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Implementing a novel process for solving contentious conservation problems: The genetic status of K'gari wongari (Fraser Island Dingoes) as a case study

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Summary Many conservation problems remain intractable because of conflicting views between policymakers, managers, researchers, conservationists and community stakeholders. Novel approaches to resolving these conflicts are required to achieve conservation outcomes that are more broadly acceptable. The conservation and management of K'gari wongari (Fraser Island's Dingoes) is emblematic of such a situation. Here we describe the successful implementation of a novel approach to advancing one such formerly intractable issue – assessing the genetic health and status of the island's Dingoes to resolve latent conflicts and assist protected area managers with their conservation activities. We developed a participatory, independent approach centred on community workshops to identify research priorities, expert workshops to identify appropriate research methods, then the commissioning of independent scientific research to address community priorities in accordance with the experts' suggested methods. The overall aim of the project was to provide managers with robust and policy-ready information on the genetic health and status of the Dingoes – information that also met community expectations and was widely supported by subject matter experts. The participatory approach of the project achieved this aim and was completed successfully and satisfactorily for all involved despite the occurrence of some expected challenges and necessary compromises. Here we describe the background to the problem, how the project was designed, the key challenges the project faced during implementation, and the key learnings from the exercise, thereby highlighting its innovative features as a participatory conflict resolution process. This process could be applied to advance other conservation problems hampered by conflicting stakeholder views.

Key words: *adaptive management, conflict resolution, Dingo, genetic rescue, human–wildlife conflict, island conservation.*

Introduction

Biodiversity conservation problems and human–wildlife conflicts occur worldwide (Nyhus 2016; Baynham-Herd *et al.* 2018), and addressing them is fraught with challenges. A wide range of conflicting opinions surround many conservation conflicts, as well as the responsibility and approaches needed to resolve them (Cooney 2004; Game *et al.* 2013; Johnson *et al.* 2019). Such conflict can often stall progress, where problems remain unresolved and may even get worse while the conflict continues (White & Ward 2010). Finding novel ways to 'break the gridlock' remains an important priority for those working to successfully resolve human–wildlife conflicts (e.g. Armitage *et al.* 2011).

The conservation and management of wongari (hereafter, Dingoes, *Canis familiaris*) on K'gari (formerly known as Fraser Island) is one such example of a highly contentious human–wildlife conflict. There are approximately 150 Dingoes on the island at any given time, some of which pose substantial safety risks to people, and the few that are deemed to be an unacceptable risk to human safety are occasionally euthanized (Allen *et al.* 2012; Behrendorff *et al.* 2023). The Dingoes have cultural and conservation significance and are highly valued, so their careful management is required to sustainably preserve the Dingo population while simultaneously mitigating human safety risks. Such careful management is occurring (Tapply 2018; Behrendorff 2021), but in general terms, there remains strong opposition by some sectors of the public to almost every Dingo management action undertaken, and a high level of distrust exists among people and agencies interested in the island's Dingoes. This opposition has been often expressed as ecological arguments about Dingo movements, diet and food availability, population size, reproductive biology, health status, welfare, and genetic health (e.g. Alexander 2009; Hoffman 2010; Parkhurst 2010; Lennox 2017; O'Neill *et al.* 2017; Bryant & Kilpatrick 2018). Common claims include:

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Implications for Managers

- The conservation management of K'gari dingoes is emblematic of a variety of other complex and controversial wildlife management problems.
- Implementation of novel participatory processes can overcome stakeholder conflicts and stalemates inhibiting research progress.
- Delegating independent decision-making power to community and expert stakeholders can deliver shared benefits to management agencies.
- Our approach creates a new option for participatory resolution of science questions, and for improving the science and public trust in it.

- Dingo numbers are small and declining.
- Dingoes have restricted movements.
- Dingoes have limited food availability.
- Dingoes are starving and malnourished.
- Management actions (e.g. exclusion fencing, humane destructions, ear tagging, collaring, hazing, aversive conditioning) have negative effects on Dingoes.
- There are very few packs or breeding pairs on the island.
- Dingoes are suffering from the genetic consequences of inbreeding.
- Mainland Dingoes need to be released on to the island to genetically rescue the population.

Subsequent to the release of a comprehensive review into the management of the island's Dingoes in 2012 (Allen *et al*. 2012), there has been an increased effort to systematically address many of these concerns through independent scientific evaluation and open-access publication of key datasets collected and maintained by the Queensland Parks and Wildlife Service (QPWS), which is largely responsible for managing Dingoes on the island in collaboration with the Traditional Owners, or Butchulla community. Data on Dingo numbers (Appleby & Jones 2011; Game *et al*. 2013; Allen *et al*. 2015), movements (Baxter & Davies 2018), diet and health (Behrendorff *et al*. 2016), food availability (Déaux *et al*. 2017; Behrendorff *et al*. 2018), feeding behaviour (Behrendorff 2018a,b), longevity (Behrendorff & Allen 2016), the frequency and cause of serious incidents (such biting or attacking children; Allen *et al*. 2012; Appleby 2015; Appleby *et al*. 2018), and the effects of humane destructions on Dingo populations (Allen *et al*. 2015) are now all publicly available and have largely quelled community concerns about most of the aforementioned issues. Instead, concern has increasingly shifted towards the genetic health and status of the Dingoes on the island.

Research to address these concerns has already been undertaken (e.g. Baker 2004; Stephens 2011; Conroy *et al*. 2017, 2021; Cairns *et al*. 2018), but the availability of these studies has not resolved the latent conflicts, community or scientific uncertainty, or provided managers with actionable information. Restrictive methods and resulting unreliable interpretations were partly to blame for this uncertainty given that some based their conclusions on a small number ($N = 4$) of Dingo tissue samples (Cairns *et al*. 2018), others addressed a narrow scope of questions of relatively little interest to local stakeholders (Stephens 2011), and others used dated analytical techniques based on microsatellites (Baker 2004; Conroy *et al*. 2021) which cannot match the inferential power of more contemporary techniques based on single nucleotide polymorphisms (SNPs). There was also concern by some stakeholders about the reliability of the interpretations and recommendations in some of these studies given that some were largely funded and undertaken by people with strong and polarised views about Dingo management. Hundreds of Dingo tissue samples were being held by QPWS during this period and new analytical methods had the capacity to reliably answer many questions of interest to local stakeholders. But although several offers to analyse all these samples had been extended to QPWS (L. Behrendorff, personal communication), no one had yet proposed a collaborative project that would have simultaneously satisfied management, scientific and community interests. Progress towards open-access publication of this dataset had stagnated, and overcoming this impasse required a novel approach to solving this contentious problem in a collaborative way.

Here we describe the process and successful outcome of a recent effort intended to progress this issue. Success, here, is defined as 'breaking the gridlock' or advancing scientific knowledge in a way satisfactory to protected area managers, community stakeholders and genetic experts. We do not discuss scientific outcomes or the genetic health and status of Dingoes (which is described elsewhere; Miller & Bishop 2023; Miller *et al*. 2024), but rather outline the project or process we followed and the learnings and challenges we experienced while implementing the project. Our overall goal is to describe an example of a novel participatory conflict resolution process that was successful in this case, and which might be useful for others working to advance conservation problems involving science questions, in the presence of stakeholder conflict. We conclude by sharing some key learnings and recommendations for others who may wish to implement a similar process.

The Project

Overall project design and approach

The overall aim of the project was to provide QPWS with robust and policy-ready information on the genetic health and status of the island's Dingoes, and to do so in an inclusive participatory way that would help to defuse latent conflicts over the science and management of Dingoes.

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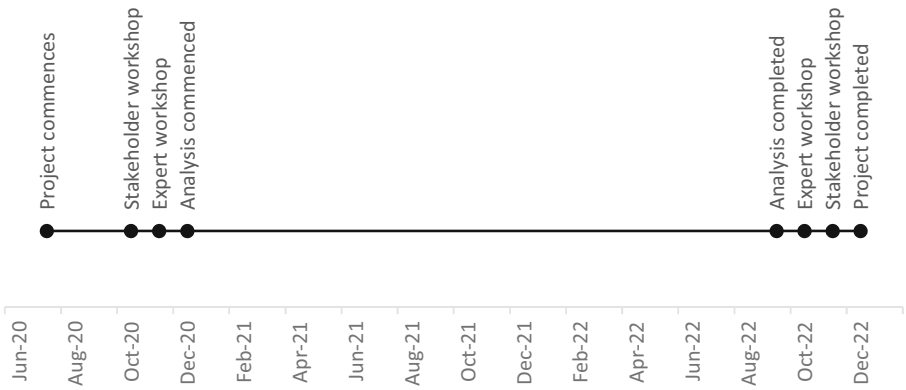

Figure 1. Timeline of key events in the K'gari Dingo genetic research project. The period for analysis was prolonged by COVID19-related issues in this case.

Table 1. Roles and responsibilities of key stakeholders involved in the K'gari Dingo genetic research project

Participant	Roles and responsibilities	Power status
Key stakeholders		
Protected area manager (QPWS)	Responsible for commissioning the research project, and for implementing the outcomes of the research	Delegated its normal powers entirely to the participatory process
Community stakeholders	Responsible for establishing research priorities related to the genetic health and status of Dingoes, or articulating research questions that would later be explored by independent researchers	Empowered
Genetics experts	Responsible for determining agreed, robust, and acceptable research methods for exploring or answering the research questions developed by the community stakeholders	Consulted
Process support roles		
Independent researchers	Responsible for undertaking research into the genetic health and status of the Dingoes using the methods developed by the genetic experts, and for providing the interpreted results to the project manager	
Independent project manager	Responsible for project administration, coordinating the activities of the other participants, maintaining the independence of the process, and delivering a completed project to QPWS	
Workshop facilitator	Responsible for facilitating group discussion at stakeholder workshops and expert workshops, for keeping and distributing meeting minutes, and for designing the agenda for each workshop	
Workshop observers	Responsible for observing stakeholder and expert group dynamics and providing advice to the project manager and facilitator on enhancing group discussion during and between sessions. Observers also contributed to group discussions on occasion	

For additional information on power status (see IAP2 2018).

Normally, a genetic research project might be established by a single researcher (or small research group) with subject matter expertise, successfully attracting funding to undertake all the design, analysis and communication work in-house. This might have been done in this case too, and several such attempts had been made (L. Behrendorff, QPWS, personal communication), but the complex and contested nature of the problem and the existing science required development of an alternative approach in this case. Our approach sought to deliver the various components of the research process independently by separating the different roles and responsibilities of stakeholders in the decisions about, and delivery ofthe research (Fig. 1), so that potential vested interests were averted. Stakeholder roles in this project included protected area managers, Traditional Owners, community members representing local government and non-government organisations (NGOs), Dingo and dog genetics experts, and a variety of process support roles including independent researchers, a workshop facilitator, observers, and a non-geneticist as project manager, discussed in more detail subsequently (Table 1).

Our approach can be classified within the wider set of participatory approaches

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to conflict management, which are documented under the concepts of conflict resolution, mediation and negotiation, consensus building, and problem-solving workshops, among others (Sidaway 2013). Although a lack of scientific evidence is known to exacerbate conflicts and fuel stakeholder concern about management strategies (e.g. Koehn 2004; Saunders *et al*. 2010; Driscoll *et al*. 2019; Scasta *et al*. 2020; Herbert *et al*. 2021), relatively few studies focus on identifying where additional scientific research can help to resolve conflicts over alternate management actions (Rehr *et al*. 2014). For example, Burger *et al*. (2005) refer specifically to collaborative creation of a 'science plan' to address radioactive land remediation issues in Alaska. Within a decision pathway for helping government agencies to manage wildlife conservation conflicts, however, Young *et al*. (2016) include deciding whether there is joint understanding of the conflict and evidence base, and if not, discussing and clarifying the evidence base as perceived by all relevant stakeholders. Thus, where other studies use clarification of the science as an input to participatory problem-solving, our study instead uses a participatory process to actually design the scientific studies required, given the extent of disagreement about the science hindering conservation effort.

Stakeholder workshops to explore underlying issues in conflicts are common in the wildlife management discipline (e.g. Moon *et al*. 2019; van Velden *et al*. 2020), and we used them here too (Fig. 1). Each workshop (described below) was facilitated by the experienced independent facilitator who possessed a sound understanding of Dingo ecology and management, but had no stake in how Dingoes are managed on K'gari. Each workshop was also observed by 2–5 others (i.e. protected area managers and interstate Dingo experts) tasked with providing advice to the project manager and facilitator on enhancing group discussion where required (Table 1). The project manager was also present as an observer. Only the project manager and independent researchers (i.e. those delivering the research) were paid for their time. The facilitator, observers, and all community stakeholders and experts volunteered their time to participate. The travel costs of some experts were funded to ensure there were no barriers to obtaining expert participation at the workshops.

Community stakeholder workshops

A relatively small, one-day workshop was first convened to identify which 'genetics issues' were most important to community stakeholders and garner a prioritised list of research questions (Fig. 1). After consultation with the protected area manager to obtain a list of all local community stakeholder groups, the project manager invited eight identified stakeholder groups to participate in the workshops. These included Traditional Owners (i.e. the Butchulla Aboriginal Corporation (BAC) and the Butchulla Native Title Aboriginal Corporation (BNTAC)) and a variety of non-government organisations (NGOs) (Table 1). A maximum of two representatives from each stakeholder group were permitted to attend to avoid any one stakeholder group dominating the discussion. Expert geneticists and protected area managers were not invited to participate at this stage of the process, but they were invited to participate later (see below).

Eleven representatives from seven community stakeholder groups attended the first workshop, in addition to the facilitator, observers, and the research project leader (for more details, see Appendix S1). After a brief welcome and introductions, the research project leader provided an overview of the research project and its scope, and a description of the research process, the role of workshop participants, and the objectives of the stakeholder workshop (see Appendix S1 for more detail). Over four sessions separated by breaks, workshop participants were asked to discuss: (i) 'What about Dingoes is important to you?', (ii) 'What about Dingo genetics is important to you?', and (iii) 'What specific research questions and sub-questions would you like to know the answers to?'. The facilitator placed no limitations on the participants when they were asked to identify their 'wish list' of topics they would like to know about Dingoes on the island, except that they had to be genetics-based issues or questions that could be explored with genetic analysis. The stakeholder group ultimately produced a list of 13 research questions they desired answers to (available in Appendix S1). They further prioritised them in order of most important to least important, by each receiving two votes that could be cast for any priority. Priorities were then ordered based on the number of votes they received.

Genetics expert workshops

A relatively small group of Australian genetics experts were invited to participate in a two-day workshop to decide how best to address the community questions with current analytical methods and available tissue samples. We sought all Australian-based experts who had recently published empirical work on Dingo genetics and/or those that were known to be currently undertaking Dingo genetic research. To broaden the potential input received we sought a few additional experts with experience in domestic dog genetics, and those with expertise in plant genetics issues of a similar nature. After first contacting those experts who had recently published work on Dingo genetics, the project manager asked them to identify additional colleagues or experts that met these criteria, thereby identifying the experts through a purposive then snowball sampling approach. Invitees were informed that they would be excluded from accessing the available genetic data during the project to maintain the independence of the process, but all were invited to contribute to a subsequent scientific publication of the results as co-authors following the conclusion of the project. Ten experts from eight research institutions were invited to participate, and eight experts from seven institutions ultimately participated in the workshop (see Appendix S1). The workshop was facilitated by the same independent facilitator and again observed by a few others.

After a brief welcome and introductions, the research project leader similarly provided an overview of the research

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project and its scope, and a description of the research process, the role of workshop participants, and the objectives of the workshop (see Appendix S1 for further details). The expert group was then briefed by QPWS on the Dingo tissue samples and metadata available. Participants raised and discussed possibilities for additional sample and data contributions of their own. Participants then discussed obtaining access to QPWS samples and metadata, and authorship and co-authorship arrangements for a proposed publication arising from the research. Over several more facilitated sessions interspersed with breaks, participants then reviewed the stakeholder priorities one-by-one, determined which priorities could and could not be answered with the available tissue samples and data, and then discussed and decided on the most robust and cost-effective methodological approaches required to answer each of the stakeholders' questions. No limitations were placed on the number or types of methods the experts could suggest. The expert group ultimately determined that some of the stakeholders' questions could not be reliably addressed with the currently available samples, or that it would not be a responsible use of limited government funding to try and address them (at the expense of other priorities) given the low chance of finding a reliable answer. However, the experts did agree that several of the stakeholder questions could be addressed, and recommended that they should be addressed.

Independent researchers

Given the decision to separate community, expert and delivery roles within the project (Table 1), an international, independent laboratory and research provider experienced with carnivore conservation genetics was sought to address the community's research priorities – i.e. those that could be addressed – using the methods recommended by the expert group. To identify independent researchers with the appropriate skills, the research project leader contacted the Southern African Wildlife Management Association (SAWMA) seeking professional recommendations of suitably experienced people that had no prior involvement with Dingoes, Dingo management issues, or had any prior interactions with any other person involved in the project. After talking with a couple of recommended people, suitable independent researchers from a foreign university were eventually identified, engaged, then briefed on the stakeholder list of priorities and instructed to complete the analysis to the best of their ability using the analytical methods recommended by the expert group. With permission from the project manager, the independent researchers and experts occasionally communicated with each other directly during the analytical phase of the project to clarify any technical issues arising.

Expert validation, stakeholder feedback, and project reporting

After eventually completing their analyses, the independent researchers then presented their near-final results and interpretations to the expert group at a second one-day workshop (Fig. 1) convened to review the results and discuss any necessary revisions to the methods. This workshop was attended by all of the same individuals that attended the initial expert workshop (see above). Minor revisions raised by the expert group were subsequently addressed by the independent researchers before the results were finalised. After receiving a copy of the final results and contributing to a scientific manuscript detailing the same, all experts later agreed that their recommended methods had been faithfully followed and that the results were the best they could be, with one dissenting exception related to a technical genetic issue that all other experts considered inconsequential.

The final results were then communicated to the stakeholder group at a second one-day workshop held on K'gari with paid transport to the venue, where participants could interact with and question the research project manager and independent researchers about the findings and implications of the results. This workshop was attended by nine people from the same seven stakeholder groups (three individuals attended both workshops, six replaced colleagues), in addition to the research project manager and observers (which this time included a few more protected area managers keen to see the results of the research). The facilitator was not required at this workshop given it centred on reporting results to participants, rather than soliciting input from participants. The workshop was instead facilitated by the project manager, who presented the results one-by-one, fielded questions and encouraged group discussion. The independent researchers briefly joined the workshop later in the day (via zoom link) and fielded additional questions from the group. As part of an informal process evaluation discussion led by the project manager, all participating stakeholder representatives expressed satisfaction with the process and the results of the research. Given the close personal connection Traditional Owners and conservation NGOs had with the K'gari wongari, participants were excited to learn about the secret lives of the animals they valued dearly.

The final report to QPWS for the overall project was written by the research project manager, who had responsibility for ensuring the integrity of the process and the overall implementation of the genetic research project. This report included: (i) a brief accounting of the participatory conflict resolution process and the implementation of the entire project (i.e. an early version of this paper); (ii) a comprehensive report containing the complete results of all the analyses, which was provided by the independent researchers; and (iii) a summary document for policy-makers and protected area managers to distil the key findings, implications and status of the work (available in Appendix S1). A (iv) copy of all genetic data (and metadata) curated by the independent researchers was also provided to QPWS with the intent that it would be made publicly available for other researchers to build upon the collaborative work that had been commenced in this project, as had been done with other key datasets held by QPWS (described above).

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Purpose of the described process

The purpose of structuring the project in this way was to ensure community and scientific acceptance of the results, and to reduce disagreement among community stakeholders, among scientists, and between these groups. By having the community identify and prioritise the research questions important to them, the community took ownership and responsibility for the type of information they received. Having all the principal Australian Dingo and dog genetics experts agree on an appropriate analytical framework ensured transparency, cooperation and inclusivity among disparate and competing research groups, ensured that the most robust and defensible methods were used, and ensured subsequent consensus and support for the results from the scientific community. Commissioning international researchers to undertake the analysis ensured research independence throughout the question development, methodology development, and analytical phases of the project. Including all expert participants in the interpretation and preparation of results provided QPWS, Traditional Owners and community stakeholders with confidence that the research was well supported by the scientific community, and it equally rewarded each of the voluntarily participating experts for their significant intellectual contribution to the project.

In terms of a participatory approach to conflict resolution, the novelty of our design lies in the separate and sequential roles of four key parties, with implications in terms of unconventional power relationships and placement on the 'spectrum' of public participation (IAP2 2018). The protected area manager (QPWS) essentially relinquished its power to a participatory process in the interests of achieving a more workable solution than had hitherto proved possible. They maintained distance from the process by hiring an independent research project manager to design and implement it, rather than attempting to implement the process themselves. Power to decide the genetic research priorities – crucial knowledge required to guide future management, and reduce contestation over it – was also delegated entirely to Traditional Owner representatives and other community stakeholders, who were thus 'empowered' with the strongest form of public participation (IAP2 2018). Genetics experts participated with reduced power when compared with the conventional scientific research process, in that their role was to decide research methods and not research priorities, and they were also excluded from conducting the research. Their role is best described as 'collaborate' under the IAP2 (2018) spectrum, in that they were asked to provide advice in formulating solutions, which would be incorporated into the decisions.

Key Challenges and Limitations

Prior to commencing the project, we anticipated some challenges that had the potential to derail the successful implementation of the process described above. For example, we suspected that some stakeholder groups would want a greater number of their representatives present at the workshops, but the process was robust to this challenge despite the expression of some relatively minor dissatisfaction with the limitations placed on the number of representatives from a given organisation. Community stakeholders ultimately formed a diverse and representative group of willing and enthusiastic individuals that respected each other and participated in the workshops in an amicable and productive way. Some community stakeholders also expressed frustration that, following the conclusion of the project, they were only given access to the summary report (see Appendix S1) and were excluded from accessing the complete results of the genetic work until after they were published (see Miller *et al*. 2024). Project delays associated with COVID-19 disruptions (Fig. 1) exacerbated this frustration, for all involved.

We also knew that some experts would express dissatisfaction with the project and process. The concerns raised during the expert workshops included the following:

- Some questioned the overall need for this type of project, and expressed dissatisfaction that independent researchers (and not themselves) were tasked with undertaking the genetic analysis.
- Some expressed concern that the project was encroaching on their exclusive research space, and did not adequately follow lines of enquiry established by their recent research efforts.
- Some questioned the need or justification for including other expert group members, and were sceptical of why others besides themselves were invited to participate.
- Some questioned the wisdom and value of selecting a non-geneticist as the research project leader, and the commissioning of independent researchers with no Dingo experience to undertake the work.
- Some expressed dissatisfaction with the scope and arrangement of community stakeholder priorities, and lamented their exclusion from the community stakeholder group where they could have had more input into the formulation of research priorities.
- Some claimed they could not participate effectively in the expert workshops or could not effectively provide advice on analytical methods unless they were granted access to the tissue samples and sample metadata before the project was complete.
- Some questioned why they were not involved in the preparation of the final report to QPWS, why they were not able to vet the final report before its submission to QPWS, or why they were not tasked with communicating the results to stakeholders.
- Some questioned the proposed authorship arrangements for the subsequent scientific publications, and were particularly concerned with who should be recognised as lead authors.

These issues generally reflected concerns about the experts' constrained role in the project and it was clear that some experts were dissatisfied that their roles

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were limited to the provision of methodological advice during the project. We speculate that some experts also felt 'scooped', relegated to being a mere participant when they would have preferred acting as the research project leader, and also felt forced into a position where they had to collaborate with others or miss out on being a part of a project of great personal importance to them. Such challenges and concerns were anticipated. But despite a fair amount of tense though respectful group discussion, the expert group ultimately worked together to contribute and articulate technically high-value information that was largely agreeable to all involved.

With hindsight, we note one important limitation in our overall approach. Although informal evaluation discussions were held at the end of the second workshops for community members and experts, we overlooked the opportunity to conduct a more formal, quantitative evaluation of participant satisfaction. It would have been possible to ask participants to anonymously complete brief end-of-day feedback forms, and ideally to do so in a way that enabled the evaluator to match responses from first to second workshops. Through questionaries it would also have been possible to gauge participant attitudes and satisfaction before, during and after the process and research was completed. In principle, it might also have been possible to budget for and conduct a formal evaluation of the overall process by engaging another independent service provider to seek feedback from the participants after a defined period of time. The absence of a formal evaluation in our report means that our assessment of participant satisfaction remains speculative. Future attempts to repeat the process we describe here would benefit from a formal, quantitative assessment of participant satisfaction.

Key learnings and management implications

Upon reflection, perhaps the most noteworthy learning from the project is that it worked! From start to finish, it worked. The participants indicated through their behaviour and in the evaluation discussions that most were satisfied with the process and their participation in it; some very enthusiastically. The novel participatory conflict resolution process we designed was successful at 'breaking the gridlock' and advancing scientific knowledge in a way satisfactory to protected area managers, community stakeholders, and genetic experts. This is tangibly evidenced by the detailed information now available to managers (Miller & Bishop 2023), but is less obviously illustrated by the presence of a scientific journal article co-authored by a multidisciplinary group of genetic experts and others who worked together to make this information publicly available (Miller *et al*. 2024). Obtaining funding to undertake such genetic research on K'gari Dingoes, the normal way, had been difficult given the conflict described above, but the proposal to implement a project like this was well-received and a relatively large amount of state government funding was provided to undertake it. That the funding was given to a non-geneticist and a substantial amount of it was spent overseas should not be overlooked given these two features would normally be considered unfavourably for typical research project proposals to government (Benjamin Allen, personal experience). That such a project was funded at all is a credit to the value of the process proposed therein and the confidence expressed in it by all those within QPWS who worked to approve the funding of such a project.

The idea to have community stakeholders form research priorities, to have genetics experts determine the methods, and to have independent researchers undertake the research (Table 1) also worked, in that it provided a robust process for managers to obtain the information they needed in a way that satisfied community expectations in an independent and scientifically agreed and defensible way. Ultimately, the community got what they wanted given that they were empowered with the task of formulating the research priorities. Experts also performed their roles well, debating and discussing alternative methods until they arrived at an agreed course of action that would yield results they could all support. Not only did this produce robust results for the community and managers (Miller & Bishop 2023) but it also minimised the chances of any subsequent criticism and undermining of the results arising by those active in the field of Dingo and dog genetics. Being inclusive and clearly defining participant roles and responsibilities was critical to achieving this. Airing concerns but adhering to the process (Fig. 1) also ensured it remained robust despite challenges to the integrity of the project (see above).

Reporting the results in multiple formats worked too. Formal reporting back to the community stakeholder group by the project manager and independent researchers (Fig. 1) was well-received and created a sense of completion and closure on an important matter. There was also a great sense of discovery and excitement as researchers revealed the results and discussed what they meant for the individual Dingoes involved. For example, learning about the unique identity of the island's Dingoes, the impact of management actions on their genetics, and the otherwise unknowable mating habits of individual animals was of great interest. Inviting all experts to be included on the authorship list of the genetic research publications arising was also well-received, and had this not been offered, we suspect that we would not have been able to assemble the group we did or have been able to assemble an expert group at all. Experts deserved some form of recognition and/or remuneration for their substantial intellectual contribution. The project was not funded well enough to pay everyone for their time, so recognising experts through offering co-authorship was essential to ensuring participation. It also introduced individuals to each other who might not otherwise have met, developing new and hopefully enduring national and international collaborations on shared research interests. Scientific publication of the results also ensures that the broader scientific community becomes aware of the research and, like other datasets (see above), becomes publicly available for others to build on the work in the future.

Conservation genetics is a highly technical field (Hedrick 2004), and it can often

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be difficult for lay people to understand many of the results or concepts being described. Providing a summary document for policymakers and protected area managers helped to close the research-implementation space by distilling all the technical information into accurate key messages that can be understood and communicated to and by managers, policymakers, the media, and the public.

Conclusions and Recommendations

Our case study revealed that complex conservation problems can be advanced by adopting novel ways of addressing stakeholder needs. Continually expanding and refining the repertoire of participatory processes useful for management of wildlife conflicts is important to address current and emerging conflicts. To this end, our approach creates a new option for participatory generation and resolution of science questions, and for improving the science and public trust in it. Where science is more often treated as an input to the conflict resolution process, decisions about the direction of science can be participatory too. Though somewhat unusual for a research project of this nature, the pattern or process we followed was relatively straightforward and may therefore be useful for advancing other conservation problems or human–wildlife conflicts. In the case of K'gari wongari, we recommend that protected area managers consider following-up on the genetic research priorities identified by the stakeholder group, and possibly repeating the process to identify other research priorities unrelated to K'gari dingo genetics. More broadly, we recommend application of this approach to other biodiversity conservation problems experiencing stagnation due to stakeholder conflict. In this way, conflict may be overcome and biodiversity conservation outcomes might be improved in a more satisfactory way for all involved.

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Data Availability Statement

This paper contains no data, and all the data mentioned in the paper is contained within it.

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Supporting Information

Additional supporting information can be found in the following online files.

Appendix S1. Supplementary information associated with the project, includes workshop agendas, attendance and summary reports.

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