI and wild dog coordinators. A number of groups were originally formed as part of Landcare or Caring for our Country initiatives. Some reported to groups at the regional level, usually if group activities were linked to access to external funding or when it was conducive to the coordination of their control activities.

As interviewees reported, groups were diverse in terms of their numbers of members with, numbers ranging from four to 180 members. However, the large groups usually included all landholders or rate payers in the council area. Often membership included landholders who attended baiting days. As such, some participants could not provide exact member numbers. In terms of membership change since 2010, the number of group members had remained the same for ten groups; in five groups numbers had decreased; and had increased in four groups. Some participants could not comment on the change in membership as some groups did not exist in 2010, or their legal status had changed over the period since then, making it difficult to compare membership. Most groups typically had a small group of core members who were members of an elected committee directly involved in decision-making.

Group objectives

As reported by interviewees, group objectives varied depending on the severity of the wild dog problem. Almost half of the groups identified their objective as management of the wild dog problem, meaning that they wanted to reduce the number of dogs to as low a level as possible. These interviewees recognised that total eradication was not a realistic goal in their situation. As one participant noted, 'there is no way you will ever eradicate'. Another stated 'ideally no predation on stock by wild dogs, but zero attacks is an unrealistic goal. Reducing severity, keep at minimum is a more achievable goal'.

As mentioned, in some cases, running sheep for a living was no longer viable in the group's area because of wild dog predation. For these groups the goal was to be able to return to running sheep. One participant noted:

> [the] goal at [the] start was to reduce dogs to a level where sheep numbers could be maintained. The long-term goal is to allow people to go back to sheep if they want to. I expect an increase in sheep numbers.

A small number of participants stated that the goal for their group is a total eradication of wild dogs and achieving nil attacks. In contrast, another participant expressed a view that the aim of his group was to maintain balance between production and nature conservation, as some wild dogs in his area are dingoes, which have a conservation value.

Group leadership

In most cases interviewees were leaders or joint leaders of the group, so their motivations for being involved in the group inform what motivates people to lead wild dog management groups. Interviewees said their motivations for involvement were generally related to the threat to their own livestock operations. Interviewees had up to 33 000 sheep, with an average of 6 400 and the sheep losses estimated by participants ranged from 0–1 500 in one year. While sheep losses can be episodic and difficult to estimate, they were clearly an important motivation for group involvement for all participants who had livestock operations (all but three of the participants interviewed). One interviewee who was a group leader when asked what motivated them to lead the group commented 'I'm passionate about keeping sheep in country. I was losing a lot of sheep. Early last year [in 2012 we] lost 900 in three months'.

Other reasons stated for becoming the leader of the group were that they were pressured to become the leader by community members, no-one else volunteered or they were groomed by a previous leader. Many of the leaders of these groups were also chairs of other community groups. Not all group leaders were drawn from the community, sometimes the person recognised as the group leader was an external coordinator. Four of the thirty groups were led by external coordinators (externally governed) and the rest had a leader from the local community (community governed).

Half the groups had strong leadership and a central core of members making decisions. They were run by elected representatives (for example chair, secretary, treasurer) and were sometimes supported by management committees that ran the group in consultation with the wider membership. A typical example of coordination in one group was described by an interviewee as:

> There is the chair, deputy chair, secretary/treasurer who decide policies. Eleven members out of 93 are on a management committee that runs 99 per cent of the group's business in consultation with the wider membership. Members contribute at the AGM, the committee is spread across the region. The management committee meets face to face twice a year and teleconferences twice a year. The committee covers all biosecurity issues including brumbies, donkeys, etc.

In this case, decisions were often made at executive level and communicated to members. Nine groups made decisions more collectively. Their leadership typically included a president, vice president and a treasurer, who ran meetings with the group making collective decisions at every meeting and deciding on action.

Six groups had very informal group structures. They were described by participants as having no formal structure with no formal leadership or having a more liquid, informal structure. Half of those informal groups were run by a coordinator funded by the local or state government or AWI. These groups had a very flat structure with a coordinator who had an overarching management and support role and provided reports on how the funding was spent.

Regional linkages

In a number of cases, wild dog management groups were integrated into a wider wild dog management network at local, regional and state levels, and sometimes cross border. Communication between the local and regional levels was two-way. This approach allowed for a high level of coordination across the region.

Figure 4 shows an example of one wider regional structure with 14 local associations (i.e. wild dog management groups), each with a president, reporting to one overarching regional group. Each of these associations represented around 10–20 landholders. The regional group was made up of representatives from the local associations, usually the president of the association. The regional group met regularly whereas the local associations generally did not formally meet but got together for baiting days and other hands-on activities. Communication between the local and regional levels was two-way. This approach allowed for a high level of coordination across the region.

Figure 4 Example of regional coordination structure for wild dog management

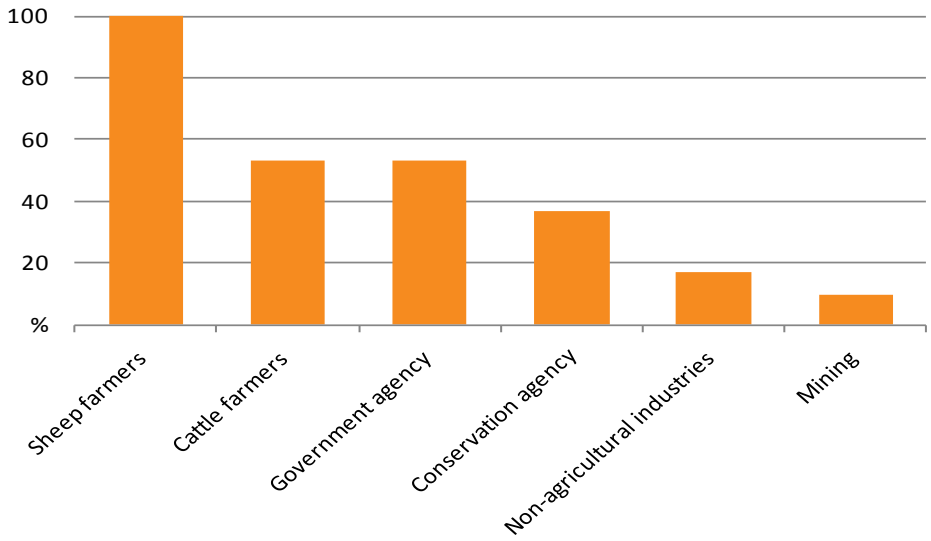
Stakeholder representation

A collaborative and coordinated approach to managing wild dog predation relies on bringing together affected landholders as well as stakeholders from industry, government and research bodies. Interviewees in this study were asked about the types of stakeholders directly involved in groups as members (Figure 5). Participants were asked to nominate representation under five categories—sheep farming, cattle farming, government, conservation, and other. Mining was added as a category after the interviews.

As might be expected, sheep farmers were represented on all groups, while cattle farmers were on half of them. However, in most cases the cattle farmers involved had both sheep and cattle.

Government stakeholders directly involved (53 per cent of groups) included those from state agriculture departments, departments of environment, Livestock Health and Pest Authorities (LHPA)—now called Local Land Services (LLS), and park rangers. Conservation agencies (often also government departments) represented on groups (37 per cent) included state parks and non government nature conservation organisations.

Figure 5 Percentage of groups with categories of stakeholders directly participating



There were also some non-agricultural industries represented on the groups (17 per cent of groups), such as a tourism organisation and a private pine plantation owner, as well as several mining organisations (10 per cent). These representatives were generally land managers who were involved because of their proximity to areas where wild dogs were known to be.

Using criteria from Ford-Thompson et al. (2012), groups with fewer than four different categories of stakeholders represented are considered homogeneous, and groups with four or more different categories of stakeholders represented are considered heterogeneous. On this basis, there were equal numbers of heterogeneous and homogeneous groups (n =28). The maximum number of different categories of stakeholders represented within a group was six and the minimum was one (sheep farmers only). The average number of different categories of stakeholders represented was 3.1, the median was 4.0.

Interviewees were also asked about which stakeholders were indirectly involved with their group. Those with indirect involvement included representatives of AWI, state agriculture departments, local councils, state national parks and wildlife services, regional NRM bodies, and energy companies.

Motivations for participation

Participants were asked to provide reasons for members' participation in their groups. Participants stated that their aim was not only to ensure the future viability of farming enterprises but also to reduce social impacts of wild dog attacks on sheep. Several noted that tackling the problem collectively was the only solution to a wild dog problem. One person stated, 'I think definitely there is strength in numbers—tackle the problem collectively. We don't make decisions without consulting each other'.

One participant attributed this motive to, 'a feeling of obligation to do your part to make the plan work. We can't just rely on people at the frontline'. Another added:

> People mostly still keep their sheep. Nobody got out of sheep completely. One guy comes and goes from sheep. We want people to stay in sheep. People in the buffer need more help from the community. They are trying to protect the whole community and sheep industry in the area. You have to help people on the border.

Other motivations reported for joining a group included peer group pressure from other landholders, the need to gather information, to consult, to increase public support, to get financial and administrative support and free baits, and to get involved in decision-making and to be proactive about the wild dog problem. Interviewees also indicated that people joined a wild dog management group because, 'There is a fundamental care for the animals and their well-being, people do care about animals'.

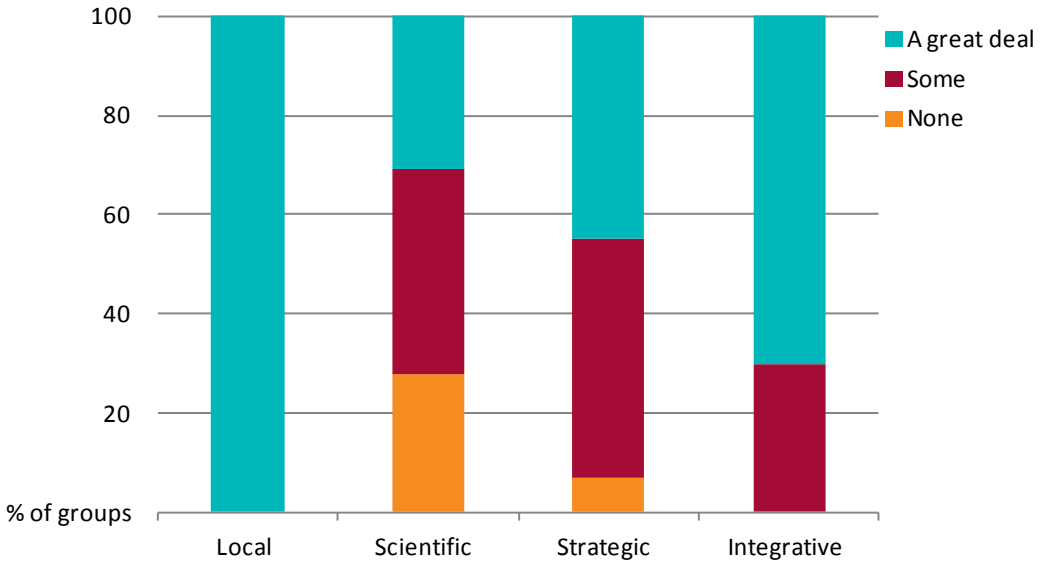
In response to the question about who benefits from the group's activities, participants said that the activities of the groups had a positive economic, social and environmental impact on landholders and communities at large, not only graziers. Most interviewees noted that landholders, both those directly involved in the group and non-participants of the group were the major beneficiaries of the group's activities both emotionally and financially. Among those landholders, some benefited more than others, for example landholders living closer to the bush or along the dog fence. Benefits to the wider community were generally related to the role of the group in keeping the sheep industry viable.

Participants also talked about the positive impact of a collaborative approach to controlling the wild dog problem on members of the group. One expressed this sentiment in the following words: 'knowing that persistence seems to work. Without the group we would have more losses'. Another participant noted, '[the] best thing is making everything work properly now—enthusiasm, achieving something, feeling of achievement—is essential for the group'.

Knowledge types

Participants were asked to comment on the relative influence of four knowledge types (described in the literature review of this report) in terms of how well they were represented by group members (Figure 6). Not surprisingly, all groups had a 'great deal' of representation of local knowledge. This was followed by integrated knowledge, which was represented to a 'great deal' in 63 per cent of groups and was represented in all groups. Strategic knowledge was the next most highly represented, followed by scientific knowledge.

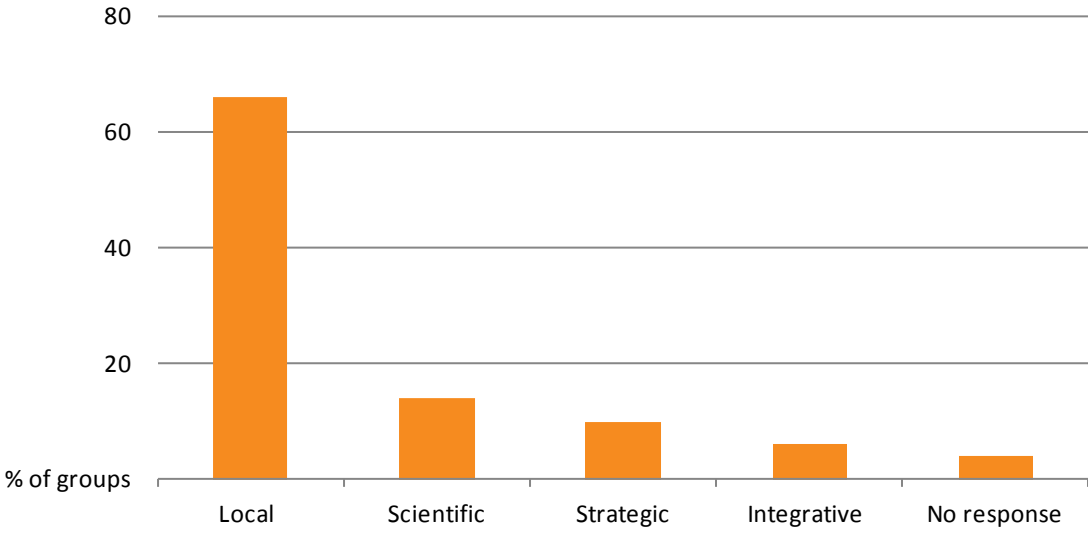
Figure 6 Representation of knowledge type within group



Note: In the interviews, strategic knowledge was also described as knowledge about government processes and policies.

Participants were also asked which of the four knowledge types had the most influence on the group's decisions (Figure 7). The majority (66 per cent) said that local knowledge was the greatest influence on decision-making followed by scientific knowledge (14 per cent), strategic (10 per cent) and integrative (6 per cent). Four per cent of respondents were not prepared to estimate which knowledge type had most influence.

Figure 7 Knowledge type influence on decision-making



Participants commented on what these different knowledge types represented for them. Local knowledge included practical knowledge gathered from personal experiences, in some circumstances gathered over several generations. Local knowledge included knowledge about dog movements, dog breeding areas and general knowledge of an area (important for baiting) and was held by individual group members and their collective knowledge. As one participant put it, '[the] most influence [is] from local knowledge of the art—the need to know where the

dogs run, how the dogs are behaving'. One group included knowledge of Aboriginal law in local knowledge.

Strategic knowledge held within groups included knowing how to deal with grant applications, knowing how to communicate with government and politicians and understanding legislation and came mostly from state and local government representatives. This knowledge type was also enhanced by those who had had formal involvement in Landcare. Understanding government processes was seen as a benefit of having this knowledge type represented in the group, with one participant noting, 'it certainly can be a big hindrance if you do not know how to negotiate red tape'.

Integrated knowledge was seen to be well represented in most of the groups generally pertaining to the view that most of the group members were able to think across issues. Participants did not highlight any particular category of stakeholder who represented this knowledge type, rather holistic thinking was considered a characteristic of most group members.

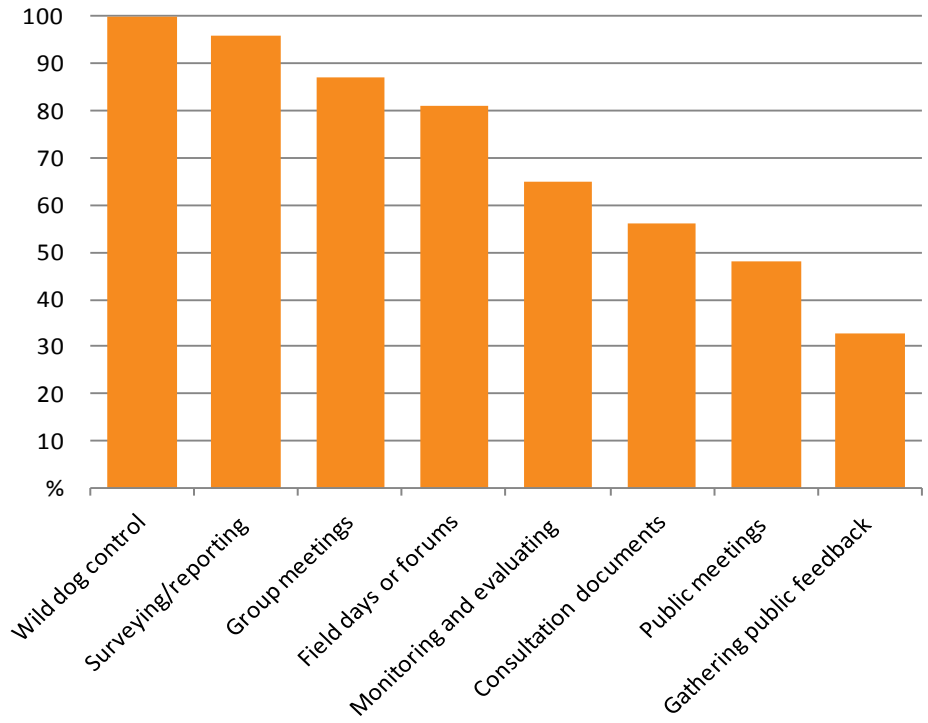
Of the four knowledge types, scientific knowledge was least represented among group members with 28 per cent of interviewees saying that no scientific knowledge was represented by members of their groups. Scientific knowledge was considered to include information about wild dog breeding cycles, timing of baiting and dog behaviour and was contributed by government, LHPA (now LLS) staff, professional trappers and AWI staff. While it was not always represented in the groups, this knowledge was often brought into the group either on an ad-hoc basis or directly sourced, as described by one participant: 'We can always find someone with scientific knowledge—can find out the information—[for example we] went to the manufacturer of chemicals'.

The view that there is an overlap between local and scientific knowledge was expressed by several participants, with comments such as, 'Local works OK. We try and find scientific knowledge—comes from local knowledge. Asked [our] best trapper—when compared with scientific knowledge—[it was] the same'. This in part explains the low representation of scientific knowledge in groups, local knowledge was often considered to be a substitute for or equivalent to, expert scientific knowledge. That said, some groups did say they would like to see more scientific evidence incorporated into decisions.

Group activities

Participants were asked to select from a list of activities that their group conducted. The results are shown in Figure 8. As expected, because of the group selection criteria, all groups undertook on ground wild dog control actions, however, participation in other activities varied. The interpretation of what is meant by these activity categories may differ. For example the methods of surveying and reporting wild dogs varied widely across groups. Four representatives did not count the face to face gatherings that the group had as being formal group meetings. In these cases, decisions were generally made by an executive and gatherings of group members involved baiting, training in dog control methods, and other exercises; rather than group discussions and decision-making typical of most group meetings.

Figure 8 Percentage of groups participating in activities



All but five groups held some type of field day or forum, including trapping schools and other training or demonstration events or forums involving guest speakers. Only 65 per cent of the interviewees said that their group actively monitored or evaluated group effectiveness. This is discussed under Planning. Involvement in public consultation by developing and responding to consultation documents, holding public meetings or gathering information about public opinion of the group's activities was undertaken by less than half of the groups. When this was undertaken, it was generally in the form of verbal or written reports to local government councils as part of general council business rather than specific efforts to engage the wider public.

Planning

More than half of the groups (53 per cent) used formal or agreed plans to support the implementation and monitoring of their activities. In a number of cases these plans were community-driven, but in most cases it was reported that wild dog groups worked with dog controllers, shires or state departments, which helped prepare their plans and associated maps.

Plans used by the groups included short and long term plans. These were reported to be as simple as a budget through to detailed strategic plans. Maps of dog sightings and dog capture were a primary document, which enabled planning of baiting activities. For many of the groups, this appeared to be the main planning document used.

Map updates were usually maintained by state departments and councils. Maps were prepared on the basis of information from dog controllers or landholders and included recordings of sightings of dogs and where dogs were caught and where the baits were laid. In many cases there were formal protocols regarding advising controllers of dog sightings. Some state departments employed an executive officer who collated information and sent a report every month to each council area about dogs, attacks, sheep, baits and maintained quite detailed maps

of where dogs were sighted and caught. These plans and maps were used for strategic planning with coordinators as to where to lay and monitor baits.

Some groups did not produce any of their own internal plans. One participant observed:

> Our strategy is year to year—collating dog activity. We have to be more professional. We are in it for the long term. Goal is to keep on top of the problem. We don't know exactly where this will lead us. We don't have a written strategy.

A number of those groups were externally managed by a coordinator or were established as part of broader programmes and obtained formal plans through those programmes and so operated under broader regional or state plans.

Some groups were reported to collect information on baiting from across the regions and to compile it into maps that outlined wild dog sightings, trappings of dogs, where people had baited, and the number of attacks and stock losses, which were then passed on to a coordinator who posted those maps and associated information to local landholders, and formulated it into actions plans for the wider area. The usefulness of these plans or maps differed depending on a group/region.

> Strategic planning has saved time and money. Having that done enables drawing lines on the map, identifying corridors, shifting baiting lines. It's important because people sell and then we have this documented. It is crucial to document this information about changes in land ownership.

A number of participants noted that management plans put forward by coordinators were not really used by the group members. One participant explained: 'Each landholder does what works for them. You do things independently. We trap dogs in the west on a needs basis. Everybody does their own whatever needs to be done'. Other participants, however, commented that the information formulated in the action plan and managed by states was very useful, 'money well spent'—in the words of one participant.

Particularly useful were management plans and maps resulting from interstate cooperation. As one participant observed, 'in [the] late 1980s, early 1990s interstate cooperation started. Cooperation made a massive difference to making plans. Baiting is now more strategic, targeting hotspots and corridors'.

Only a small number of groups did not have any written plans either internal or externally managed by a coordinator. According to one participant, 'the group is reactive to what happens and decides on the best way to deal with it at the time'. Another reported that, 'we do only monitoring of dog scalps. On an annual basis landholders report on attacks to LHPA, to have a record kept on the database. It has been an issue—so busy, hard to find time to fill in the form. It is hard to itemise losses'.

Communications

A number of participants stated that the success of a group depends on communication, not only within a group but outside with people in its district. They identified good leadership, planning and communication to be necessary attributes of a successful group. One of the participants summed it up as 'Good leadership is important. Communication is paramount. Planning is important—you need to know where you want to be'. Another commented:

> I reckon the biggest thing you are doing is communicating. You have to open communication channels to deal effectively with a problem. Exchanging information. Properly communicating. People may be doing something but just have not talked to the division leader. [You need to] talk if you see a dog—tell neighbours.

Communication was particularly important given the large geographic distances between landholders and meeting places. The majority of groups met between two and four times a year. Others met at least twice a year at bait injecting services or on a needs basis if there was a particular issue to work out. An important aspect of the group's effectiveness was the improvement in communication as a result of the group.

> Communication between neighbours is better. They talk to each other more on issue of dogs and related issues. If they can't get near the computer, you can act for your neighbour.

Groups were reported as using a number of communication methods to organise their activities and expand their membership by involving other landholders who did not initially want to cooperate. Some groups were formed and continued to exist through word of mouth, others relied on internet and email, traditional mail outs or contact by telephone. Groups made good use of internet and telephone, in combination with occasional face to face contact.

> Group members will contact each other frequently, especially when there is a dog sighting or tracks are seen in the area. There is generally a small amount of face-to-face contact between the members of this group as they are such large properties. However, phone and email contact is regular.

Groups were also reported to use local newspapers and notice boards in public areas to advertise their activities and meetings, especially community baiting programmes. One of the participants started a website and email 'tree'—tapped into through the neighbouring community and bush nursing centre (the post office and school had closed down) to inform people of the group's activities.

Wild dog control activities

Interviewees were asked about the wild dog control methods used or supported by the group. According to interviewees, all groups used ground baiting and trapping (Table 2). Participants were asked to rank the methods in order of importance for their group, using rankings of 1 to 5, where 1 was 'most important' and 5 was 'least important'. Ground baiting was ranked first by 63 per cent of groups and ranked second by 36 per cent of groups. The next most important method was trapping, which was ranked most important by 26 per cent of groups and second most important by 43 per cent. Shooting was the next most used method, however, one group did not use shooting at all and five groups did not respond on this method.

Table 2 Wild dog control methods used by groups, ranked by importance (number of groups)

Ranking	Trapping	Shooting	Ground baiting	Aerial baiting	Fencing	Guardian animals
Ranked 1st	8	2	19	9	5	1
Ranked 2nd	13	4	11	6	2	
Ranked 3rd	7	15	–	–	1	2
Ranked 4th	2	3	–	2	3	3
Ranked 5th	–	–	–	–	2	3
Total no. of groups using this method	30	24	30	17	13	9

Source: ABARES

Because the questionnaire focused on what methods groups did use, rather than those that they didn't and there was some missing responses to questions on specific methods, the results for

'No. of groups using this method' should be considered rather than the not used or no response. This refers to methods generally endorsed or coordinated through the group, and does not exclude activities that might be undertaken by individuals. All groups used ground baiting and trapping; 80 per cent used shooting; 56 per cent used aerial baiting; 43 per cent used fencing; and 30 per cent used guardian animals.

Perspectives on the different wild dog control methods and some of the major issues noted for each method are discussed briefly here, in order of the overall ranking of the importance of these methods.

Ground baiting

Ground baiting was seen as an essential element in proactive wild dog management in combination with other methods. However, not all ground baiting was seen as proactive and some was considered reactive. The purpose of proactive baiting was to pre-empt likely dog appearances and was generally considered more useful than reactive baiting. Proactive baiting was not always well resourced with one participant noting, for example, that 'funding does not allow for proactive baiting in National Parks'. Despite this, in general, there were positive comments about combined baiting efforts on public and private land.

Although there were many strategies used, the problem of obtaining meat for baiting was seen as a serious limitation to the success of baiting programmes and was mentioned by many of the participants:

> Getting meat is going to be the biggest issue. We are getting less than half what we need to get—we could do twice as much baiting—doubled ours this year but still not enough.
>
> Problem areas are state forests/parks—have to collect 1.5 tonnes [of meat] on their behalf. Same group of people turning up, especially collecting meat. Called 20 people and got 5. Need more funding for meat.
>
> Meat is a massive issue.
>
> [We require] 15 tonnes of meat a year. [In addition to] feedlot stock that get hurt. We probably will have to purchase meat.

While baiting was supported, the problem of the 'lack of trophy' was mentioned frequently. One participant noted, 'You do not see the results of baiting—lack of proof or evidence of effects of baiting. For example, foxes will take a dozen baits'.

Trapping

In general trapping was supported as an important method in conjunction with baiting but there was dissent on the practicalities. For example, there was a tension about whether trapping should be left to the experts or continue to be done by community members. While trapping schools were highly regarded in many of the areas, some participants said that they thought trapping was better left to professionals, recognising that doing it successfully, efficiently and humanely was a skill developed over time. One participant noted, 'We need more funding for trapping and baiting, not training. We are all over 60 and overtrained'. This is countered by support for landholder trapping with one participant supporting the schools saying 'the more you do for landholders the less they do themselves', commenting on the negative aspects that dependency on paid trappers can bring. One comment was that trapping (by funded trappers) was supported by some landholders because it does not cost them anything, rather than being motivated by reasons related to effectiveness.

Another participant categorised trapping as a reactive strategy, whereas baiting was proactive. The issues (relevant to trapping, baiting and shooting) of how doggers are reimbursed were

noted with some criticising the bounty system and others going to the extent of suggesting that some doggers had an interest in seeing that wild dogs continued to be present to keep their work flowing.

Shooting

According to interviewees, shooting was seen as an opportunistic method for individual landholders, in addition to employed or bounty driven doggers who were paid to shoot. As one participant noted, 'you can only shoot a dog if [dogs are] in plague proportions'. In general, professional doggers were highly regarded in terms of effectiveness in wild dog control, both in regards to shooting and trapping.

Aerial baiting

There were varying opinions of the success of aerial baiting with comments that it can be necessary in inaccessible areas and can work if strategic. As for ground baiting, participants commented that it is hard to monitor the outcomes of aerial baiting. Organisation of aerial baiting was outside the scope of many of the groups from which interviewees were drawn and is generally coordinated by organisations such as NRM boards or Local Land Services. It requires large infrastructure and administration.

Fencing

Five of the 30 interviewees indicated that fencing was a priority for their group and it was being considered as a possibility for others. In some cases, fencing was seen as a 'last ditch effort' when other methods have failed. Issues for fencing include its high costs. In one area, individual landholder costs were estimated at $100 000 to $400 000 to build a fence for one property. Fences have to have extreme specifications because of the athleticism of the dogs, with one participant noting, 'This is difficult to justify...five foot tall, electric fence—lots of 25-30 kg dogs jumping'.

The difficulty of maintaining fences in the long term, especially in rugged terrain, was also mentioned often. Fencing strategies related to fencing at individual landholder scale and also for larger public fencing projects. The following quote presents one interviewee's argument for individual landholders pursuing fencing as their major strategy for keeping out wild dogs:

> We are surrounded by parks, dogs are coming from these parks. It is not on their agenda, not hitting their pocket, compliance is not as high as neighbours. Because of these difficulties and lack of government funding, people initiated their own dog control measures—private fencing on their properties. We started creating cells. In doing so we realised that we can solve a number of issues. If a dog got inside an exclusion fence it would get locked into the next cell. Responsibility for the maintenance of the fence is [at the scale of] individual cells. This is a community grassroots initiative which arose organically out of people's need to address the wild dog problem. If we could get assistance to finish this off, this would be sustainable into long term. Because the ball has started rolling, you can see the logical steps.

There was also discussion about building new or upgrading publically funded boundary fences, such as this example:

> Fencing is becoming our most important technique now. We have submitted an application for [several million dollars] for fencing a cell that will enclose multiple properties. Council has [also] contributed.

Of course, as one participant noted, 'A fence is only as good as its weakest link'. Multiple players are often involved in maintaining fences, including state and local government staff and landholders, which can lead to issues around delegation of responsibility.

The additional function of fencing in controlling kangaroo and emu access was also mentioned by a number of participants.

Guardian animals

Only one interviewee indicated that guardian animals were a primary strategy for the group. One participant suggested guardian animals are a 'back up', and can be used in support of other methods, such as electric fencing. Another participant said that donkeys and maremma dogs can 'push the problem onto someone else'.

Experiences with maremma dogs were mixed with some success in small areas. Negative experiences included one example where maremmas were moving the sheep on towards safety, but left lambs behind. Also reported were cases of maremmas bonding with one mob of sheep but not another and killing sheep and goats from the mob that was not their own. The need for registration of maremmas was noted with some reported as going wild. Also, it was thought that the presence of maremmas acts as a disincentive to baiting in a region, which was problematic for landholders not using these guardian animals.

However, maremmas were considered to be 'a big success story' in one region where 15 landowners had maremmas and they were reported to have mitigated the problem in this area with no wild dog attacks for 12 years and no baiting needed on properties with maremmas. In this case, the keys to success were reported as having obtained the maremmas from a good breeder who also passed on basic training principles for managing them. Also allowing a good amount of time to become familiar with the breed was reported as a reason for success—'it doesn't happen overnight'.

Llamas and alpacas had been trialled to protect sheep flocks from attack, with less reported success than maremmas, and were noted by one participant as better for managing foxes than wild dogs. Donkeys were also reported to have had limited success in deterring dogs from attacking sheep with which they were held.

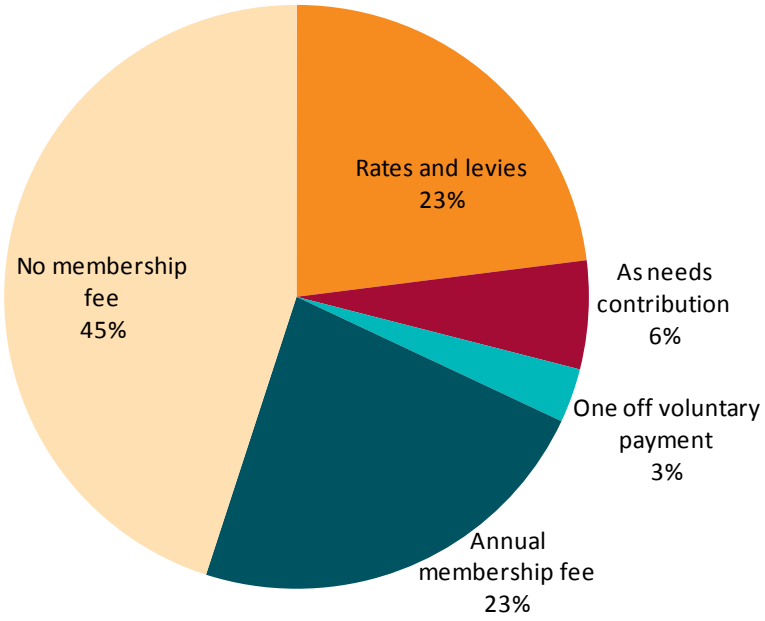
Other

Other emerging methods were commented on. One of the groups had trialled the use of sodium cyanide ejectors (M44) and suggested it was too early to comment on their use. Recreational hunters game hunting in national parks as a method of controlling wild dogs was noted by one participant who observed problems with it: 'some hunters remove baits, take traps, let dogs out, drive over traps'. Cameras were used by many groups and were seen to be very effective in providing information about the presence of wild dogs, however, there were also problems with cameras being reportedly stolen, as well as maintenance issues.

Resourcing

Wild dog management activities require significant resources. In terms of basic operating resources, groups had a variety of ways of obtaining what was required, including charging membership fees and levies (Figure 9).

Figure 9 Group funding



Note: Rates and levies are generally mandatory based on land ownership. In addition to these funding arrangements, groups received external support.

Almost half of the groups (45 per cent) had no membership fees at all, but relied on in-kind contributions from members (mainly their time). A number of groups either charged an annual membership fee or relied on funding from mandatory council rates or a levy collected by the state government, including a separate dog fence levy fee in some cases. Members of two groups contributed on an 'as needs' basis to cover the cost of baits or insurance for staff and volunteers, and one group asked for a one-off voluntary payment from members.

A key issue in raising funds to support the group is 'who pays?'—sheep farmers or the whole community, with some cases where all the ratepayers in the council area pay a contribution towards wild dog management through their rates, and other cases where only the farmers involved in wild dog management or directly affected by wild dog attacks contribute to controlling the dogs:

> The levy is mandatory, collected by state revenue; everyone is obliged to pay $2000–4000 depending on general valuation (farm size, productivity and capacity).

According to one interviewee, their group wanted compulsory levies to be introduced rather than only participating landholders contributing to the cost of wild dog management:

> [The chair] wants to get [a] levy introduced—so everybody pays. Twenty dollars per property would be sufficient. I know [about lack of participation] through participation at baiting programmes. Those not turning up for baits are not participating. Good participation in my group and some [other] groups. People in the middle who do not think it's their problem. I believe that [a] levy would solve this.

External support

All groups had received external support in addition to obtaining the kinds of resources discussed (under Resourcing), to maintain group operations. This support was mainly from AWI,

local and state governments. Interviewees were asked what external support had most benefited their group. Replies were focused around the following themes:

- funding
- mentor groups
- coordinators
- regional to local linkages
- regional NRM organisations and landcare groups
- access to research findings
- administrative support.

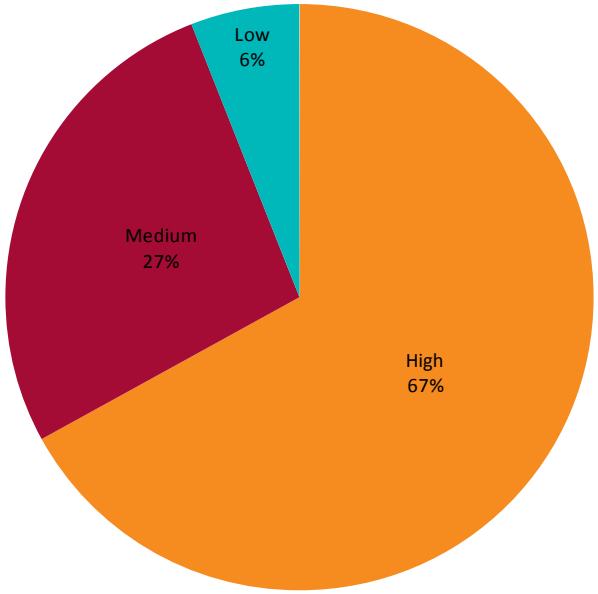
The most beneficial source of support was reported to be funding. Funding of group activities was one of the critical issues raised by interviewees in relation to enabling current activities to continue and future plans to be made. This included funding for doggers, trapping schools, baits, fencing, infrastructure (such as refrigerated containers for storing baits) and executive or administrative support for the group. As indicated previously, access to funding was the catalyst for some groups to form. Their survival and continuation of activities often depended on external funding. Funding and how it was best allocated was also one of the key reasons for disagreements within the group. The flexible nature of AWI funding was commended. That is, providing funds for the most important activity as determined by the group rather than the prescriptive use of funds.

Another important source of support was mentor groups such as the Paroo Wild Dog Management Advisory Committee, which was available to provide inspiration and support to new groups. Interviewees highly valued coordinators, including the national wild dog coordinator, AWI coordinators, and state government coordinators.

Group effectiveness

When asked to self-rate the effectiveness of their group, the majority of interviewees said that their group was effective (Figure 10). When asked what these effectiveness ratings were based on, participants said dog control success, participation levels, commitment and collaboration, and the extent to which decision-making processes were democratic.

Figure 10 Self rating of group effectiveness



In response to the question 'Do you monitor or evaluate the group's efforts?', 50 per cent of participants said that group members did do this. Participants were not asked to specifically describe how this was done but one participant commented that at the start of each meeting, group members always reviewed what had changed since the last meeting and what could be improved.

Monitoring of the effects of group efforts on wild dog numbers was mostly informal. In some cases this was done locally through simple email systems or by telephone, while in other cases 'high tech' solutions were used, with GIS maps being created centrally by government officers. The latter could mean weeks or months before the information got back to landholders. The view was that the faster the dog sighting information was available to landholders, the better – simple systems providing immediate feedback were reported as very valuable.

It was noted that high ratings of group effectiveness did not necessarily mean there had been a decrease in dog numbers. Participants frequently noted that while they believed their group was operating at maximum effectiveness, within reason, the dog problem may have stayed the same or worsened. A number of external factors affecting dog numbers were described such as rat plagues, increased deer carrion as a result of deer hunter activity or dogs moving into a new area because dam construction had altered dog movement patterns. Another cause of increased dog numbers was interruptions in dog management programmes, such as those that occurred during transition from a government to a community-managed model, as described in this comment:

> Cattle losses in the north have increased and losses in small livestock in the south have increased significantly. When the government employed doggers left we had to start from scratch. That two to three year period stuffed everything. The increase in losses is NOT to do with the new group but the transition period. Had to form new contracts with doggers etc., took a year to get organised.

Barriers to groups operating effectively

Participants were asked to identify factors influencing the effective operation of wild dog management groups. The majority of participants identified insufficient funding as one of the main factors limiting their groups' ability to effectively manage wild dogs. Most participants generally believed that an increase in funding would improve current wild dog control. They stated that if they had more support they could reduce the extent of the problem, as it would enable them to apply control methods at the scale they believed most appropriate in their circumstances. One of the participants observed: 'If we had more funding we could employ more trappers and we would minimise the problem'. A number of participants stated that the success of the group was reliant on external funding. As one of the participants explained, 'In the short-term we could function without [external] funding, but it would be difficult in the long term'.

Another key impediment to groups' effectiveness was lack of cooperation from some landholders in their area, either because of lack of interest or awareness of the situation or lack of acknowledgement of a problem. Among those who did not cooperate or refused to become involved were cattle owners, those who had left sheep farming and other landholders who were not motivated to control wild dogs. Included in this were corporate operations with managers and absentee landholders.

Participants' comments on these attitudes included: 'Some cattle owners are too self-interested. They act only when they see dogs. They do not care if they are part of the problem'. Another added: 'There is complacency especially among those landholders who only run cattle. They claim that there are no wild dogs. They do not believe that there is a problem'.

Participants believed that there could be between 10 and 40 per cent of landholders in the group's area who were not motivated to control wild dogs and argued that improved neighbour participation in management, better management on public land and improved co-ordination of management across land tenures would improve current wild dog control. In reference to the latter, many participants noted the nil tenure approach that had been implemented with varying degrees of success across the groups in the study.

A number of participants reported difficulties affecting group operations that related to finding the right control methods, ease of use of these methods, adoption of new technologies, and delays in effective new methods being introduced, such as safer baiting methods (for example using PAPP rather than 1080 as a poison in baits).

As an example of a 'poor choice of the management tools resulting in poor investment' one participant mentioned an investment in electric fencing. He explained, 'When the fence wasn't in good repair the group invested in electric fencing. This was not effective as it often shorted out and the dogs could tell if the fence was working or not. It was high maintenance to keep it running. Not very successful at all'.

Managing public-private interface problems was another barrier identified by a number of participants. Some raised an issue of difficulty in using some methods on public land, for example ejectors and cyanide, which had to be done appropriately under specific conditions. Participants noted that in general government was working effectively with landholders to reduce impacts from public land.

Other participants discussed the reluctance of some people to use some control methods such as 1080 baits because of fear that working dogs would take baits. Some participants considered that these claims were exaggerated and served as an excuse for non-participation. One participant stated that, 'because of this mentality that baiting will damage working dogs we can't get total participation'. They argued that, 'there are ways around it—you just need education about dog corridors and using baits. With 1 700 landholders it is difficult to persuade everybody. We do not just throw them [baits] everywhere and you can muzzle them [working dogs]'.

A number of participants noted their belief that legislative constraints restricted the availability of some wild dog control methods. These constraints included regulations limiting the use of rifles and injection of baits, lack of uniform legislation about the use of some methods across states, and slow processes to update legislation.

Participants commented that changing some of the laws to allow people in the local community to inject baits would help with the uptake of baiting, 'as the travel involved in getting to baiting services to get meat injected is not a perfect scenario, as it takes one full day'.

Dealing with a change in their state's role in managing wild dogs was seen as another barrier to effective group operations. One participant observed, '[State government] used to send out a dogger in a ute to set traps and baits when there was a dog problem. The state was responsible for active management. Now the Department provides research and advice, not on the ground work'. These concerns also included procedural and governance issues such as those relating to the unclear legal status of the group.

Time constraints were seen as another significant barrier that affected people's ability to be involved in a group. These included time constraints because of property sizes and distance to travel, and simply not having enough time to do baiting or set traps. Many participants said that people tried to get involved as much as they could. One said, 'We could dedicate more time to

wild dog management, but [we] need to weigh up the costs of time and results. It comes down to the physical capacity of the land managers. There is a critical shortage of staff. Coordinating a date is difficult'. One participant summarised this conundrum as, 'I would like to spend more time to do it. This is one of those situations where we would be more effective if we had more time'.

Another factor that was believed to influence the effectiveness of the group was difficulty maintaining motivation and enthusiasm. One participant observed, 'To get everyone on board and keep them on board is hard. Motivation decreases as time goes by'. Other reasons for decreasing interest in participation indicated by participants were difficulties in seeing the results or outcomes, including not seeing a 'trophy'.

Conflict

Participants were asked to discuss areas of disagreement within the group. Two thirds of participants said there were no major disagreements within the group. Because of social desirability bias—a tendency of people to answer questions about sensitive topics in a way that will be viewed favourably by others (Fischer 2000)— participants may have understated the extent of conflict. It is also important to note that the groups were selected for the interview because they were a functioning group. High levels of conflict may have resulted in previous groups disbanding and therefore not being included in the list for possible interviews in this study.

Those participants who said that there were no areas of major disagreement internally and that groups functioned effectively noted that they all shared common interests, and aims were closely aligned among members: to bring wild dog numbers under control and to be able to continue the sheep farming business. They also generally indicated that they were happy with funding levels.

Where there were disagreements, they were about:

- non-participation / unequal participation
- inadequate funding
- responsibilities
- dog control methods
- funding allocations
- risk to farm dogs
- dingoes as a pest versus environmental value.

Some participants stated that contentious issues arose about funding allocations for control methods, for example there were conflicting views about which strategy would achieve better results. In some groups, participants disagreed over the effectiveness of wild dog control methods, for instance employing doggers versus training landholders to use traps, or the effectiveness of manufactured baits versus fresh meat baits.

A number of participants raised the issue that external funding agencies could better target group needs, commenting on the rigidity of grant conditions that did not always reflect groups' needs.

Some disagreements related to time constraints and consequent unequal sharing of responsibilities among members. One participant expressed his dissatisfaction through

comments such as: 'The biggest problem is that there are only two people in each group that do all the work'.

Cooperation within the group could also be disrupted by differences in members' beliefs about the role of pest animals in the ecosystem. These conflicts were about the environmental value of dingoes and a need for dingo protection versus the belief that all wild dogs needed to be controlled, irrespective of whether they were dingoes or not. As one participant explained;

> There are some issues with the Bush Heritage site within the area which has different priorities than the sheep stations. There are conflicts over dingoes. Bush Heritage has a different view of wild dogs—more conservation of the dingo than seeing them as a pest. As a compromise, Bush Heritage baits around the edge of their property.

Other disagreements concerned the role of wild dogs in moving kangaroos to new areas. As one participant explained, 'Roo control is a major issue. Some people think dogs keep kangaroos moving'.

Another factor causing tensions was availability of external support. Participants' comments on the need for support included statements such as: 'The only conflict in the group is the lack of government funding—they want long term funding commitment from government' and 'It would be better if there is continuity in funding. It is the hardest part of all'.

Some groups noted that internal group dynamics were affected by disagreements over the responsibility for managing and funding wild dog control activities: sheep farmers or the whole community? Participants were aware that in some jurisdictions all the ratepayers in the relevant council area contributed to wild dog management through council rates or levies and, in other cases, only the farmers involved in control activities or affected by wild dog attacks paid for this.

Assigning responsibility was a source of conflict. Views that the problem is the state's or council's responsibility were expressed by some. As one of the participants commented, 'The whole issue is a government issue and they need to fix it. Some are saying it is a government issue because wild dogs are coming from public lands'. Another participant noted, '[State government] should be actively controlling the problem as a state. It is not the growers who are causing the problem so it should be a state responsibility'.

One group wanted levies to be introduced rather than only participating landholders contributing to the cost of wild dog management.

> [the chair] wants to get [a] levy introduced—so everybody pays. Twenty dollars per property would be sufficient. I know [about lack of participation] through participation at baiting programmes. Those not turning up for baits are not participating. Good participation in my group and some [other] groups. People in the middle who do not think it's their problem. I believe that [a] levy would solve this.

Another disputed area concerned the 'carrot versus the stick' in increasing participation of landholders in wild dog management efforts. Some participants argued that contribution to wild dog control efforts should be mandatory for all landholders in a region, perhaps through a council levy (and this was the case in some areas). Some participants mentioned a need for more pressure, through legislative changes and enforcement, to be applied to increase landholder participation, particularly participation of neighbours, non-sheep farmers, 'lifestylers' and conservation area staff. In reference to greater enforcement of legislation, one participant stated: 'If you don't increase participation it will not work. What's the point if you don't increase participation'. Some believed that better (blanket) participation in trapping and baiting of wild dogs is a prerequisite for better outcomes. However, others did not support mandatory baiting.

'We don't support—[this] would make life very unpleasant for the enforcer. Should be more pressure to participate but it is not an answer [to make it mandatory]'.

Also noted were some personality related conflicts, however, these seemed to concern individuals rather than be reflective of group processes.

Future arrangements

As discussed earlier (in Group effectiveness), the majority of participants in this study reported satisfaction with the effectiveness of their groups and did not give any indication that they intended to stop their current activities. When asked about their plans beyond the next three years, all groups expressed a commitment to continue their activities. Many groups, however, did not have long-term strategies and were not certain about future objectives and strategies. Some stated that they had not made any formal arrangements for the future. One participant noted: 'Nothing formal and haven't really thought about it. Future arrangements will depend on the problems. Necessity to act will determine arrangements'. Another said, 'we are clinging on to the current system and trying to get more to participate'.

Many responses indicated that the lack of firm plans was a result of the uncertainty about secure long-term funding. Participants' comments on the need for improved financial support included this statement, 'We have expertise and commitment from everyone. Continually looking at best options but it comes back to dollars. The only issue is finances'. One participant acknowledged that, 'The greatest fear [is] that the funding will dry out and we would not be able to afford programme without external funding'. As indicated earlier, almost all participants noted that they were very reliant on external funding from shires, state government and the wool industry, particularly AWI. The extent of their dependence was expressed in comments such as: 'In the short term we could function without funding, but it would be difficult in the long term'.

A number of participants believed that their future seemed to be secure because of a strong support system, both financial and legal behind them. These participants represented groups that enjoyed ongoing arrangements for funding via a rates or levy system.

5 Discussion

> We are successful because we are smart, intelligent people and we work as a team. We are good at problem solving. [It's] easy to hash through a problem and come up with a solution. Look for the highest idea—[we are] forever growing, discussing ideas.

This statement by one participant captures the adaptive and action-oriented approach to collective action on wild dog management of the groups considered in this study.

According to statements from interviewees, groups considered in this study may be dealing with medium to severe impacts of wild dogs on local sheep farmers and communities. In some cases, it appears that group efforts to control wild dogs have reduced dog numbers, while in others despite control efforts, problems continue to worsen with around half of the group representatives reporting that the financial and social impacts of wild dog attacks had increased since 2010 (the timeframe of interest in this study). This is in keeping with the findings from the 2010 national survey of landholders in wild dog-affected areas (Wicks et al. 2014), where 45 per cent of respondents reported that the wild dog problem was becoming more severe. In many cases losses to wild dogs have not lessened as a result of group activities because they already were on an upward trend, however, it was considered there would have been significantly more losses without group activity.

In general the groups appear to focus on getting things done based on high levels of local knowledge, local leadership (with some exceptions) and a commitment to a shared purpose of supporting farming, particularly sheep farming, in the local area. When group members come together it is generally to plan or undertake a wild dog management action, such as baiting, or learn skills to support this. Based on comments from interviewees, they appear to do relatively little long term strategising or detailed examination of outcomes, with this tending to occur at regional and higher scales. This lack of time for strategising was also demonstrated in the lack of mention of national and state strategies relevant to wild dog management, except where participants were also directly involved at a state, regional or national scale. Based on comments from interviewees, group members experience similar feelings of urgency to act as has been reported elsewhere by individuals dealing with wild dog attacks (Wicks et al. 2014) and this urgency may somewhat explain the action orientated rather than strategic characteristic of these groups.

Most of the groups appear to have limited opportunity for collective problem-solving as they tend to meet irregularly or not at all, with many gatherings arranged around baiting days or training. Also, much of the work of coordinating tends to be done by one or two people in the group or sometimes by an external agency employed coordinator.

Factors contributing to the success of groups included strong and committed leadership, consensus on objectives among group members, regular communication between leaders and group members, strong networks and a range of external supports, including funding, external coordinators, mentor groups and research.

Group typologies

Using the typology for participation in NRM developed by Ross et al. (2002), these groups would be described as similar to either community based management or community collective action groups. The Australian based typology considers differences in agency (which parties carry the initiative), tenure (the nature of the parties' control over the resources), nature of the participants, nature of the task, and task duration. This typology is shown in Appendix A.

In community based management, only members of the community collective are involved and close bonds between members and kinship ties help this form of management to work (Ross et al. 2002). This describes some of the groups represented in this study such as those homogenous groups with only one or two stakeholder types represented (for example sheep farmers and one other stakeholder type). Ross et al. (2002) conclude that a typical problem with this type of participation is that lack of member participation can jeopardise management. This concurs with findings of this study that lack of participation, because of difficulty in recruiting new members, was one of the greatest challenges for success.

More of the groups would be described in the Ross et al. (2002) typology under community collective action. This has wider scope of involvement and participation than the previous typology. This type of participation provides opportunities for landscape-scale approaches, crossing land tenures, land uses and government agency responsibilities. Ross et al. note that this type of participation also provides opportunities for social learning. However, as found in the groups considered in this study, members may not be interested in performing tasks other than on-ground activities. Issues faced in these kinds of groups include issues relating to voluntary labour such as burnout (see Maslach et al. 1996), dependence on government resources, and the need for government agencies to be supporting and enabling.

Ross et al. (2002) distinguish between these two typologies with greater government involvement in the community collective action than the community based management typology. Both these typologies have a local knowledge focus and rely on community capacity. Recognising the nature of these groups through such a typology can help focus support on the challenges faced by these groups.

Another typology useful in understanding the needs of these groups can be related to the level of severity of the impact of wild dogs. While all groups identified their goals for positive outcomes for industry such as reducing damage and minimising stock losses from wild dogs, there are three different categories that are useful in distinguishing these groups, adopting terms that were used by interviewees: frontline, status quo/maintenance and protection.

Frontline

In these cases the problem is overwhelming, sheep are no longer a viable option (or never have been) because of predation by dogs and the effort revolves around stopping the problem from expanding into other areas.

Status quo/ maintenance

This category includes groups which have seen a dramatic reduction in wild dog attacks and sightings and want to maintain the status quo and groups that have never had a very serious wild dog problem to start with. This includes groups for which the goal is to maintain sheep numbers or to bring sheep back into the country.

Protection

In these cases the wild dog problem is relatively mild and the sheep industry is well established in the area. Wild dog management in these areas focuses on responding to occasional dog sightings and attempting to eliminate these dogs. Groups often work in conjunction with other surrounding areas to stop the dog problem from advancing to their area.

These categories are important for understanding the type of support that different risk status groups require, and ultimately for regional and national coordination in managing the spread of wild dogs.

Implications of conflicts for wild dog management groups

Four conflicts pertinent to collective wild dog management identified in the literature review undertaken for this study were: wildlife conservation objectives versus agricultural production objectives; animal welfare concerns versus the need for effective control; local versus government-controlled management; and scientific versus local knowledge (Thompson et al. 2013).

Wildlife conservation objectives versus agricultural production objectives

The wildlife conservation versus agricultural production challenge often represents differing opinions between farmers and the wider community. Therefore, there is a case for looking at how wild dog management groups interact with the community beyond those who are immediately affected by wild dogs. These groups appear to have limited engagement with the wider public, with many participants seeing wider engagement as outside the group's scope. Based on the Wicks et al. (2014) finding about the levels of interest and potential support for controlling wild dogs in the urban community, there is potential to improve this engagement. As Shuffstall et al. (2014) note, increasing awareness among community residents of the social, environmental and economic impacts of pest incursions can help to motivate action and support. Keough & Blahna (2006) also list inclusive public involvement as a key principle in achieving integrative, collaborative ecosystem management. Building relationships with other stakeholders beyond those immediately affected by wild dogs was not a focus for groups in this study. However, it is at this level where engagement with the wider public can be most useful. This is supported by some participants' comments on a need for more research and education of people in the wider community, to make people more aware of the problem. In addition, wider stakeholder engagement can be helpful in encouraging different ideas and different ways of framing the issues.

Animal welfare concerns versus the need for effective control

Although this was not a focus of this study, animal welfare was raised by participants in three key areas. Firstly, animal welfare was raised in regards to damage to stock from wild dog attacks. Maimed stock was frequently mentioned in regard to responsibilities graziers have to manage animal welfare impacts. Participants told of the frustration and distress about not being able to protect stock from the harm of wild dog attacks. Secondly, animal welfare concerns were raised regarding impacts of baits on working dogs and pets. Finally, there was mention of the need for humane destruction of wild dogs, particularly in reference to the debate around this being done by professionals versus landholders who may or may not have had adequate training. Jones (2014) notes that implementation of humane vertebrate pest control methods according to RSPCA specifications in Australia is slow, with outdated methods being used despite recommendations. This study did not explore the details of trapping and baiting procedures, and makes no comment on the procedure used by groups in this study, but it is evident from participant comments that the welfare of stock is the primary concern in regards to animal welfare concerns.

Local management versus government-controlled management

Local management versus government control of wild dog management groups was a theme of interest considered in this study. While more than a third of the groups had been initiated with the help of external support (government and non government agencies), the majority were community governed. Half of the groups included government officers as direct members on the group and their contribution was highly regarded in most cases. The issue, as the findings show, is not so much whether the group is defined by a local management versus government control philosophy but the degree to which the groups were inclusive of a range of stakeholders. While government is an important stakeholder in terms of access to policy and resources, it is likely that the more important tension is between local and any other stakeholders, rather than just between local and government members of wild dog management groups.

Scientific versus local knowledge

In regard to the tension between local and scientific knowledge reported in literature, groups in this study, whilst being strongly local knowledge focused, capably sought out scientific input as needed. Participants also recognised a need for more scientific research, or current levels to at least be maintained to help ensure that wild dog management decisions are as effective and efficient as possible.

Scientific input to group decisions came from government representatives, through direct access to research, such as via guest speakers and participatory research (where stakeholders in the problem at hand have a role). Also, participants believed there was strong concurrence between local and scientific knowledge. Some participants described the interaction between scientific and local knowledge where both types of knowledge are combined to inform decisions. This concept is supported by Flora & Flora (2005) who consider 'social capital' (the connections between people and organisations) in relation to invasive animal management and note that inclusion of scientific knowledge is, 'often done best through a constant and well-connected rural presence ... giving local people a way to reciprocate in a way that maintains their dignity and meaning'. They also comment that:

> ... biosecurity is not achieved by science and technology alone. The increasing vulnerability of local landscapes to invasive species requires on-going mobilization of all community capitals in order to have the agility of constant response. … when all the capitals are invested in ... scientist-community partnerships can increase biosecurity for a healthy ecosystem, a vital economy and social well-being (Flora & Flora 2005).

That is, the scientific–local knowledge junction (as opposed to tension) can be facilitated by interactions between local community and scientists in forums that respect and validate both knowledge types. In general this is the sentiment expressed by participants in this study.

Opportunities for enhancing group effectiveness

Overall, participants considered that groups were operating effectively, with some exceptions. Responding to the question 'what would make things better for the group?', participants predictably addressed factors they identified as barriers and sources of conflict within the group (discussed in Group effectiveness). In addition to improvements proposed by participants earlier in this report, some considerations for supporting groups in the future are given here.

Among the groups considered here there was little evaluation of group processes or decision-making practices reported. Keough & Blahna (2006) stress the need for stakeholders to be involved in ongoing monitoring programmes to ensure their interests are being protected and efforts continue to be focused on agreed goals. A method called 'transformative learning' has

been suggested for pest management groups where they assess how problems and solutions are related, question assumptions and consider the influences of the governance system (Pahl-Wost 2009 as cited in Dickson 2014). However, this sort of learning may not be practical for the groups examined, as it requires greater interaction opportunities than they generally have available. More interactions and time are unlikely solutions as it was clear that burnout was already an issue among group leaders. Hence, support is needed to implement strategic planning approaches that suit these informal and infrequently meeting groups.

Lack of resourcing was the main barrier identified by participants. In terms of external support, many participants identified a need for additional funding, as well as funding that better targets the needs of groups and longer term/more secure funding arrangements. They indicated that easier access to funding and more security for future funding would enable them not only to plan the long-term future but enable the group to better focus on their wild dog control activities and honing landholders' skills in dog control, rather than spending valuable time seeking funds. They noted that funding agencies need to better understand what these kinds of groups want and need.

Many groups indicated that they needed external support not only to be maintained, but increased, mentioning the need for easier bait supply and better availability of trappers. Results also indicated a need for other forms of support. Suggestions included support for: implementation of blanket baiting, better mapping, improved data collection, better monitoring of baiting and help with analysing group effectiveness. The need for greater regional and national coordination was also mentioned.

Ford-Thompson et al. (2012) conclude that government provision of resources is an important aspect of success for invasive species programmes. Most of the groups involved in this study apparently did not have secure arrangements in place for ongoing funding, although some were seeking this and others were confident that it would arrive. Ford-Thompson et al. also note that government-initiated and government-managed programmes may have greater success than citizen-initiated ones, for the reason that it is often easier for the former to access funds. Based on this, the 50 per cent of groups in the current study that included government staff, or representatives from other potential funders, may do better in terms of resourcing. Groups in this study that do not already have in place ongoing arrangements have highlighted that their operations would benefit from increased security of resourcing.

A number of respondents reported on changes in governance over time as state departments have withdrawn resources from this area. The transition to greater community/industry management has not always been effective, they said, and has created gaps in wild dog management. Such transitions could be assisted by a 'ghosting' period where government stays directly involved as a safety net in a monitoring role, while supporting the community to take leadership of the situation.

As in this study, Ford-Thompson et al. (2012) found that using community coordinators helped motivate stakeholders to continue their participation in programmes. Coordinators appeared to be an important element in the success of groups and, given that community based or community collective types of participation are likely to have ongoing needs for external support (Ross et al. 2002), coordinators have an important ongoing role in the context of wild dog collection action. Long term resourcing of this support is also an important consideration in supporting effective wild dog management groups.

Both in terms of the stakeholders represented and the knowledge types represented, there is scope for increasing the heterogeneity of these groups. Half of the groups had homogeneous

stakeholder representation (that is, three or less different stakeholders represented) and while all four knowledge types were represented on most of the groups, decisions were influenced by local knowledge in two thirds of the groups. Ford-Thompson et al. (2012) found that groups that were more heterogeneous in composition (had a wider variety of stakeholders), reported higher levels of cooperation than more homogenous groups, consistent with social inclusion principles (Reed 2008), despite possibly higher levels of conflict among participants initially. This may present challenges for the wild dog management groups that had three or fewer stakeholders directly participating.

Improving management structures is also noted by Ford-Thompson et al. (2012) as important in maintaining groups over time. Around two thirds of participants in this study found their current group structures satisfactory. However, the remaining groups could benefit from ideas about developing more appropriate management structures and support to establish these in a way that suits the nature of these groups. As noted by participants, having successful group structures available to emulate is one way of improving structures. Facilitation support to identify the most appropriate structure for groups who are dissatisfied with current structures could also be made available.

There were a range of communication, monitoring and planning tools and techniques that groups have developed that could be usefully shared among groups. Generally, simple methods that quickly relay information to landholders were considered the most useful.

Further research

Research directions include the need to understand participation in groups from the landholder perspective, including investigating the effect of participation in wild dog management groups on farm businesses, individual members and their families. This would include estimating the extent and nature of participation among different landholders as well as the costs of participation and investigating ideas for improving participation. A national survey of landholders in wild dog affected areas was undertaken by ABARES in late 2014 as the next stage of this AWI funded project, including questions on group participation as well as questions aimed at understanding the current status of the extent of wild dog impacts across the country.

Appendix A: Types of participation in natural resource management

This table shows different models of participation in natural resource management (NRM) adapted from Ross et al. (2002).

Table A1 Types of participation in natural resource management

Participation type	Characteristics	Examples
Individual management	Private ownership, freehold or leasehold tenure, land usually managed to meet owner's economic needs	Privately owned agricultural and pastoral properties
Community-based management	Resource (for example land) is managed collectively largely without government or industry financial support Often important to participants' identities Management may be for commercial or non-commercial purposes, including subsistence	Land held under community title Indigenous-owned traditional lands Community-based nature conservation areas
Community collective activity	Voluntary, few or loose requirements for membership May have some government financial or in-kind support Often focused on particular activities and on-ground works May work across land tenures Tend to be ongoing	Voluntary stewardship groups, for example Landcare Community environmental monitoring groups Some local environment and conservation groups
Organised interest groups	Formed on basis of specific set of interests, whether economic or non-economic May or may not have specific geographical focus Often have representation on peak bodies	Peak conservation/environment bodies Naturalists' groups Ornithological associations Farmers' federations
Composite stakeholder bodies	Mixed membership and management structures, involving government, industry and community members, purpose-designed to involve range of stakeholder interests Geographical and planning focus Resources in question not under direct control of any one of the parties	Regional NRM and catchment management bodies
Shared management	Formal, mutually-agreed management partnerships for specific land or resources where parties have clearly-defined rights over the resource Clearly identified partners Parties notionally equal in status Tends to involve senior level representatives of the partners Often long duration	Joint or co-management of protected areas

Participation type	Characteristics	Examples
Stakeholder-based planning or negotiation	Formally identified stakeholders plan or negotiate on a defined area or resource Notional stakeholder equality Usually finite timeframe	Collaborative planning processes for example Regional Forest Agreements, Australian Government Ecologically Sustainable Development process
Consultation	Public directly consulted, usually by government, in relation to a specific issue or process for which government has decision-making responsibility Two-way communication Usually short timeline	Public participation in environment assessments Development of government policy or programmes Public input into formal plans
Information	Public informed about proposal or decision, but not directly consulted	One-way communication
Agency/corporation management	No attempt to involve public directly - government or business makes decision internally on matters for which it has responsibility	Corporation boards and directors Government agency decision-making structures

Source: Ross et al. 2002

Appendix B: Interview schedule and questions

We are looking to understand what is working effectively in wild dog management groups and what can be improved. The results of the interviews will aim to identify processes which are appropriate to different situations and for different groups. We are aiming to develop ways to support wild dog management groups improve their effectiveness. Please be assured that anything you say is confidential and you or your group will not be individually identified in any report or publications.

Do you give your consent to this interview?

Are you happy for the approximate location of your group (to the nearest town) to be identified on a map to show the distribution of groups in this project?

Section 1: Background

a) What is your role within the wild dog management group, and what are your responsibilities?

b) When did the wild dog management group form?

c) How did the group originate?

(Prompt - from concerns raised by the community, or through issues identified by relevant authorities? Or some other way?)

d) When did you join the wild dog group?

e) How did you get involved in the group?

(Prompt: For example, were you involved in the project set up, or was it passed on to you?)

a) What area does your group cover?

b) How many members does your group have?

c) How many did you have in 2010?

e) Why do you think the group numbers have changed?

(Only ask if there has been a change)

What land uses occur in the management group's area and approximately what percentage do the different land uses cover?

Prompts –

(only ask those applicable based on geography)

1. Conservation and 'Natural Environments'

Includes nature conservation areas (such as Nature Reserves and Parks and protected landscapes.

2. Production from relatively natural environments

Includes grazing unimproved or native pastures, production forestry

3. Production from Dryland Agriculture and Plantations

Includes plantation forestry, grazing improved pastures pastures, cropping, perennial and seasonal horticulture and land in transition

4. Production from Irrigated Agriculture and Plantations

Includes plantation forestry, grazing irrigated pastures, cropping, irrigated perennial and seasonal horticulture and irrigated land in transition

5. Intensive Uses

Includes land for intensive horticulture (such as glass houses), intensive animal production, Industrial, Residential, Services, Utilities, Transport, Mining and Waste Treatment/Disposal

Do your members run sheep or cattle or both?

a) What wild dog management methods does your group use?

	Tick=yes	Rank
Trapping	☐	☐
Shooting	☐	☐
Ground Baiting	☐	☐
Arial Bating	☐	☐
Fencing	☐	☐
Guardian Animals	☐	☐
Other	☐	☐

b) Please rank them from most to least used

Section 2: Vision and objectives

a) What does your group hope to achieve in wild dog management in the future?

b) What motivates your group?

(Prompt- what inspires or energises your group?)

Section 3: Current situation – group structure

a) On a scale from 1-5 (1 being not a problem at all and 5 being a very significant problem) how would you measure wild dog problems your area in terms of:

Social impacts (e.g. loss of people from the area, personal family stress, conflicts in the community) ☐

Financial impacts (e.g. loss of agricultural production, diversion of labour or labour costs from production to dogs) ☐

Environmental impacts (including biodiversity loss and environmental degradation) ☐

b) (If ranked above 1) How has each kind of impact changed since 2010? Please answer for:

Social?

Financial?

Environmental?

	Social	Financial	Enviro
Increased	☐	☐	☐
Decreased	☐	☐	☐
Stayed the same	☐	☐	☐
I don't know	☐	☐	☐

a) Has there been a change in cattle and or sheep losses since the group started or since you joined the group?

b) What kind of change have you seen?

a) Has there been a change in management costs since the group started or since you joined the group?

b) What has been the change?

What have you learnt from the changes about

a) Stock losses

b) Management costs?

Prompt – different management methods, changed the way the group works

What are the barriers to using different and new wild dog management methods?

Please rank these from 1 to 3 in order of importance, with 1 being most important in your groups' objectives and activities.	Rank
Addressing environmental impacts (including biodiversity loss and environmental degradation)	☐
Addressing financial impacts (loss of agricultural production, diversion of labour or labour costs from production to dogs)	☐
Addressing social impacts– i.e. the impact of wild dogs on the welfare of the people living in the area (e.g. loss of population from the area, personal stress, risk to health and stress)	☐

a) Has the group received any kind of external support since 2010?	Yes	No	I don't know
	☐	☐	☐

b) What type of support has it received?

(Prompt – funding, training, in kind, coordinator)

c) Where has this support come from?

d) What type of external support has achieved the best results for your group?

a) How much do members pay in fee each year, if any?

b) Has this changed since 2010?

What formal or agreed plans does your group have?

(Prompt – management plan, maps, monitoring plan or plans developed on an as needs basis)

What is the group structure in terms of coordination and leadership?

(Prompts – leadership, decisions, authority?)

Section 4: Drivers and Methods

a) Why do you think people become involved in your wild dog management group?

(Prompts:

To try to tackle the problem collectively as a community

To increase public support

To gather information

To help decision-making

Because of a feeling of obligation

What do you think is the most important reason?)

b) How do people become members of your group?

(Prompt- how do people generally find out about your group and make contact?)

This question is about how members participate in your group. Please answer yes or no for each type of participation method your group uses.

I can give a brief definition if needed:	Yes	No
Wild dog surveying/reporting:		
Participants gather information on wild dog attacks or sightings	☐	☐
Activities preventing wild dog attacks:		
For example, setting up fencing to deter wild dogs, dog drives,	☐	☐
Organising group meetings:		
Formal or informal meetings of the group in which participants are informed and decide on policies or plans to manage wild dogs.	☐	☐
Organising public meetings:		
Meetings are open to the public providing the opportunity for people to ask questions and receive responses over wild dog management	☐	☐
Consultation documents:		
Official documents made available to the public and the group that detail a particular policy or plan to manage wild dogs	☐	☐
Monitor and evaluate your group's efforts: Monitor the impacts of wild dogs and gather feedback from group members	☐	☐
Gather feedback from the public on their interactions with and perceptions of your wild dog group	☐	☐
This can be in the form of workshops, focus groups or attitude surveys/option polls	☐	☐
Participate in field days or forums:		
Activities which bring together people who are affected by wild dogs or wild dog management issues, usually on a regular basis	☐	☐
Other(s)		

Please describe

What works well in supporting internal and external collaboration in your group?

What arrangements are in place for maintaining the group and any of its projects beyond the next 3 years?

How often does the group meet or organise activities?

Who benefits most from the group's activities?

Section 5: Representation

a) From the following list, which types of stakeholder groups or individuals are members of your wild dog management group?

- Sheep farmers ☐
- Cattle farmers ☐
- Government agency staff ☐
- Conservation representatives ☐
- Mining ☐
- Other non-agricultural industries ☐
- Other ☐

* A member is some who is involved in the wild dog group through participating in meetings and activities and may pay a membership fees (if applicable)

b) What non-members are involved indirectly with the group?

(Prompt –partners, alliances, funders, government)

c) Are group members' roles voluntary or paid?

a) Do you think the group membership structure could be improved?

Yes	No
☐	☐

b) What would be the best membership structure for the group?

Are there areas of disagreement in your group? If so what are they?

(Prompts- Land use issues

Wild dog control methods

Interaction about responsibilities or who should be involved

Funding

Group procedural issues/governance)

a) To what extent are the following kinds of knowledge or expertise represented in your group?	Not at all	Some	A great deal
Local knowledge	☐	☐	☐
Scientific knowledge	☐	☐	☐
Knowledge about government and government processes and policies	☐	☐	☐
People who are good at putting the whole picture together	☐	☐	☐

b) Which kinds of knowledge and expertise have the most influence in your group?

a) How do you rate your group's effectiveness?

High ☐

Medium ☐

Low ☐

b) What is this rating based on?

Section 7: Improvement

What would make things better for your group

(Prompt – external and internal)

Section 7: Close

Any other comments?

Individual Section

Would you mind if we asked about your individual farming operation? As part of AWI's monitoring of wild dog activities they are interested in getting the perspectives of a small sample of land managers. Please be assured that anything you say is confidential and you or your group will not be individually identified in any report or publications.

Over the last 3 years what is the typical number of sheep and/or cattle numbers on your property?	a) Sheep b) Cattle
What were the typical stock losses from wild dogs before you joined the group?	a) Sheep b) Cattle
What were the typical stock losses from wild dogs after you joined the group?	a) Sheep b) Cattle

Would you be able to comment on the costs of your management methods both before and after you joined the group?

What wild dog control measures do you, as a sole individual, use on your own property and what is the annual cost of each? (in table)

Participant estimate of wild dog management group costs

Measure	**Current cost to you per year in $**	
	Costs before you joined a group	Costs after you joined a group
Trapping		
Shooting		
Ground baiting		
Aerial baiting		
Fencing		
Guardian animals		
Other: Please specify		

Appendix C: Interviewee profiles

Thirty interviews, involving 31 people (two people participated in one interview), were completed between 21 November 2013 and 2 April 2014. Individual interviews lasted between one hour and two hours fifty minutes. All were conducted by telephone.

The breakdown of interviewees by jurisdiction was: New South Wales = 8 (27 per cent); Queensland = 8 (27 per cent); South Australia = 3 (10 per cent); Victoria = 5 (17 per cent); Western Australia = 6 (20 per cent). No-one was interviewed from the Australian Capital Territory or Tasmania (wild dogs are not considered to be present in Tasmania). Twenty-nine of the interviewees were livestock producers and the remaining two were a government employee and an NGO employee. Of the interviewees, 27 (87 per cent) were male and 4 (13 per cent) female.

All but two of the interviewees were sheep farmers. The number of sheep typically held on interviewees' properties ranged from zero to 33 000, with an average of 6 353 (25 properties).The typical number of cattle interviewees' reported holding on their properties ranged from zero to 9 500, with an average of 1 124 (24 properties).

Interviewees' experience with groups

In terms of interviewees' length of experience with their current group, specific year ranges were from less than a year to more than 18 years. Ten interviewees indicated that they were an initial or founding member of their group, or that they had been involved from the start, beginning or inception of the group.

Roles and responsibilities within groups

Multiple responses were possible to this question, that is, interviewees could hold several concurrent roles. Fourteen interviewees indicated that they were the chair, coordinator, president or leader of their group. Five said that they were a member, landholder or livestock producer. Three indicated that they were the secretary or secretary/treasurer of the group. Six said that they had 'another' role in the group, such as coordinating baiting, speaking for the group, fund-raising, mediating differences in the group, or as a committee member for the group. Four interviewees indicated that there were no formal roles within their particular group. However, eleven interviewees described a formal role they had in another related group, for example as a member of a Landcare group, with local government, or with a wild dog advisory group.

In terms of whether interviewees' group roles were paid or voluntary, all but two interviewees' roles were voluntary. These two interviewees participated in the group as part of their roles with state government agencies.

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